

ANNEX III

Final Report on implementation of the project (FR) **Summary report for publication and** **Financial Statement**

T E M P U S I V **(First call for proposals n° EAC/04/2008)** **Joint Project / Structural Measure**

144856-TEMPUS-2008-RS-JPGR

(Agreement N.)

<u>FINAL REPORT</u>	<u>DEADLINE</u>
<ul style="list-style-type: none">• Final Report on implementation of the project (FR)• Summary report for publication• Financial statement	<u>Two months</u> after the end of the eligibility period

Structure of the Report

- Annex III/2: Declaration
- Annex III/3-5: Report on implementation of the project
- Annex III/6-8: Statistics and indicators
- Annex III/9: Example showing how to fill in the outcome tables
- Annex III/10: Table of achieved outcomes
- Annex III/11: Summary report for publication
- Annex III/12: Financial Statement: instructions
- Annex III/13-21: "Financial statement" Excel tables (separate Excel document)
- Annex III/22: Acknowledgement of receipt
- Annex III/23: Checklist

One original (with copy of supporting documentation) and two copies (one of which with copy of supporting documentation) are to be sent by the deadline by registered mail (date as per postmark) to:

Klaus Haupt
Head of Unit
Education, Audiovisual & Culture Executive Agency
EACEA / P10 Tempus - BOUR 02/17
Avenue du Bourget, 1
B-1140 Brussels – Belgium

Please also send an electronic version to: eacea-tempus-project-management@ec.europa.eu when submitting the paper version of the Final Report.

We kindly ask you to enclose with your report, a sample of the most important promotion materials produced during your project (such as publications, brochures, leaflets, reports, etc.) which can provide clear evidence of the outcomes of your project.

DECLARATION

This declaration should be completed and signed by the following people:

1. the contact person at the beneficiary institution;
2. the person who is legally authorised to represent the beneficiary institution.

We, the undersigned, certify that we have submitted all the required documentation, including the documents listed in the checklist.

Furthermore, we certify that the information given in this final report and financial statement is correct to the best of our knowledge and complies with the requirements of the provisions of Article II.15 of the grant agreement.

We are aware that amendments to these documents will not be accepted after the date of submission.

Name of the beneficiary institution: **University of Belgrade, Faculty of Mechanical Engineering**

Name of the contact person:

Prof. Dr. Milos Nedeljkovic

Function: Professor at the Faculty of Mechanical Engineering, University of Belgrade, former Dean

Done at: Belgrade

Date: 11.03.2013.

Signature:

Dean of the Faculty of Mechanical Engineering,
University of Belgrade

Prof. Dr. Milorad Milovancevic

Signature:

Seal of the beneficiary institution:

(Faculty stamp)

Name of the legal representative:

Prof. Dr. Vladimir Bumbasirevic

Function: Rector of the University of Belgrade

Done at: Belgrade

Date: 11.03.2013.

Signature:

Stamp of the legal representative institution:

(University stamp)



FINAL REPORT ON IMPLEMENTATION OF THE PROJECT

PART I: ACTIVITIES CARRIED OUT

For each section indicated below, please provide a **short description** of the **activities carried out** since the submission of the Intermediate Report and describe the main changes that have occurred in the plans described in the Intermediate Report.

Development of programmes and courses

Please indicate which activities have been carried out for the development of the new teaching/training programme(s).

All beneficiary institutions (faculties) in this project have developed all aspects of their study programmes by using experience and results of conducted activities 1.x-4.x. The essential part of the project was the necessary improvement at beneficiary universities concerning all relevant faculty/university processes and relevant engineering study programs with all of their characteristics, in order to reach a new and relevant quality in engineering education verified by international accreditation of these study programs.

GUC activities:

Review of current standards in engineering education and contemporary qualifications frameworks has been processed by the Quality Management and Accreditation Committee (QMAC), as shown in the National Academic Reference Standards (NARS) publications of January and August 2009 with active participation of GUC. Also, GUC thoroughly studied the European Qualification Framework (EQF) & the German Qualification Framework (GQF). The QMAC held several meetings with EMS curriculum committee staff members to discuss NARS, EQF & GQF. Comparison of Mechatronics study programs of 5 different degree awarding institutions was prepared by GUC. Modernization of the Mechatronics Bachelor & Master programs, together with Design & Production Engineering Bachelor & Master programs, was made and the learning outcomes were modified in compliance with Bologna process with verification of the allocated student workload and the courses' syllabi catalogues preparation. Two study programs at both BSc and MSc study level were under modification to confirm to the accreditation requirements, taking into consideration the modular structure and flexibility. Finally, **GUC has submitted applications for international accreditation to ACQUIN for two study programs:**

- Mechatronics Engineering International Bachelor of Science Program (in English)
- Mechatronics Engineering International Master of Science Program (in English)

After accreditation of international Mechatronics study programs by ACQUIN, GUC and University of Ulm will **establish joint degree programmes** in Mechatronics (at Bachelor and Master level). ACQUIN accreditation will make necessary compatibility with quality assurance and education system at University of Ulm. In essential sense there aren't differences between ASIIN and ACQUIN approach in international accreditation.

UB-FME activities:

Faculty of Mechanical Engineering at University of Belgrade (UB-FME) has submitted applications for international accreditation to ASIIN for two study programs:

1. Mechanical Engineering - Bachelor of Science Program (in Serbian/ English)
2. Mechanical Engineering – Master of Science Program (in Serbian/ English)

with all teaching modules (elective line of courses in order to reach foreseen specialization in engineering). Also, Faculty of Mechanical Engineering, University of Belgrade has established a new system curricula design as a part of quality assurance mechanisms. This solution is accredited by national Committee for accreditation and quality assurance. It is a unique accredited solution in Serbia at BSc study level with inherent flexibility for students to collect elective subjects from different areas engineering, science and soft skills. Professors can offer new elective courses in each year and propose new modules with defined line of courses (within different old modules, with both new and old courses). Students have opportunity to expand their qualification framework related to elected subjects within one or more modules.

UKg-FE activities:

In this manner also, at Faculty of Engineering (Faculty of Mechanical Engineering up to 28.07.2011.) University of Kragujevac (UKg-FE) new study programs were formed from the old courses within different study modules of Mechanical Engineering study program at both BSc and MSc study level. At this faculty had been majority opinion that "new" study programs like Automotive Engineering, Military-Industrial Engineering, are more useful for attractive for enrolment of new students than proposed elective path inside Mechanical Engineering study program like solution of Faculty of Mechanical Engineering at University of Belgrade.

Restructuring: university management and governance

Please provide information on the activities carried out during this period relating to the introduction of institutional changes in the partner country consortium institutions or at national level (capacity, management, governance, quality assurance, links with labour market, etc.).

By conducting activities 1.x, 3.3 and 7.1 all beneficiary institutions have made influence on restructuring of university management and governance. All partner project members have improved internal quality assurance system at their institutions related to relevant ASIIN, ABET and/or ACQUIN standards for international accreditation. Also, some mechanism for quality assurance have been transferred from EU project partners as well as examples of their good practice in management, governance quality assurance, links with labour market, etc.

New laboratory facilities, library facilities, administrative/student services and ICT facilities have expanded capacities of the project beneficiary faculties in engineering education, as well as in the sense of university management and governance.

Beneficiary faculties have developed different forms of partnership with enterprises: 1. Quality assurance procedure for student practice organization is established and adopted, 2. Partnership based on infrastructure development for better education (different donations of enterprises have been implemented), 3. Partnership based on employment of students & graduates in accordance with defined enterprises' needs (for example, the Center for Applied Automatic Control at University of Kragujevac has selected 10 students & graduates for Muehlbauer Technologies doo (Ltd), and at the same time has got donation from Muehlbauer (for infrastructure needs).

With more details we can illustrate restructuring university management and governance at GUC concerning improvements of quality assurance system: Namely, the GUC had an adequate central quality management system that already existed within the whole university, and then a recent Quality Management and Accreditation Committee (QMAC) was established at the university level with a representative unit in each faculty. Based on the previous studies, the QMAC adopted more Total Quality Management (TQM) implementation (leadership, process approach) focusing on quality culture. The challenge was to introduce three concepts (quality, management and new educational concepts) to the already busy staff in addition to the normal resistance to change and the fear of extra administrative work. Several meetings and discussions took place with the members of the EMS quality unit concerning the European Credit Transfer and Accumulation System (ECTS) and the learning outcomes concept implementation and adopting the student centred approach.

Several techniques were used to adopt the concept of learning outcomes. General meetings were held between the QMAC members & the EMS quality unit to explain the learning outcomes concept & Bloom's taxonomy. Other technique was to hold "workshops" with CC members, then departmental meetings were tried but due to the fact that the staff is busy & couldn't attend collective meetings another technique was used; where QMAC used "training of trainers" technique Trainers were trained on the methodology of writing the learning outcomes using Bloom's taxonomy, accurate calculation of student workload Trainers held one to one "on job training" for the busy staff. To increase the buy in of staff the QMAC members supported the academics in the fulfilling administrative part.

The Quality Management and Accreditation Committee (QMAC) together with the EMS curriculum committee decided to adopt the best practices accreditation standards based on previous studies made (engineering criteria mentioned in ABET, ASIIN, and on the National Academic Reference Standards [NARS]). It was found to be difficult to adopt both formats of our national accreditation agency (NAQAEE) and ASIIN resulting in duplication of work. Furthermore, the NARS had 2 versions; the first was issued in January 2009 and updated in September 2009. ASIIN also changed its criteria issued in 2006 to another updated version with removed specified curriculum structure in June 2011. GUC decided to apply for accreditation by ACQUIN especially that GUC management is going for ACQUIN System Accreditation. ASIIN workshops gave to the attendees more insight into engineering criteria and helped markedly in developing the quality culture at EMS faculty

Although different agencies have apparent differences in their criteria for accreditation, they all agree on covering two essential requirements namely strategic planning and process approach. In addition to accreditation criteria set by accreditation agencies (ASIIN and ACQUIN), GUC will also adopt models for continuous educational enhancement (EFQM model for organizational excellence (European model) and Baldrige award model. Adopting one of these two models will in fact assist GUC in pursuing its goal to achieve a newly introduced system accreditation by the German accreditation council.

Too many concepts can not be introduced to the staff at the same time, so the focus was on the processes of teaching learning and assessment to ensure full implementation of the concepts.

The EMS curriculum committee together with QMAC carried on the continuous quality improvement cycle (plan-do-check-act) where the planning part was done by filling the students' workload template including the learning outcomes, teaching & learning methods, and assessment methods together with the estimated workload (written in the updated course description template). The do part of the cycle was to follow what was written in the form. The check part was done by using different surveys (course evaluation survey, fresh graduate survey) the act part was done by using the course report where survey analysis was done and course assessment results analyzed an action plan was written for the next delivery of courses.

Implementation of appropriate quality assurance system is a precondition for international accreditation of engineering studies. Committee for quality assurance can permanently propose new improvements, but faculty management is responsible for implementation of quality assurance and enhancement system. Implemented quality assurance and enhancement procedures at beneficiary faculties/departments are printed as public document (on the project's web site <http://tempus.mas.bg.ac.rs>).

The most obvious proofs of the implementation are finalizations of accreditation processes and getting of the appropriate certificates for University of Belgrade, Faculty of Mechanical Engineering for the study program in Naval Architecture Engineering (MSc level), and for German University in Cairo for the study program Engineering and Materials Science (BSc and MSc levels). But, for finalizing accreditation the following processes took place:

- Preparing policies & procedures of the EMS curriculum committee
- The policies & procedures of the CC were made by the QMAC & revised with the heads of the CC in the different faculties
- Forming the curriculum committee in EMS
- Holding meetings in the QMAC office with the staff participants.
- Preparing materials to help in explaining new educational concepts
- Forming the flow chart explaining the old concept of education (teacher centred/ content oriented) versus the new concept (student centred/ learning outcomes oriented) and explaining Bologna process.
- Preparing materials, handouts and power point presentations about ECTS, learning outcomes, Bloom's taxonomy, unified format for proper writing of course aims.

Several materials were studied to prepare handouts

Preparing templates

Course description template

Student workload template 1 (detailed per session, modified from Tuning Approach template)

Student workload template 2 (Collective workload calculation for the course as a whole)

Course report

Several drafts of the student workload templates were tried as a pilot in order to choose the most suitable one.

A collective course description template was formed satisfying the requirements of NAQAAE, ASIIN ACQUIN & ABET.

Other technique was to hold meetings with CC members, then departmental meetings were tried but due to the fact that the staff is busy & couldn't attend collective meetings another technique was used:

- Where QMAC used training of trainers technique
Trainers were trained on the methodology of writing the learning outcomes using Bloom's taxonomy
- Trainers held on job training for the staff

Estimation of students' workload, allocating the credit points, & comparing it to the previously allocated credit points.

During the on job training with the courses instructors and their assistants', there discussions about how to estimate the students workload and then to allocate the credit points for each course.

The second step was to compare the newly allocated workload with the previously allocated one.

- Involvement of students in EMS curriculum committee
- Start of students' meetings to have their feedback concerning courses, workload, etc...
- Collect students' suggestions.

Mobility and training activities for staff and students

Please provide a description of the activities carried out in order to train staff and/or students from the partner country participating institutions along with an outline of the staff/student mobility scheme implemented in this period.

Transfer of the knowledge and experience (organization, quality control implementation, making up to date and internationally harmonized study programmes and contents of the study courses, educational methods, upgrade of the laboratory support for subjects, teaching materials, selection of the reference literature for subjects, etc.), control and advisory role in the planned activities, are the essence of the role of the EU part of the consortium. Project representatives from beneficiary faculties have spent some time at participating EU universities in order to gathering of necessary knowledge. After their visits they held meetings for colleagues and students and presented their experiences.

All consortium meetings as well as dissemination activities are used for training activities for staff and students. ASIIN seminars were especially useful during consortium meetings in Cairo (2011) and Belgrade (September, 2011 – ASIIN presentations and workshop concerning learning outcomes).

Realized staff mobility implemented in the period after intermediate report submission

1. 2010-10-15 – University of Kragujevac – *I Conference for Quality Assurance in Higher Education*
2. 2011-03-22 – Karlsruhe – staff retraining
3. 2011-05-20 - Cairo - consortium meeting with ASIIN seminar & workshop
4. 2011-07-08 - London - consortium meeting/staff retraining
5. 2011-07-15 - Barcelona - consortium meeting/staff retraining
6. 2011-09-04 – Belgrade, Nis, Kragujevac - consortium meeting with seminar
7. 2011-11-04 – Munich – staff retraining
8. 2011-11-06 – Slovenia (Robotina) - staff retraining
9. 2012-28-02 - Kopaonik, RS, TREND conference
10. 2012-09-24 – Belgrade, – Days of Future: Robotics
11. 2012-11-16- Belgrade, TEMPUS Info Day (NTO)
12. 2012-11-20 – Kragujevac – IMP Mechatronics seminar
13. 2012-11-28 - Cairo - consortium meeting
14. 2012-12-10 - Barcelona - consortium meeting
15. 2011-08-20 - Kragujevac – staff retraining (IMP seminar)
16. 2012-08-29 - Kragujevac – staff retraining (IMP seminar)
17. 2011-09-01- Kragujevac – staff retraining (IMP seminar)
18. 2012-06-25- Kragujevac – staff retraining (IMP seminar)
19. 2011-07-18- Kragujevac – staff retraining (IMP seminar)
20. 2012-09-20 - Kragujevac – staff retraining (IMP seminar)

Realized student mobility implemented in the period after intermediate report submission

1. 2010-01-24 – London – student training
2. 2011-02-03 - London – student training
3. 2011-06-25 – London – student training
4. 2011-08-01 – Belgrade – student training
5. 2012-09-15 – Belgrade – student training

Purpose of student mobility was preparation of the best students for teaching assistant position in new laboratory supported environment. Also, representatives from Institute Mihailo Pupin were organized workshops and presentations for students and teaching staff at University of Kragujevac.

Equipment

Please provide an outline of the equipment purchased and explain how it has been used during the project lifetime and who has access to it.

At all the beneficiary faculties, laboratory equipment is planned to support education in Mechatronics as an interdisciplinary engineering field which is a part Mechanical Engineering education too. New laboratory facilities are showed at <http://cpa.fin.kg.ac.rs:30/Home/EquipmentUniversity>, and some illustrations of a new laboratory supported teaching/learning methodology are showed at: <http://www.youtube.com/watch?v=cBVfc3Gwv1Y>, <http://www.youtube.com/watch?v=ACziG6gIygo>, <http://www.youtube.com/watch?v=QgzGUVxm4ck>, <http://www.youtube.com/watch?v=pS4kRwyNqOE&feature=g-upl&context=G255f9b4AUAAAAAAAAA> and so on.

At the Faculty of Mechanical Engineering University of Belgrade a new laboratory for 25 students is formed, and procured laboratory equipment for individual student's work.

At the Faculty of Engineering (former Faculty of Mechanical Engineering) at University of Kragujevac, two laboratories with 8 and 20 student places are improved. Additional donation resources from industry were used in order to improve some laboratory aspects (furniture, and so on).

At the Faculty of Mechanical Engineering at University of Nis, existing Mechatronics educational laboratory is improved.

Laboratory equipment at RS beneficiary faculties is available for teachers and students in accordance with adopted quality assurance system. Note that equipment is a part of teaching laboratories.

The Mechatronics Department at GUC purchased two new educational equipments that are used in the Mechatronics Lab. These two equipments are:

- a. LDS 100 lb Shaker,
- b. Two workstations model HP Z800.

The usage of the mentioned equipments can be summarized as follows:

1. The shaker that was bought is used in two main directions. The first one is for demonstration purposes for the students in the Vibrations of Structures course where simple structures like a cantilever beam is excited both directly and parametrically at different frequencies and students can see different mode shapes existing at different frequencies. Hence, they can relate theory with experiment. Another important use of the equipment is that several students do their B.Sc. theses utilizing the equipment, along with a spectrum analyzer to obtain and analyze experimental frequency response functions.
2. The Computational Fluid Dynamics (CFD) lab is heavily used for the research activities of the EMS graduate students as well as for the B.Sc. theses of the undergraduate students in the area of thermo-fluids including renewable energy and fluid dynamics. Moreover, the lab may be used for other engineering programs in their applications including modeling and simulation.

The lab has two workstations capable of carrying out the required research activities in fluid dynamics, structure analysis as well as fluid-structure interactions. The specifications of the workstations are listed in the following table:

Workstation model	HP Z800
Processor	2 Intel® Xeon® Quad-Core X5560 processor (2.80 GHz, 8 MB cache, 1333 MHz memory)
Memory	Minimum of 16 GB 1333 MHz DDR3 ECC Unbuffered RAM
Hard drive	500 GB 7200 rpm SATA NCQ
Graphics Card	NVIDIA Quadro FX3800 1GB PCIe Graphics Card FY949UT

Courses:

- Fluid Mechanics: 5th semester Mechatronics, Materials Engineering and Design and Production.
- B.Sc. theses
- Graduate research

Scantron scanner (iNSIGHT 4) hardware and software:

Uses:

- a. Used for designing and reading surveys, providing statistical analysis reports to survey responses, so it's a powerful indirect tool for program assessment and development.
- b. Also it is used in correcting exam answer sheets and providing statistical analysis reports about students' responses, so it is also used as a direct assessment tool for courses, as the statistical reports provided can help instructors write and implement their action plans depending on the statistics of students' responses.

Access:

- The Scantron device was located in the QMAC office.
- Regarding using the Scantron device in program assessment and development; the Scantron device was mainly accessed by the QMAC team.
- Regarding using the Scantron device in correcting exam answer sheets and providing statistical analysis reports; all the GUC faculties were welcomed to access the Scantron device after having training sessions provided by the QMAC team about the scanning procedures, and about how to

consider the exam statistical analysis reports of students' responses in the instructors' action plans.

Intelligent Item Bank (IIB) software:

Uses:

a. Intelligent Item Bank (IIB) is an item banking application; it provides extensive information regarding test development and psychometric characteristics of the items (questions).

It is a software used to build question banks for each course, in which the questions are listed under the categorization of learning outcomes, and after building a question bank, the instructor can put as example that he/she needs (according to the courses learning outcomes) the exam to be of 30 % in the level of knowledge and understanding, 50 % in the intellectual level, and 20% soft skills, then the software will export automatically the exam with the required structure and levels. So, this software is used in the project to deepen the concept of learning outcomes in the instructors' minds, and to link the written learning outcomes to the courses' assessment.

1. 3 PCs:

Uses:

3 PCs, 1 of them to be used as a server for the IIB software, and the other 2 to be used by clients (instructors and trainees).

Dissemination and sustainability

Please describe the actions that have been carried out to disseminate the results of the activities and in order to ensure the future sustainability of these results.

Dissemination analyzing & actions planning.

The dissemination has included information exchange (using web publishing, marketing presentations, etc.), information sessions and workshops where outputs of the project are presented.

Some dissemination results – 16 TV broadcasts, 5 university presentations, 7 newspaper articles, <http://tempus.mas.bg.ac.rs/doc-1.html> , <http://cpa.fin.kg.ac.rs:30/Home/Home>, academic collaboration among WBC faculties and universities, secondary school presentations which are given with intention techniques popularization, participation at TREND Conferences (about university education) www.trend.uns.ac.rs from 1st to 4th March 2010, and in March 2012. within sessions with university, faculty and government representatives from Western Balkan Countries.

Participation in one month robotics science festival in Belgrade (September/October 2012 – “Days of Future: Robotics”) is used for promotion of use robotics in engineering education and IAES Tempus project also.

CD "Introduction to Object-Oriented Programming - Collection of tasks with interactive software-testing system and support learning", 144,856-TEMPUS-2008-RS-JPGR, was presented at the Roundtable - "New concepts of learning and ICT technologies as a help or hindrance" Faculty of Engineering at University of Kragujevac

The presentation: “International Accreditation. Results and planned activities at 144856-2008-RS-JPGR Tempus project International Accreditation of Engineering Studies”, *1 Conference for Quality Assurance in Higher Education*, 15th October 2010, University of Kragujevac

YouTube resources about some aspects of the Tempus results (some TV broadcasts, equipment use, master thesis presentations, new teaching methodology) are organized and have stayed a part of practice concerning with results sharing and promoting.

Four workshops were organized 2 by ASIIN.

GUC (The dissemination of information about the project and its results):

Due to QMAC's efforts to always disseminate the results of the activities carried, other faculties and departments in the GUC adopted the student centred approach. Where learning outcomes, Bloom's taxonomy & ECTS were adopted.

The detailed student workload form was fully implemented in the Faculty of Pharmacy & the Faculty of Management where outcomes & ECTS credit points were written for every session of the course. This approach couldn't be implemented in EMS so a shift took place to another approach where a general workload table was used

for the average estimation for the student's workload.

Also further dissemination will take place through the 10th national TEMPUS day and projects forum titled "TEMPUS in Egypt, 10 years".

Sustainability analyzing and action planning.

All officially adopted documents which result from the project directly contribute and guarantee that the project results will be implemented and used for a long time after project completion: 1) documentation about adopted teaching quality procedures at faculty and university levels, 2) documentation about new curricula, courses and syllabuses, 3) documentation about equipment procurement, 4) documentation about publishing activities. 5) accreditation certificates, 6) adopted quality assurance system, 7) stable financial support to beneficiary faculties and developed infrastructure by this project (laboratories, QA system, and so on).

GUC example- Establishment of QMAC as a physical and political structure on the university level.

The QMAC will carry an ongoing process of training the trainers and staff of different faculties on different quality concepts including enhancing the implementation of TQM and CQI. Also the central QMAC unit will guarantee applying the state of art national and international accreditation standards and models and to distribute the TQM culture all over the GUC faculties.

Establishment of **EMS curriculum committee** as a physical structure. EMS curriculum committee will carry on an on going process of revising the programs' objectives and learning outcomes. Prof. Imam Morgan; the head of the **EMS curriculum committee**, will be the ECTS coordinator for the faculty.

Involvement of students in curriculum committee in all the GUC faculties.

Where an on going process of collecting students' feedback and suggestions regarding workload, curriculum, instruction, and assessment is to take place to be used in enhancing the educational process.

Forming courses' syllabi catalogues for 4 engineering programs.

Four courses' syllabi catalogues were prepared by revising the program learning outcomes and the students' workload, namely:

- Mechatronics Engineering Bachelor of Science Program
- Mechatronics Engineering Master of Science Program
- Design & Production Engineering Bachelor Program
- Design & Production Engineering Master Program

This process is to be carried out for all the GUC programs on regular basis by the curriculum committees of the different GUC faculties.

Preparation and initiation of assessment committee

The QMAC started the assessment process on the university level, by preparing and implementing course evaluation survey, fresh graduate survey, alumni survey, & employer survey where the reports about the surveys will be used for continuous quality improvement.

The QMAC prepared for the initiation of the assessment committee to be responsible for the previously mentioned tasks as on going processes, including the direct and indirect assessment.

Using technology transfer and physical infrastructures in continuous quality development based on direct and indirect assessment statistics provided by Scantron (iNSIGHT 4) scanner hardware and software, and Intelligent Item Bank (IIB) software.

Scantron (iNSIGHT 4) scanner hardware and software was bought for continuous process of designing and reading surveys, providing statistical analysis reports to survey responses, so it's a powerful indirect tool for assessment of the different programs and continuous development on the GUC level.

Also it is used in correcting exam answer sheets and providing statistical analysis reports about students' responses, so it is also used as a direct assessment tool for courses, as the statistical reports provided can help instructors write and implement their action plans depending on the statistics of students' responses fulfilling the continuous quality

improvement of courses.

Intelligent Item Bank (IIB) is an item banking application; it provides extensive information regarding test development and psychometric characteristics of the items (questions).

It is a software used to build question banks for each course, in which the questions are listed under the categorization of learning outcomes, and after building a question bank, the instructor can put as example that he/she needs (according to the courses learning outcomes) the exam to be of 30 % in the level of knowledge and understanding, 50 % in the intellectual level, and 20% soft skills, then the software will export automatically the exam with the required structure and levels. So, this software is used in the project to deepen the concept of learning outcomes in the instructors' minds, and to link the written learning outcomes to the courses' assessment.

Also the continuous quality improvement cycle was adopted. These activities and approaches are to ensure the future sustainability of the results as long as there is always measuring & improvement.

PART II: PROJECT OUTCOMES AND IMPACT

By responding to the following questions, please provide an overview of the overall project achievements, demonstrating how the objective of the project has been met and the impact of the project outcomes.

Overall achievement level and impact

- Please indicate which national/regional priorities have been addressed by the project (as outlined in the Call for proposal and original application) and describe the main results achieved by the project in addressing these priorities.
- Has the project achieved its set objective and does it match the needs identified in the original application? If yes, could you please describe how? If not, could you explain the reasons why?
- Please describe any positive changes, as a result of the project, in terms of institution management, individual behaviour, teaching methodology, course content, teaching/learning processes and any benefits to managers, teaching staff, students and other target groups.
- Please describe the opportunities that are being created by the project beyond the specific objectives in particular in relation to graduate employability and/or increased cooperation between university(ies) and the non-academic sector.
- Please describe the impact of the project on the reform of higher education in the partner country(ies).
- Please describe the impact of the project on the economic and/or social reforms in the partner country(ies).

This project was in compliance with the following national and wide priorities: 1) To enhance the quality and relevance of higher education in the partner countries, 2) To enhance inter-disciplinarity, 3) To enhance the employability of university graduates, 4) Introduction of quality assurance, 5) Development of international relations, 6) Development of partnerships with enterprises, 7) Qualifications frameworks

Achieved results related to national/regional priorities:

The essential part of the project was the necessary improvements at beneficiary universities concerning all relevant faculty/university processes and relevant engineering study programs with all of its characteristics, in order to reach a new and relevant quality in engineering education verified by international accreditation of these study programs. Study of European Qualification Framework (EQF) & the German Qualification Framework (GQF) as well as study of EU engineering programs were necessary for relevant modernization of partner country engineering study programs, taking into consideration the modular structure and flexibility. Interdisciplinary study programs are more focused by this project. Also, implementation of relevant quality assurance system is necessary in order to reach international accreditation.

According to the project application, in the final phase of this project, at faculties with similar structural characteristics, the implemented activities will be tested and verified through the international accreditation at least on two study programs. This pilot international accreditation encompasses updating of laboratories and libraries, student counselling practices, organization of student mobility and industrial practice, as well as informational facilities, administrative & student services, etc.

Up to now, Faculty of Mechanical Engineering, University of Belgrade has got international accreditation for the study program in Naval Architecture Engineering (MSc level), and German University in Cairo for the study programs in Material Science (BSc and MSc levels).

Also, GUC has submitted applications for international accreditation for two interdisciplinary study programs:

1. Mechatronics Engineering International Bachelor of Science Program (in English)
2. Mechatronics Engineering International Master of Science Program (in English)

These international study programs were targeted focus of GUC in this project during the overall project realization. Development of international relations as a priority will be obviously reached by accreditation of international study programs. As a logical extension of this project, GUC is started with establishing joint degree programmes in Mechatronics (at Bachelor and Master level) with University of Ulm.

Faculty of Mechanical Engineering at University of Belgrade has submitted applications for international accreditation to ASIIN for two study programs:

1. Mechanical Engineering - Bachelor of Science Program (in Serbian/ English)
2. Mechanical Engineering – Master of Science Program (in Serbian/ English)

with all teaching modules (elective line of courses in order to reach foreseen specialization in engineering including interdisciplinary engineering specialization like Automatic Control or Mechatronic, and so on). ASIIN visit is foreseen on 25th – 28th February 2013.

Faculty of Engineering (up to 28.07.2011. Faculty of Mechanical Engineering in Kragujevac) at University of Kragujevac were prepared itself for international accreditation at the same manner as the Faculty of Mechanical Engineering at University of Belgrade. Unfortunately the Dean - Prof. Babic and Vice-rector for finance - Prof. Jeremic are not supported request of the contact person in this project for University of Kragujevac – Prof. Matijevic to apply for international accreditation.

Faculty of Mechanical Engineering at University of Nis hasn't has intention from the start of this project to apply for international accreditation.

All beneficiary faculties had enhanced the quality and relevance of higher education in engineering area and achieved following objectives during the project: 1) Adoption of quality assurance and enhancement system (related to criteria of national and international accreditation agencies), 2) Improvement of laboratory, library, learning and teaching facilities.

Also, during the project different forms of partnership with enterprises are developed: 1) Quality assurance procedure for student practice organization is established and adopted, 2) Partnership based on infrastructure development for better education (different donations of enterprises have been implemented), 3) Partnership based on employment of students & graduates in accordance with defined of enterprises needs (for example, Center for Applied Automatic Control at FE UNI KG has selected 10 students & graduates for Muehlbauer Technologies doo, and at the same time has got donation from Muehlbauer (for infrastructure needs).

Achieved results related to set of the project proposal objectives:

The project has achieved its set objective which matches the needs identified in the original application in accordance to available the project budget and to planned activities. Please, notice that planned budget for this project realization has reduced for 21%, but planned verification of the project results by international accreditation of the least two study programs is reached.

The overall objective of this project is to enhance the quality and relevance of higher education in engineering area in partner countries, in order to reach the integration of partner country universities into the European university system, with obvious result manifested by international accreditation of engineering studies.

Positive changes and impacts, as a results of the project:

The essential part of the project are the necessary improvements at beneficiary universities concerning all relevant faculty/university processes and relevant engineering study programs with all of its characteristics, in order to reach a new and relevant quality in engineering education verified by international accreditation of these study programs. International accreditation of any study program at partner country institutions has national significance and means promotion of high quality assurance and EU standards in higher education. Internationally accredited study programs in partner countries with a lot of obviously problems in higher education have better reputation in national environment and can offer new opportunities for enrollment of international students and development of joint study programs with EU partners. Efforts oriented to international accreditation of study programs have positive impact to both the reform of higher education and to economic reforms in partner countries. Also, conducted activities have made benefits to managers, teaching staff, quality assurance committees, students and other target groups (small and medium entrepreneurship firms, global industry in partner countries, and cooperation between university and non-

academic sector in general). The main reached results are

- Faculty of Mechanical Engineering at University of Belgrade has reached international accreditation in Naval Architecture Engineering (MSc level) – study program in Serbian
- German University of Cairo (GUC) has reached international accreditation in Engineering and Materials Science (BSc level) - study program in English (international study program)
- German University of Cairo (GUC) has reached international accreditation in Engineering and Materials Science (MSc level) - study program in English (international study program)
- The GUC has submitted applications for international accreditation to ACQUIN for two study programs:
 1. Mechatronics Engineering International Bachelor of Science Program (in English)
 2. Mechatronics Engineering International Master of Science Program (in English)
- Faculty of Mechanical Engineering at University of Belgrade has submitted applications for international accreditation to ASIIN for two study programs:
 1. Mechanical Engineering - Bachelor of Science Program
 2. Mechanical Engineering - Master of Science Program
- Faculty of Mechanical Engineering at University of Belgrade has reached high positive national external evaluation for the institution and its study programs.
- Faculty of Engineering at University of Kragujevac has reached positive national external evaluation for the institution and its study programs.
- Internal quality assurance and enhancement mechanisms based on the best international practice were implemented at all beneficiary faculties/universities.
- A new models of flexible curriculum structure are designed and implemented at Faculty of Mechanical Engineering at University of Belgrade and GUC
- New laboratory facilities have installed at beneficiary faculties
- Developed are different forms of partnership with enterprises: 1. Quality assurance procedure for student practice organization is established and adopted, 2. Partnership based on infrastructure development for better education (different donations of enterprises have been implemented), 3. Partnership based on employment of students & graduates in accordance with defined of enterprises needs (for example, Center for Applied Automatic Control at FE UNI KG has selected 10 students & graduates for Muehlbauer Technologies doo, and at the same time has got donation from Muehlbauer (for infrastructure needs).
- Administrative/student services including logistic support for international students are improved
- New teaching materials (textbooks, lab practicum, web presentations, ...) have published and in use via Moodle LMS
- Teachers are (re)trained.
- New teaching methodology (PBL, etc), software support and new laboratory facilities in use
- New software tutor system for better interactive teaching/learning environment is produced and gifted to non-university regional educational management and teaching representatives too (<http://cpa.fin.kg.ac.rs:30/Home/EPublishing#prettyPhoto>)
- Life long learning courses are also supported by new lab-equipment. Three different courses are organized for training of non-university teachers.
- Project data available on WEB site <http://tempus.mas.bg.ac.rs> and in printed form
- New e-teaching services and e-shared resources are developed
- Laboratory technicians are (re)trained
- Students' work at EU Universities
- Students' involvement in decision making and teaching processes.
- Student's satisfaction with revised courses and student exchange program.

Activities are being performed strictly following the essence of the project proposal, but not strictly with the time table plan. Due to considerable budget cutting and seven months delay in transfer of the first installment of the money, political instability in Egypt, some unregulated financial & administration relations within country partner universities concerning with the Tempus project budget implementation and administration responsibilities - our project was late in some of the activities, but far ahead with some concrete results. We have been got the prolongation time span of the project and have reached the overall project objectives promised in the project proposal.

The following activities have been carried out up during the project time span:

1.1 Review of existing national and international quality assurance and enhancement systems for engineering education, January-April, 2009

Within this activity, the Project Tempus Offices at beneficiary universities and the project web site (<http://tempus.mas.bg.ac.rs> and latter <http://cpa.fin.kg.ac.rs:30/Home/Home>) have been established. The project web site is linked with web pages of European Network for Accreditation of Engineering Education <http://www.enaee.eu/> (ENAAE), Council for Higher Education Accreditation <http://www.chea.org/>, ASIIN <http://www.asiin.de/>, ABET <http://www.abet.org/>, ECUK <http://www.engc.org.uk/> and contains actual information about national standards for accreditation and quality assurance in higher education. The project representatives from beneficiary universities are included as web site editors. They have collected all necessary information about national and international quality assurance and standards for enhancement of engineering education. Also, they have selected and transferred the collected information to their relevant faculty/university bodies and authorities who can help the project realization.

Accreditation agencies requirements are compared by including objectives, learning outcomes, & the different credit systems, etc. In meanwhile, kick off meeting is organized at Faculty of Mechanical Engineering, University of Belgrade, Serbia. A part of its content was:

- An overview was given about the outlines of the project, overall project goals, outputs & outcomes
- Also the exchange of ideas about the national & international accreditation agencies namely; ABET, ASIIN, ACQUIN, NAQAAE, KAPK took place in the kick off meeting
- During the kick off meeting, introducing the delegates to each others took place, where they discussed the different aspects and the implementation procedures of the project.
- Presentation and discussion about European Standards and Guidelines (ESG) http://www.eqar.eu/fileadmin/documents/e4/050221_ENQA_report.pdf
- ASIIN presentations about QA and ASIIN
- Presentations and discussions of EU partners

German University in Cairo (GUC) approach: To reach to the best QA practices, we selected to compare the criteria of ABET, ASSIN, ACQUIN, and Egyptian National QAA agency “NAQAAE” (GUC is already accredited by ACQUIN in other programs). In addition, the Tempus project team had further reading about the qualifications framework (EQF and German QF), Dublin descriptors, ECTS user guide (different versions), the Baldrige Award Excellence Model (Education), the publications of the QAA of England and the Australian publications of AUQA.

Curricular reform and modernization of curricula

Our comparison of the criteria of different accreditation agencies showed general agreement of the requirements (criteria), with *three main good practices (concepts)* that will be **considered in the next phase of the project when refining the curricula of the 2 study programs in preparation for ASIIN accreditation.**

The three concepts are: 1) the **program outcomes approach** - although all the above mentioned agencies have a uniform agreement on the concept of learning outcomes (competencies) for curriculum design (compared to the content oriented approach, teacher centred approach versus student centred approach), the terminology program outcomes was only mentioned explicitly in the ABET criteria with clear emphasis on the program outcomes assessment. A workshop held in the premises of the NAQAAE in Cairo at march 2010 confirmed this approach (the title of the workshop: “Difference between class room and program assessment “ held by an ABET expert; Dr Gloria Rogersfor, 3 days). 2) The second good practice is the concept of **breaking down the learning outcomes** into more defined **measurable performance criteria**, with good illustrative examples for defining the intentionally vaguely constructed ABET criteria by a project funded by the American national science foundation. The concept was confirmed to be in agreement with ASIIN requirement, as approved by ASIIN representative in the workshop held in Cairo at 15/6/2010. During the workshop the attendees were trained by the ASIIN expert on breaking the outcomes to measurable performance criteria. 3) The third concept is the **assessment of the workload** by the examples of the Tuning project. All these concepts had been discussed in the presentations held in the workshop held in Egypt. Also, Bloom’s taxonomy was discussed in the presentations which are very important for defining of the cognitive level of learning outcomes (it is basically an essential requirement for assessment and for designing of the teaching methods). This is the taxonomy which is used in designing the courses at GUC.

1.2 Establishment of Committee for quality of engineering education, February-May, 2009

In accordance with RS national accreditation standards from January 2007, the Committees for quality assurance are established at all RS universities and faculties. These Committees, on faculty’s or university’s level, discuss actual issues concerning general quality assurance measures in order to reach national accreditation standards. At Serbian universities there is a Committee for quality assurance at Faculty of Mechanical Engineering, then a Committee for quality assurance at Faculty of Electrical Engineering and so on, but there is no Committee for quality assurance in engineering education at university level. Establishment of Committee for quality assurance of engineering education is proposed by this project in order to establish university body which 1) improves, promotes and

implements quality assurance and enhancement mechanisms based on international and national accreditation standards in engineering education, as well as industry needs and overall EU projects, 2) promotes inter-, multi- and trans- disciplinary studies in order to reach contemporary EU qualifications frameworks in engineering education, 3) evaluates engineering curricula and, if necessary, suggests changes and improvements in order to reach harmonization with respective EU engineering curricula. The Committee should be composed of experts and representatives of academia (from different engineering branches), students, administrative staff, scientific associations and industry representatives. The Committee should examine globalization processes in engineering education including the life long learning education processes, support other quality assurance and enhancement bodies, work on improvement of internal processes and quality management, keep public relations and work on specific projects.

In intermediate report we noted that Committees for quality in engineering education, as new RS university bodies haven't been established. The reasons were:

1) There was a suggestion of National Tempus Office that active Tempus projects should collaborate among each other in order to reach synergetic effects. There were at least four Tempus projects in realization concerning quality assurance improvement at university level:

- 158999 "Strengthening Quality Assurance System within West Balkans HEIs in support of National and Regional Planning"
- 145677 "Internal Quality Assurance at Serbian Universities" (*all universities in RS are included*)
- 144856 "International Accreditation of Engineering Studies"
- 158926 "Governance and Management Reform in Higher Education in Serbia"

So, this project is very probably not the primary one for that purpose.

2) The budget for this project has been considerably cut.

3) Introduction of quality assurance and enhancement system based on **the best international practice** must be dominantly supported by university Committee for quality assurance.

That is why the Committees for quality of engineering education were established by project representatives as a service for faculty/university authorities and colleagues in realization of Tempus projects with complementary aims.

Nevertheless, persons who are leading the project actions are mainly members of faculty and university Committees for quality assurance. For example, representatives from the Faculty of Medicine, Faculty of Science and Faculty of Mechanical Engineering in the Committee for quality assurance at University of Kragujevac have been closely included in this project activity. On 16th October 2010 "The First Quality Assurance Conference in Higher Education" is held at University of Kragujevac, with co-organization of the Committee for quality assurance in order to exhibit impact of the mentioned Tempus projects and disseminate knowledge about quality assurance in higher education.

Namely, the aim within this activity was to establish Committee for quality of engineering education. It is done at GUC (EG), and in RS - Committee for quality of engineering education is established by project representatives as a service for faculty/university authorities and colleagues in realization Tempus projects with complementary aims. In RS, Committees for quality assurance on university level are established, and they encompass quality of engineering education issues, also.

This activity was encompassed following:

- Reviewing of the adequate central quality system that already existed within the whole university
- Study of accreditation agencies and the excellence models adopting TQM, and the global shift from the inspection concept to the concept of TQM, meaning the involvement of everybody
- Proposal for Re-organization of the Quality Assurance System in GUC
- Two proposals were prepared; the first one was to develop a central quality assurance department at the university level with corresponding quality assurance units at the faculties' level, the second one was to develop a central quality assurance department at the university level, with corresponding central functions, managed by persons from each faculty or by committees within each faculty. (Curriculum committee and assessment committee)
- Establishment of quality management and accreditation committee (QMAC) on the university level *(GUC).
- The upper GUC management approved the second proposal. A quality management and accreditation committee (QMAC) was established at the university level with a representative unit in each faculty.
- Establishment of the EMS Curriculum Committee for quality of engineering education has been done.

GUC approach: Establishment of the Committee for quality of engineering education has been done. In addition to the adequate central quality system that already existed within the whole university, a recent quality management and accreditation committee (AQMC) was established at the university level with a representative unit in each

faculty. A review for learning outcomes has already been achieved, but according to the Gantt chart a creation of an enhanced study program should be implemented during the same period, which is not practical because the learning outcomes were needed first in order to enhance the existing curriculum.

1.3 Proposal of quality assurance and enhancement system for engineering education, April 2009 – July 2010

We were transferring knowledge and good practice from EU universities and consequently improve our quality assurance mechanisms. Some results were presented by Prof. Matijevic at TREND conference www.trend.uns.ac.rs from 1st to 4th March 2010, at Kopaonik, Serbia, within sessions with university, faculty and government representatives from Western Balkan Countries.

At RS beneficiary universities quality assurance system dominantly depends on top management of faculties and universities, as well as its Committees for QA. One of duties of QA Committee is continuously improvement of quality assurance system. This project has gave its contribution related with improvements of quality assurance system at Serbian faculties and universities.

GUC approach: Although different agencies have apparent differences in their criteria for accreditation, they all agree on covering two essential requirements namely strategic planning and process approach.

In addition to accreditation criteria set by accreditation agencies (ASIIN and ACQUIN), GUC has also adopted models for continuous educational enhancement (EFQM model for organizational excellence (European model) and Baldrige award model). Namely, the central QMAC took a decision for taking the approach of compliance to standards - Based on the previous studies, the QMAC adopted more TQM implementation (leadership, process approach) and continuous quality improvement using PDCA cycle (Plan-Do-Check-Act). A decision was taken for adopting the compliance to standards approach based on the previous studies made and on the NARS. Adoption of the best models for continuous quality enhancement: Studying the EFQM (the European model for organizational excellence), & Baldrige award model

Adopting one of these two models will in fact assist GUC in pursuing its goal to achieve a newly introduced system accreditation by the German accreditation council.

Report "Guidelines for quality assurance and enhancement in engineering education" has done within this activity, which aim was to propose improvements existing quality assurance system on faculty and university level at beneficiary universities. Proposed improvements are based on Comparisons for accreditation agencies requirements regarding; students admission, examinations, facilities & support, & staff as well as QA standards from EU partner universities.

1.4 Promotion of necessity of quality assurance and enhancement system based on the best international practice, April 2009 – March 2011

This activity started even before the kick-off meeting (April 3-4), on Wednesday Feb.18th 2009, when National Tempus Office (shortened as NTO) organized a TEMPUS day on Faculty of Mechanical Engineering in Belgrade. The project has been presented to the audience of about 100 people. To dignify the meeting, welcome speeches have been addressed by H.E. Mr. Josep Loveras, Ambassador of European Commission delegation in Serbia, Mr. Bozidar Djelic, Vice-president of the Government in charge for European integration (and, at the same time, Minister for science and technological development), Prof Dr Zarko Obradovic, Minister of education, representatives of NTO and others.

Prof. Dr. Milos Nedeljkovic as a responsible Project leader and at the same time Government secretary in the Ministry for science and technological development, in every appropriate occasion within his official visits to RS universities and media, explains necessity of quality assurance and enhancement system based on the best international practice, and which is the essence of this project proved by accreditation.

Participation in this project is often used for faculty promotion in media by deans and vice deans in Belgrade, Kragujevac and Nis. Comparative advantage of engineering profession is its internationality by nature and because of that it is necessary to apply international standards in engineering education.

During whole the project span the necessity of introducing of quality assurance and enhancement system based on the best international practice has been promoted.

GUC approach: To implement the excellence model we need to have a culture of TQM, in which everyone is

involved and committed, to continuous enhancement. GUC plan was delivered to the university level committee QMAC for approval and implementation with their support. Over time span of the project, several workshops were held.

The project participants have took place within different occasions like:

- Participation at “The First Quality Assurance Conference in High Education”, University of Kragujevac, Kragujevac, Serbia, 15/10/2010.
- Participation in one month robotics science festival in Belgrade (September/October 2012 – “Days of Future: Robotics”) is used for promotion of use robotics in engineering education and IAES Tempus project also
- A lot of presentations were organized
- Meetings with the members of the EMS quality unit. Several meetings and discussions took place with the EMS quality unit members discussing the project progress and requirements, also an introduction about the ECTS and the learning outcomes concept were discussed.
- QMAC meetings & discussions with Dr Mona Osman, the head of the English & Scientific Methods department in the GUC. Several meetings and discussions took place between the QMAC team and Dr. Mona Osman introducing to her the TQM concepts and approaches, and she decided to implement these new concepts in one of her courses as a pilot.
- Preparing materials to be presented in the third consortium meeting. Internal meetings and discussions were held between QMAC members & Dr. Mona Osman to discuss the TQM concepts and applications and to prepare the materials and handouts to be discussed during the third consortium meeting. Also internal faculty meetings and discussions in the faculty of EMS took place to prepare for the third consortium meeting.
- Presentations and workshops of the 2 consortium meeting held at the GUC in 6/2010. Four presentations were given by the representatives of the GUC and the faculty of EMS about the GUC’s performance indicators, postgraduate studies & research, faculty of EMS, and the IT infrastructure. Two presentations were held by Dr. Mona Osman , the head of the English department in the GUC ; in the first one, she gave brief idea about quality, learning outcomes concept, difference between course assessment & program assessment . She also referred to Bloom’s taxonomy, workload, ECTS & the Tuning project. In the second presentation, she explained the concept of learning outcomes’ assessment in the course objectives survey. A presentation and a work shop were given by Ms. Jana, the ASIIN’s consultant.
- Introducing the total quality management concepts to the different faculties on the university level through a presentation. Two presentations were held by Dr. Mohamed Shohaib, & Dr. Magdy Mansour to the different faculties’ representatives, introducing Total quality management concepts.
- RS presentation at TREND conferences, to students and professors at organized occasions, and so on

1.5 Implementation of quality assurance and enhancement system at beneficiary faculties, January 2010 – January 2013

Implementation of appropriate quality assurance system is a precondition for international accreditation of engineering studies. Committee for quality assurance can permanently propose new improvements, but faculty management is responsible for implementation of quality assurance and enhancement system.

Implemented quality assurance and enhancement procedures at beneficiary faculties/departments are printed as public document (on the web site <http://tempus.mas.bg.ac.rs>).

All beneficiary partners are adopted a few essential procedures for this project realization.

An example of a lot of sub-activities with instances of quality assurance improvements & implementations at GUC:

- Preparing policies & procedures of the curriculum committee. The policies & procedures of the CC were made by the QMAC & revised with the heads of the CC in the different faculties.
- Forming the staff curriculum committee in EMS. Initiating the EMS staff CC. Holding meetings in the QMAC office with the staff participants.
- Preparing materials to help in explaining new educational concepts. Forming the flow chart explaining the old concept of education (teacher centered/ content oriented) versus the new concept (student centered/ learning outcomes oriented).
- Preparing materials, handouts. Several materials were studied to prepare handouts.
- Explaining the new educational concepts. Several presentations held with staff members explaining the difference between the 2 concepts, the learning outcomes concept, & the ECTS.
- Collecting materials required to prepare the templates. Revising all the available materials and accreditation agencies requirements. (Tuning project, Egyptian agency, ASIIN, ACQUIN, & ABET). Collective requirements template (collective good practices).

- Preparing templates. Student workload template. Course description template. Modified template. Course report. Several drafts of the student workload templates were tried as a pilot in order to choose the most suitable one. A collective course description template was formed satisfying the requirements of NAQAAE, ASIIN ACQUIN & ABET.
- Implementing the learning outcomes Concept & using Bloom's taxonomy in writing the outcomes. Several techniques were used to adopt the concept of learning outcomes. General meetings were held between the QMAC members & the EMS quality unit to explain the learning outcomes concept & Bloom's taxonomy. Other technique was to hold meetings with CC members, then departmental meetings were tried but due to the fact that the staff is busy & couldn't attend collective meetings another technique was used: Where QMAC used training of trainers technique. Trainers were trained on the methodology of writing the learning outcomes using Bloom's taxonomy. Trainers held on job training for the busy staff.
- Estimation of students' workload, allocating the credit points, & comparing it to the previously allocated credit points. During the on job training with the courses instructors and their assistants', there were discussions about how to estimate the students workload and then to allocate the credit points for each course. The second step was to compare the newly allocated workload with the previously allocated one.
- Forming the student's curriculum committee in EMS. Start of students' meetings to have their feedback concerning courses, workload, etc. Collect student's suggestions.
- Linking the learning outcomes concept with assessment by using the item analysis bank software. This software is bought & is to be implemented to deepen the use of the concept of learning outcomes.
- Training sessions are to be held in the QMAC office by the service providers to the trainees including courses' instructors, teaching assistants & some of the QMAC assistants
- Action plan for the implementation of the use of the item bank for Mechatronics program.
- Action plan for the implementation of the use of the item bank for other programs. Action plan is to be prepared for implementing the use of the software.
- External evaluation of the Mechatronics program. Professor Dr.-Ing. S. Helduser visited GUC and evaluated the Mechatronics programs
 - o Program & suggesting adding new elective courses to the master level (semesters 9 & 10)
 - o Final exams for 5 courses where complete analysis was given & a comparison to the exams held in Dresden was done
 - o Research activities
- Preparation of materials for the initiation of the assessment committee. Preparing presentations using a reference book "Developing Effective Assessment in Higher Education": A Practical Guide as a main source together with other materials.
- Collecting materials from different national & international universities concerning surveys to adopt good practices. National & international surveys were studied & GUC made its own survey including its own areas of interest.
- Differentiating between fresh graduate survey & alumni survey. Comparing surveys of different universities. Concluding that the fresh graduate's survey is to be answered by graduates within 6 months of graduation. The alumni survey is to be answered by graduates after 6 months of graduation.
- Implementing fresh graduate survey. The fresh graduate survey (FGS) was prepared, collected & analyzed. It is a survey that students have to fill right after their graduation ceremony. The FGS is implemented in 2010, 2011, 2012 and it is an ongoing process where it is to be implemented every year. A surveying machine was bought to be used in surveys analysis.
- Implementing alumni survey. The alumni survey was prepared, collected & analyzed in 2010. It was implemented in a certain ceremony held at the GUC (Sohour gathering).
- Implementing employer survey. A brain storming session was held and the recommendations were to implement 3 templates, one for the HR, the other one for the supervisor of the employee, and the last one for the manager. The process included 3 phases; preparation, proposing, & implementation.
- Implementing course objectives achievement survey. The course objectives achievement survey was formed & implemented in the ABSK course as a pilot. It was then implemented in this course every semester to detect the degree of achievement, improve, etc. It will be implemented in other courses.
- Implementing course evaluation survey. The course evaluation survey was first prepared in Dec. 2010. It is an online survey that students have to fill by the end of each semester.
- Collecting materials from different national & international universities concerning the course monitoring. National & international reports were studied & GUC made its own report including its own areas of interest. The report was tried as a pilot. This resulted in deciding to simplify the template.
- Implementing course report. QMAC held presentations to show the importance of the report & to explain the methods of filling the report. QMAC set deadlines for the instructors to fill the reports & write their action plans.

The most obvious proofs of the implementation of quality assurance and enhancement system at beneficiary faculties are finalizations of accreditation processes and getting of the appropriate certificates for University

of Belgrade, Faculty of Mechanical Engineering for the study program in Naval Architecture Engineering (MSc level), and for German University in Cairo for the study program Engineering and Materials Science (BSc and MSc levels).

2.1 Review of current standards in engineering education and contemporary qualifications frameworks, June 2009-January 2010

The activity has been performing according to the plan stated in the project proposal.

This activity was encompassed

- 1) collection of all necessary information about contemporary engineering education
- 2) exchange of all relevant information between the consortium members
- 3) preparation of project staff for the next activity

GUC staff members have revised

-the National Academic Reference Standards (NARS):

- the European Qualification Framework (EQF) &

- the German Qualification Framework (GQF)

- QMAC members studied the NARS published in January 2009
- QMAC members studied the NARS published in August 2009
- QMAC members studied the EQF & the GQF
- The QMAC held several meetings with CC staff members to discuss NARS, EQF & GQ

GUC staff members were done a comparison of Mechatronics study programs of 5 different degree awarding institutions. Namely, the staff CC compared the GUC Mechatronics program to those of:

- Ain Shams University (Egypt)
- University of Waterloo (Canada)
- Festo Germany/Marroco
- University of Wollongong (Australia)

RS staff members have revised the European Qualification Framework (EQF) & interdisciplinary engineering programs contents and organization at Imperial College London (UK), TU 9 German Institutes of Technology (especially at TU Munchen, and KIT). Also, have been reviewed and discussed principles of engineering education at the most recognized U.S. universities like MIT, Stanford or Harvard. MIT visiting professor V.M. Stojanovic at University of Kragujevac had been helped to Serbian colleagues to better understanding of U. S. engineering education system and organization at MIT and Stanford University. Some organizational concepts could be used at Serbian universities, also.

2.2 Creation of new flexible study program models in order to reach interdisciplinarity and new qualifications frameworks, July 2009 – November 2010

Goal of the activities 2.1 and 2.2 is modernization of traditional engineering curricula, to provide lacking interdepartmental and interfaculty collaboration and flexible frameworks for new engineering curricula in order to reach new engineering qualifications and degrees.

But, after the first cycle of national accreditation, the most of RS accredited faculties and universities accepted accredited status in a less or more unchangeable situation as compared to the new national accreditation cycle. For example, at the Faculty of Mechanical Engineering in Kragujevac (FME-KG), the Faculty Council by Decision No 01-1/445-2 from 28/02/2008 adopted the interdisciplinary/interdepartmental study profile "Mechatronics" at Bachelor and Master study levels. The diploma supplement for both study profiles was defined (including titles: BSc in Mechanical Engineering – Mechatronics and MSc in ME – Mechatronics). The Faculty Council adopted further proposed improvements on 15/10/2009 in order to accommodate that both study profiles can start in current school year. But, the Dean of the Faculty has not implemented this decision yet. In his opinion it is not clear whether it is necessary to wait for the new accreditation cycle in order to begin the realization of the new study profiles, no matter whether all accreditation criteria are satisfied. Having this experience, and bearing in mind realization of several Tempus projects, FME-KG adopted new study profiles which consist from existing subjects within different branches of engineering education at FME-KG and has submitted two new study programs for national accreditation. No less complicated procedure was used at the Faculty of Mechanical Engineering, University of Nis. At university level, situation for creating inter-faculties or university study programs is practically impossible because there is no administrative support and organization for integrated university study programs.

However, Faculty of Mechanical Engineering, University of Belgrade has established new system curricula building it as a part of quality assurance mechanisms. This solution is accredited by national Committee for accreditation and quality assurance. According to this solution, it is possible to introduce new elective subjects (but under strong quality assurance conditions) and link them within old or new study profile. Also, a few months ago, national Committee for accreditation and quality assurance opened possibility for establishment joint degree study programs among national faculties in its realization.

It is a unique accredited solution in Serbia at BSc study level with inherent flexibility for students to collect elective subjects from different areas engineering, science and soft skills. Professors can offer new elective courses in each year and propose new modules with defined line of courses (within different old modules, with both new and old courses). Students have opportunity to expand their qualification framework related to elected subjects within one or more modules.

At this manner at Faculty of Engineering (Faculty of Mechanical Engineering (FME-KG) up to 28.07.2011.) are formed new study programs from old courses within different study modules of Mechanical Engineering study program at both BSc and MSc study level. At this faculty had been majority opinion that "new" study programs like Automotive Engineering, Military-Industrial Engineering, are more attractive for enrolment of new students than proposed elective path inside Mechanical Engineering study program like solution of Faculty of Mechanical Engineering at University of Belgrade.

Faculty of Mechanical Engineering at University of Nis is introduced Engineering Management (at both BSc and MSc level) as a new interdisciplinary engineering study program.

Development of programs and courses at GUC

Two study programs (namely design and production engineering and mechatronics engineering) are currently under modification to conform with the ASIIN requirements, taking into consideration the modular structure and flexibility.

- Modifying the learning outcomes
- Verifying the allocated student workload
- Forming the courses' syllabi catalogues

Using data collected in the previously filled course description forms, the student workload form courses syllabi catalogues are formed, edited & printed.

3.1 Selection, procurement and instalation of laboratory software and equipment, November 2009 – November 2011

Necessary laboratory setups, measurement and computer equipment have been defined. The activity has been conducted according to the original project plan. Appropriate education laboratories are necessary for accreditation and quality assurance of any relevant engineering study program. Our fund for the equipment is extremely limited after budget cutting and we were in doubt if it is necessary to apply for project budget restructuring. Because of that we were slightly late in performing this activity.

At all beneficiary faculties, laboratory equipment is planned to support education in Mechatronics as an interdisciplinary engineering field. At the Faculty of Mechanical Engineering University of Belgrade, appropriate part of the equipment for mechatronics (experimental robots) has been bought from its own budget. New laboratory facilities are showed at <http://cpa.fin.kg.ac.rs:30/Home/EquipmentUniversity>

At Faculty of Mechanical Engineering University of Belgrade is formed new laboratory for 20 students, and procured laboratory equipment for individual student's work.

At Faculty of Engineering (former FME) at University of Kragujevac, two laboratories with 8 and 20 student places are improved. Additional donation resources from industry are used in order to improve some laboratory aspects (furniture, and so on).

At Faculty of Mechanical Engineering at University of Nis, Mechanotronics educational laboratory is improved.

The Mechatronics Department at GUC purchased two educational equipments that are used in the Mechatronics Lab. These two equipments are:

- a. LDS 100 lb Shaker,
- b. Two workstations model HP Z800

These equipments will enhance the education and research for the following courses:

- Fluid Mechanics: 5th semester Mechatronics, Materials Engineering and Design and Production.
- B.Sc. theses
- Graduate research

Engineering education laboratories were improved and established.

3.2 Library facilities and administrative/student services improvement, November 2009 – November 2011

During this project, Faculty of Engineering at University of Kragujevac (former FME-KG) employed one person in order to permanently improve ICT support for administrative/student services as well as for teaching services. They have developed Internet based software for support and control all more important processes in teaching and student administration. RFID system is implemented in order to establish evidence about student presence at lessons and classroom consume. Interactivity among students, teachers and faculty management was increasing. Moodle portal (web pages based on open source learning management system named Moodle) for each subject is established. Students can find all relevant data concerning their subjects and communicate among themselves and with teachers via organized Moodle portals. These results were presented at TREND conference www.trend.uns.ac.rs from 1st to 4th March 2010, within sessions with university, faculty and government representatives from Western Balkan Countries. At RS government level software facilities for all government faculty/university libraries are improved. Library databases are connected among by Internet and access to new databases from libraries is enabled. There is collaboration among beneficiary faculties in order to reach contemporary ICT support for administrative/student/teaching services at these faculties.

GUC: Purchase of administrative equipments (copiers, laptops, PCs, printers, etc). These equipments are used in preparing and presenting the orientation materials used by QMAC in doing orientations and workshops. GUC had developed administrative/student services according to ASIIN standards.

RS-beneficiary faculties: Printed textbooks were gifted to RS faculties and universities libraries. Software for teaching/learning support in engineering education with some e-publishing materials are produced and it has gave to public use by the cite: <http://cpa.fin.kg.ac.rs:30/Home/EPublishing>

Also, e-learning teaching support is organized by LMS Moodle with adopted quality assurance standards concerning with a subject Moodle portal content. Software solutions for the following student statistics and attendance to lecturing are also developed. Basic software authors are Nenad Zahar and prof. Vladimir Cvjetkovic. Practically they have gifted their solutions to ICT office of Faculty of Engineering at University of Kragujevac. Now, all beneficiary faculties have developed ICT service and its software solutions for documentation management and trace of all essential processes related to administration and student services.

Some international office functions are transferred as a part of local student services, especially at GUC where internationally accredited study programs in English (international study programs) .

3.3 Developing of partnership with enterprises through student practice organization, November 2009 – October 2011

Partnership model with enterprises through student practice organization was developed. In September/October 2009 the typical agreement which includes all aspects of student practice organization is defined and it is offered to local firms to sign this agreement according to the new proposed quality procedures concerning with student practice organization at beneficiary faculties. This agreement covers different possibilities of student work in industry: student practice, laboratory work without engineering departments, student part time job, student projects and diploma thesis for industry, etc. The part of mentioned agreement is also the new proposed questionnaire for the companies which should provide feedback from industry about quality of engineering education and their needs in the future. It is very important that engineering education ensures industry focus, research focus, industrial placements and professional qualification confirmed by the degree. At the beginning of 2009/2010 school year, the vice deans have sent accompany letter, agreement and questionnaire to companies proposed by teaching staff and student organization. The first agreements were signed. Involving of students and teachers in real industry environment is necessary part of engineering education which also can enable graduates to take up employment corresponding to their qualification.

Developed and another kind of partnership with enterprises. For example: the firm Muehlbaur has asked Center for

Applied Automatic Control at University of Kragujevac to select young engineers for them. Also, Muehlbaur donated 5000EUR for laboratory infrastructure needs.

Student career and development office (SCAD) at GUC is responsible for supporting students in their internships and training and it is enhanced through the implementation of various project phases (student mobility). The SCAD office contributes to the statistics of graduates' employability.

4.1 Accreditation of at least two selected study program with ASIIN, July 2010 – January 2013

According to the project time plan, beginning of this activity was planned for July 2010, but the Faculty of Mechanical Engineering, University of Belgrade before this term reached international accreditation in Naval Engineering. It is result of good study program including teaching organization, quality of education laboratories, excellent teaching staff, and it is result of administrative efforts to do it concerning this project idea.

Also, before submission of intermediate report of this project, GUC reached international accreditation for

- Engineering and Materials Science, Bachelor of Science Program
- Engineering and Materials Science, Master of Science Program

But essential intention was accreditation of interdisciplinary study programs (especially Mechatronics, as well as programs which are outcome of 2.1 and 2.2 activity).

A few study programs (namely Design and Production Engineering and Mechatronics Engineering) at GUC had been under modification to conform with the ASIIN requirements, taking into consideration the modular structure and flexibility.

The GUC has submitted the applications for accreditation to ACQUIN. Two courses' syllabi catalogues namely:

- Mechatronics Engineering International Bachelor of Science Program
- Mechatronics Engineering International Master of Science Program

The Faculty of Mechanical Engineering at University of Belgrade has submitted the applications for accreditation to ASIIN. Two courses' syllabi catalogues namely:

- Mechanical Engineering - Bachelor of Science Program (in Serbian and English)
- Mechanical Engineering - Master of Science Program (in Serbian and English)

The peers of ASIIN have visited UB-FME for two days and announced their positive decision, which is to be confirmed by the agency and officially declared on June 28th, 2013;

At Faculty of Engineering, University of Kragujevac (former Faculty of Mechanical Engineering) from different resources were developed teaching laboratories in Mechatronics (now, it is the best teaching laboratory infrastructure at Faculty). Regardless to developed resources, self-assessment reports, the dean prof. M.Babic and the vice rector prof. B.Jeremic haven't answered positively at request of prof. Matijevic to submit the applications for accreditation to ASIIN, like the Faculty of Mechanical Engineering at University of Belgrade did.

The Faculty of Mechanical Engineering at University of Nis has not had intention to reach international accreditation for any of its study programs. They used this project in order to improve overall processes and resources at its institution.

Development of programs and courses at GUC

Two study programs (namely design and production engineering and mechatronics engineering) were under modification to conform to the ASIIN requirements, taking into consideration the modular structure and flexibility.

However, the EMS faculty of GUC has good experience in preparation of accreditation documents. On March, 13th 2008, the application was sent for the accreditation of the Faculty of Engineering and Materials Science together with the documents, in order for the accreditation committee to decide on the accreditation of the B.Sc. and M.Sc. study programs. On 26th of October, the feedback was received of the first meeting of the peer group which took place at Stuttgart on 17th of October 2008 requesting further information to be able to have a broad view of the program. On 15th of December 2008, the reply on the feedback questions of the peer committee was sent. Based on this fact the nominated peers for the accreditation procedure of Bachelor and Master of Science study programs for Engineering and Materials Science Faculty have visited GUC for two days 1st and 2nd of February 2009. The delegation held meetings with the university authorities and another meeting with the faculty dean, department heads and staff members. In these meetings, they discussed and clarified the points they need about the study

programs and also they met a sample of the students and visited the labs, examination office and all related departments. At the end of the visit, they were very satisfied and promised that they will deliver a positive report for the next ACQUIN meeting. In conclusion, in June 2009 the ACQUIN accreditation approval has been received for five years for both the Bachelor and Master of Science programs.

5.1 Consortium and TEMPUS meetings, January 2009 – January 2013

5.2 Project coordination and project reports generation, January 2009 – January 2013

Consortium meetings were held on schedule. The progress reports were discussed at the meetings.

6.1 Quality control and monitoring ensured, January 2009 – January 2013

Semi-annual quality control reports were prepared by each RS University and GUC. Faculty and University official documents concerning the project realization were gathered.

Quality control and monitoring of the project has been doing by the project management, by the beneficiary faculty and university management and representatives, and by national TEMPUS Office teams.

Indicators of achievement and/or performance as indicated in the project proposal are reached for this project.

7.1 Dissemination analyzing and actions planning, January 2009 – January 2012

The dissemination has included information exchange (using web publishing, marketing presentations, etc.), information sessions and workshops where outputs of the project are presented.

Dissemination results – 16 TV broadcasts, 5 university presentations, 7 newspaper articles, <http://tempus.mas.bg.ac.rs/doc-1.html> , <http://cpa.fin.kg.ac.rs:30/Home/Home>, academic collaboration among WBC faculties and universities, secondary school presentations which are given with intention techniques popularization, participation at TREND Conferences (about university education) www.trend.uns.ac.rs from 1st to 4th March 2010, and in March 2012. within sessions with university, faculty and government representatives from Western Balkan Countries.

Participation in one month robotics science festival in Belgrade (September/October 2012 – “Days of Future: Robotics”) is used for promotion of use robotics in engineering education and IAES Tempus project also.

CD "Introduction to Object-Oriented Programming - Collection of tasks with interactive software-testing system and support learning", 144,856-TEMPUS-2008-RS-JPGR, was presented at the Roundtable - "New concepts of learning and ICT technologies as a help or hindrance" Faculty of engineering Science, University of Kragujevac

The presentation: “International Accreditation. Results and planned activities at 144856-2008-RS-JPGR Tempus project International Accreditation of Engineering Studies”, *I Conference for Quality Assurance in Higher Education*, 15th October 2010, University of Kragujevac

YouTube resources about some aspects of the Tempus results (some TV broadcasts, equipment use, master thesis presentations, new teaching methodology) are organized and have stayed a part of practice concerning with results sharing and promoting.

Four workshops were organized by ASIIN.

GUC: Participation in Egypt Tempus day (January 18th, 2010) with a booth under the title of international accreditation of engineering studies explaining the activities of the project has been held in this well-attended conference. A booklet for all the tempus projects was published and distributed among attendees. Dissemination of knowledge within the different partners of the project was carried out through meetings held in Serbia, Germany, and Egypt. Also, five presentations were conducted during the partners visit to Cairo by the Egyptian partner.

7.2 Sustainability analyzing and actions planning, January 2009 – January 2012

All officially adopted documents which result from the project activities directly contribute and guarantee that the project results will be implemented and used for a long time after the project completion: 1) documentation about adopted teaching quality procedures at faculty and university levels, 2) documentation about new curricula, courses and syllabuses, 3) documentation about equipment procurement, 4) documentation about publishing activities, 5) accreditation certificates, 6) adopted quality assurance system, 7) stable financial support to beneficiary faculties and

developed infrastructure by this project (laboratories, QA system, and so on).

Quality management system has been established to ensure active involvement of faculty members in the continuous development and modernization of curriculums and its implementation. Top management representatives are also involved to support the implementation of the project outcomes.

GUC example: Establishment of QMAC as a physical and political structure on the university level. The QMAC will carry an ongoing process of training the trainers and staff of different faculties on different quality concepts including enhancing the implementation of TQM and CQI. Also the central QMAC unit will guarantee applying the state of art national and international accreditation standards and models and to distribute the TQM culture all over the GUC faculties.

Establishment of QMAC unit as a physical structure in EMS. The QMAC unit of EMS together with the staff curriculum committee will carry on an ongoing process of revising the programs' objectives and learning outcomes. Prof. Imam Morgan; the head of the EMS unit, will be the ECTS coordinator for the faculty.

Forming the student's curriculum committee in all the GUC faculties. Initiating the students' curriculum committee in EMS, and carrying on the same process in the different GUC faculties.

The students' CC is to pursue an ongoing process of collecting students' feedback and suggestions regarding workload, curriculum, instruction, and assessment to be used in enhancing the educational process.

Forming courses' syllabi catalogues for 4 engineering programs. Four courses' syllabi catalogues were prepared by revising the program learning outcomes and the students' workload ,namely:

- Mechatronics Engineering Bachelor of Science Program
- Mechatronics Engineering Master of Science Program
- Design & Production Engineering Bachelor Program
- Design & Production Engineering Master Program

This process is to be carried out for all the GUC programs on regular basis by the QMAC units of the different GUC faculties.

Preparation and initiation of assessment committee. The QMAC started the assessment process on the university level, by preparing and implementing course evaluation survey, fresh graduate survey, alumni survey, & employer survey where the reports about the surveys will be used for continuous quality improvement. The QMAC prepared for the initiation of the assessment committee to be responsible for the previously mentioned tasks as on going processes, including the direct and indirect assessment.

Using technology transfer and physical infrastructures in Continuous quality development based on direct and indirect assessment statistics provided by Scantron (iNSIGHT 4) scanner hardware and software, and Intelligent Item Bank (IIB) software.

Scantron (iNSIGHT 4) scanner hardware and software was bought for continuous process of designing and reading surveys, providing statistical analysis reports to survey responses, so it's a powerful indirect tool for assessment of the different programs and continuous development on the GUC level.

Also it is used in correcting exam answer sheets and providing statistical analysis reports about students' responses, so it is also used as a direct assessment tool for courses, as the statistical reports provided can help instructors write and implement their action plans depending on the statistics of students' responses fulfilling the continuous quality improvement of courses.

Intelligent Item Bank (IIB) is an item banking application; it provides extensive information regarding test development and psychometric characteristics of the items (questions).

It is a software used to build question banks for each course, in which the questions are listed under the categorization of learning outcomes, and after building a question bank, the instructor can put as example that he/she needs (according to the courses learning outcomes) the exam to be of 30 % in the level of knowledge and understanding, 50 % in the intellectual level, and 20% soft skills, then the software will export automatically the exam with the required structure and levels. So, this software is used in the project to deepen the concept of learning outcomes in the instructors' minds, and to link the written learning outcomes to the courses' assessment.

Obstacles and shortcomings

Please describe any obstacle and/or shortcoming experienced during the project lifetime and the measures taken by the project team to address them.

The overall objective of this project was to enhance the quality and relevance of higher education in engineering area in partner countries and to reach the integration of partner country universities into the European university system by international accreditation of engineering studies.

All relevant university/faculty processes, as much as study programs relevance and quality, were planned to be improved in order to reach international accreditation. It is obvious that our financial support was very limited and that beneficiary faculties/universities have different organization and overall start up potentials in order to reach international accreditation within project span. Faculty of Mechanical Engineering University in Belgrade had accredited system solutions by national body for accreditation and quality assurance, as an inherent part of internal quality assurance mechanisms, which enable flexibility and improvement in building inter- trans- and multi-disciplinary engineering profiles. But, other beneficiary faculties/universities do not have a similar approach yet. Unfortunately, its management prefer inherited organization structures and mechanisms in decision making. Because of that they have not enough flexible study programs and they were late in building contemporary engineering profiles planned for international accreditation in this project. In this moment, Serbian universities are not integrated yet *(university is a “confederation” of different faculties) and system solutions for introducing inter- and multi- disciplinary study programs are missing. This made a lot of administrative misunderstanding. For example, Faculty of Mechanical Engineering in Kragujevac (from 28th July 2011 Faculty of Engineering at University of Kragujevac), by the Faculty Council by Decision No 01-1/445-2 from 28/02/2008 adopted the interdisciplinary/interdepartmental study profile “Mechatronics” at Bachelor and Master study levels. The diploma supplement for both study profiles was defined (including titles: BSc in Mechanical Engineering – Mechatronics and MSc in ME – Mechatronics). The Faculty Council adopted further proposed improvements on 15/10/2009 in order that both study profiles can start in current school year. But, the Dean of the Faculty has not implemented this decision. The alleged reason was that it is necessary to wait for the new national accreditation cycle in order to begin the realization of the new study profiles no matter whether all accreditation criteria are satisfied. Similar problems were motivated faculty management to promote decision that new subject could not be introduced (the mentioned study profile in Mechatronics comprised existing subjects from different engineering study profiles at the Faculty). Because of this occasion, in meanwhile Faculty has nationally accredited a few new study profiles with existing subjects from different engineering study profiles from the Faculty or other faculty throughout joint study programs establishment. It was very important to explain that accredited situation will not change with the introduction of new possibilities for engineering education on the Faculty.

It is obvious that Faculty of Mechanical Engineering at University of Belgrade has introduced the best solution and that it is like the solutions at German universities. Of course, this solution should be transferred on other faculties and this nationally accredited solution is promoted as an excellent outcome of this project.

Our intention was to provide improvements on all beneficiary faculties/universities and to reach international accreditation for as much as possible new study programs. We have reached planned verification of the project results by international accreditation of the least two study programs, but we have needed more time then we had foreseen for the project realization.

Namely, the project activities were being performed strictly following the essence of the project proposal, but not strictly with the time plan. Significant changes of the project time plan were been happened because of

1. Significant delay of the first installment of finances.
2. Political situation in Cairo, Egypt, for a longer time during 2011

Because of that at the end of 2011 we requested for an extension of the project period and prolongation of the project duration were granted for one year.

But, we also have mentioned other significant reasons like difficulties we faced as one of the first projects where Serbia was allowed for coordination (such as implementation of the project according to the TEMPUS rules by respecting the national regulations), problems of Egypt’s private university relationship with their government regulations and TEMPUS rules, then, due to considerable budget we had more complicated decision making about the budget spending related to overall the project goals and new opportunities at beneficiary faculty environments (we had prolonged spending for equipment if there were chance for procurement from another financial resources – for example, at University of Kragujevac were formed a few teaching laboratories concerning with wide Mechatronics area) , etc. We have consumed the project funds very carefully in order to reach the overall project objectives.

The project practically started on November 1st, 2009, since the money arrived in August when there is not anybody

at university, and then in September they had a problem how to administrate the projects since this was the first time for them. You may even recall that for this project we even had to transfer the finances to university, since originally it was supposed to be run by faculty administration. So, the university organized itself at the end of October, which can be easily checked by the first financial page opened there (the scan of which is given as the attachment to this request).

Because of both numbered reasons we had consequently been very cautious with budget expenditure, making sure that project progresses as planned but with a force majeure delay. Then, intermediate report was very satisfactory for us, but then the instabilities in Egypt started, which made another delay. But, we even managed to make results better than promised.

Also, notice that during the project realization contact person in three of the co-beneficiary institutions are changed:

- Due to the changes in the Ministry of Education, Prof. Dr. Radivoje Mitrovic, State Secretary, was involved in the Tempus project instead of previous Assistant Minister Prof. Dr. Aleksandar Lipkovski
- Prof. Dr. Milos Nedeljkovic personally moved to the position of State Secretary for Science and Technological Development, and the new Dean of the Faculty of Mechanical Engineering at the University of Belgrade is Prof. Dr. Milorad Milovancevic, who was strongly included in the project.
- On behalf of the TU Munich Dr. Ralf-Peter Mundani has got an important role although his name was not explicitly stated in the project proposal.
- From the ASIIN side, instead of Ms. Frauke Muth, Ms. Jana Moehren was an acting person in charge for international accreditation

These changes were not planned, but have not disturbed the project realization.

Curricular reform

- With regard to new/restructured programmes/courses, please indicate:
 - the level of the programme/course implemented (Bachelor, Master, Doctorate, continuing education, further education, upgrading, etc.); the type of course (mandatory course in a regular programme or an optional course); the language of the course;
 - whether the newly developed course is structured according to the three cycle system and using the ECTS;
 - whether a double, multiple or joint degree has been established;
 - whether recognition arrangements between higher education institutions in the EU and in the partner countries have been established;
 - the target group (students, university staff, managers of education systems, public civil servants, employees in private sector, etc.) and if relevant, the approximate number of students who already attended;
 - whether the programme/course was formally recognised, the level (institutional, national, etc.) and the form of recognition (certificate, diploma, degree);
 - the teaching material produced and the method (translated, adapted, developed in partnership, etc.);
 - whether teaching methods have been reviewed and are appropriate for the new/restructured programmes/courses;
 - whether assessment measures have been introduced for the new courses (by students for instance);

All beneficiary faculties in this project have developed all aspects of their study programmes at Bachelor and Master study levels by using experience and results of conducted activities 1.x-4.x in according to the three cycle system and using the ECTS. The essential part of the project was the necessary improvements at beneficiary universities concerning all relevant faculty/university processes and relevant engineering study programs with all of its characteristics, in order to reach a new and relevant quality in engineering education verified by international accreditation of these study programs.

Development of programs and courses at GUC

Six international interdisciplinary study programs (1. Design & Production Engineering, 2. Mechatronics, and 3. Engineering and Materials Science – at Bachelor and Master level) were been under modification to conform to the ASIIN requirements, taking into consideration the modular structure and flexibility. **Processes held on the development of the study program at GUC:**

- Review of current standards in engineering education and contemporary qualifications frameworks took place by the QMAC, as the National Academic Reference Standards (NARS) publications of January, and August 2009, the European Qualification Framework (EQF) & the German Qualification Framework (GQF) were studied. The QMAC held several meetings with EMS curriculum committee staff members to

- discuss NARS, EQF & GQF.
- Modernization of the Bachelor & Master programs took place where **the learning outcomes were modified in compliance with Bologna process also verification of the allocated student workload took place and the courses' syllabi catalogues were prepared.**
 - Using data collected in the previously filled course description forms, the student workload form courses syllabi catalogues are formed, edited & printed.
 - Study programs at both BSc and MSc study levels were under modification to confirm to the ASIIN requirements, taking into consideration the modular structure and flexibility.
 - Before submission of intermediate report of this project, GUC reached international accreditation for
 1. Engineering and Materials Science, Bachelor of Science Program
 2. Engineering and Materials Science, Master of Science Program,
 - GUC has also submitted applications for international accreditation for two study programs:
 1. Mechatronics Engineering International Bachelor of Science Program (in English)
 2. Mechatronics Engineering International Master of Science Program (in English)

After accreditation of international Mechatronics study programs, GUC and University of Ulm will establish joint degree programmes in Mechatronics (at Bachelor and Master level).

Faculty of Mechanical Engineering at University of Belgrade has developed and accredited Naval Engineering by international accreditation agency which is respective for Naval Engineering issues, and has submitted applications for international accreditation to ASIIN for two study programs:

1. Mechanical Engineering - Bachelor of Science Program (in Serbian/ English)
2. Mechanical Engineering – Master of Science Program (in Serbian/ English)

with all teaching modules (elective line of courses in order to reach foreseen specialization in engineering). The peers have visited UB-FME for two days and announced their positive decision, which is to be confirmed by the agency and officially declared on June 28th, 2013;

Also, Faculty of Mechanical Engineering, University of Belgrade has built stimulating quality assurance system which enables flexibility and permanently improvements existing study programs with possibilities for introducing of new subjects and engineering profiles. This quality assurance system has reached national accreditation. It is a unique accredited solution in Serbia at BSc study level with inherent flexibility for students to collect elective subjects from different areas engineering, science and soft skills. Professors can offer new elective courses in each year and propose new modules with defined line of courses (within different old modules, with both new and old courses). Students have opportunity to expand their qualification framework related to elected subjects within one or more modules.

At this manner at **Faculty of Engineering (Faculty of Mechanical Engineering up to 28.07.2011.) at University of Kragujevac** are formed new study programs *(like Automotive Engineering, Military-Industrial Engineering etc.) from old courses within different study modules of Mechanical Engineering study program at both BSc and MSc study levels. In general the Faculty has interests for development and modernization of all existing study and collaboration with other faculties inside and outside University of Kragujevac. But there is a majority opinion that “new” study programs, like Automotive Engineering, are more useful for attractive for enrolment of new students than flexible elective path inside Mechanical Engineering study program like solution of Faculty of Mechanical Engineering at University of Belgrade. On other side by the Faculty Council by Decision No 01-1/445-2 from 28/02/2008 adopted the interdisciplinary/interdepartmental study profile “Mechatronics” at Bachelor and Master study levels. The diploma supplement for both study profiles was defined (including titles: BSc in Mechanical Engineering – Mechatronics and MSc in ME – Mechatronics). The Faculty Council adopted further proposed improvements on 15/10/2009 in order that both study profiles can start in current school year. But, the Dean of the Faculty has not implemented this decision. The alleged reason was that it is necessary to wait for the new national accreditation cycle in order to begin the realization of the new study profiles no matter whether all accreditation criteria are satisfied. At this manner the faculty management has been promoted decision that new subjects could not be introduced, but teaching staff can improve teaching methodology and subject content (the mentioned study profile in Mechatronics comprised existing subjects from different engineering study profiles at the Faculty). Having this experience, and bearing in mind realization of several Tempus projects, FME-KG adopted new study profiles which consist from existing subjects within different branches of engineering education at FME-KG and has submitted two new study programs for national accreditation. No less complicated procedure was used at the Faculty of Mechanical Engineering, University of Nis. At university level, situation for creating inter-faculties or university study programs is practically impossible because there is no administrative support and organization for integrated university study programs.

Faculty of Mechanical Engineering at University of Nis is introduced Engineering Management (at both BSc and

MSc level) as a new interdisciplinary engineering study program.

All RS beneficiary faculties are improved laboratories, ICT infrastructure for teaching both in Mechatronics and Mechanical Engineering (or Design and Production Engineering) as well as teaching & learning methodology and tools. Also, software solution for tutor system is produced and given for public use (<http://cpa.fin.kg.ac.rs:30/Home/EPublishing>). Printed and e-printed publications from this project are had a positive influence at overall teaching and learning processes at beneficiary institutions. By internal quality assurance system is defined content of e-learning LMS Moodle support for teaching in courses at Faculty of Engineering at University of Kragujevac (instruction model is given at <http://moodle.mfkg.rs/course/view.php?id=248>).

At all beneficiary faculties, laboratory equipment is planned to support education in Mechatronics as an interdisciplinary engineering field which is a part Mechanical Engineering education too. New laboratory facilities are showed at <http://cpa.fin.kg.ac.rs:30/Home/EquipmentUniversity>, and some illustrations of a new laboratory supported teaching/learning methodology are showed at: <http://www.youtube.com/watch?v=cBVfc3Gwv1Y>, <http://www.youtube.com/watch?v=ACziG6gIygo>, <http://www.youtube.com/watch?v=QgzGUVxm4ck>, <http://www.youtube.com/watch?v=pS4kRwyNqOE&feature=g-upl&context=G255f9b4AUAAAAAAAAA> and so on.

At Faculty of Mechanical Engineering University of Belgrade is formed new laboratory for 25 students, and procured laboratory equipment for individual student's work.

At Faculty of Engineering (former FME) at University of Kragujevac, two laboratories with 8 and 20 student places are improved. Additional donation resources from industry are used in order to improve some laboratory aspects (furniture, and so on).

Life long learning courses are also supported by new lab-equipment. Three different courses are organized for training of non-university teachers: 1) Introduction in Circuits, Sensors and Actuators, 2) Introduction in Object Oriented Programming and Mobile Robotics, 3) Introduction in Programming and Applications of PLC/HMI Devices and Industrial Computer Networks. Teaching activities at these LLL courses aren't paid from Tempus budget. Practically, this project has given equipment and LLL courses which were consumed within different LLL programs and projects for training and retraining.

This project has influence on teaching/training programme(s) at GUC, University of Belgrade (Faculty of Mechanical Engineering), University of Kragujevac (Faculty of Engineering, and Faculty of Science) and University of Nis (Faculty of Mechanical Engineering). Faculty of Mechanical Engineering at University of Kragujevac is changed its name in Faculty of Engineering on 28.07.2011. Procured equipment at RS beneficiary institutions is very similar which is important because of joint efforts in development of teaching methodology and materials.

Governance reform

Were changes at institutional level introduced (establishment of units, new faculties, international relations offices, etc.)? If so, what is the statute of the new unit(s) within the institution(s) concerned? What kind of financial support and staffing arrangements will be provided in the future? Did the project introduce any reforms in university governance (i.e. decision process, autonomy, accountability)? If yes, please describe these reforms and the institutional support given by academic and local authorities.

Were changes in the national higher education structure and system supported by the project (establishment of representative bodies, associations, agencies for quality assurance, development of roadmaps for national reforms, national certification and qualification systems, etc.)? If yes, please describe the project contribution to the reforms and the involvement and support given by local authorities.

This project has offered an excellent opportunity for beneficiary universities/faculties to introduce more relevant quality assurance mechanisms by transferring knowledge, methods and good practice from EU respective engineering schools. It is possible to modernize standard organization scheme of engineering faculties by introducing new quality assurance system. For example, traditionally, Departments within engineering faculties in Serbia were developing separately its study profiles for engineering education. This system is expensive, not flexible and it does not look like the contemporary EU models. Faculty of Mechanical Engineering at University of Belgrade has overcome this problem with new quality assurance system. All beneficiary faculties have improved ICT and laboratory facilities and ICT support in administration, teaching and student service building

By conducting activities 1.x, 3.3 and 7.1 all beneficiary institutions have made influence on restructuring university management and governance. All partner project members have improved internal quality assurance system at their institutions related to relevant ASIIN, ABET and/or ACQUIN standards for international accreditation. Also, some mechanism for quality assurance have transferred from EU project partners as well as examples of their good practice in management, governance quality assurance, links with labour market, etc.

New laboratory facilities, library facilities, administrative/student services and ICT facilities have been expanded capacities of the project beneficiary faculties in engineering education as well as in sense of university management and governance.

Beneficiary faculties have developed different forms of partnership with enterprises: 1. Quality assurance procedure for student practice organization is established and adopted, 2. Partnership based on infrastructure development for better education (different donations of enterprises have been implemented), 3. Partnership based on employment of students & graduates in accordance with defined of enterprises needs (for example, Center for Applied Automatic Control at University of Kragujevac has selected 10 students & graduates for Muehlbauer Technologies doo, and at the same time has got donation from Muehlbauer (for infrastructure needs).

With more details we can illustrate restructuring university management and governance at GUC concerning with improvements of quality assurance system: Namely, the GUC already had an adequate central quality management system that already existed within the whole university, a recent quality management and accreditation committee (QMAC) was established at the university level with a representative unit in each faculty. Based on the previous studies, the QMAC adopted more Total Quality Management (TQM) implementation (leadership, process approach) focusing on quality culture. The challenge was to introduce three concepts (quality, management and new educational concepts) to busy staff in addition to the normal resistance to change and the fear of extra administrative work. Several meetings and discussions took place with the members of the EMS quality unit concerning the European Credit Transfer and Accumulation System (ECTS) and the learning outcomes concept implementation and adopting the student centred approach.

Several techniques were used to adopt the concept of learning outcomes. General meetings were held between the QMAC members & the EMS quality unit to explain the learning outcomes concept & Bloom's taxonomy. Other technique was to hold "workshops" with CC members, then departmental meetings were tried but due to the fact that the staff is busy & couldn't attend collective meetings another technique was used; where QMAC used "training of trainers" technique. Trainers were trained on the methodology of writing the learning outcomes using Bloom's taxonomy, accurate calculation of student workload. Trainers held one to one "on job training" for the busy staff. To increase the buy in of staff the QMAC members supported the academics in the fulfilling administrative part.

The Quality Management and Accreditation Committee (QMAC) together with the EMS curriculum committee decided to adopt the best practices accreditation standards based on previous studies made (engineering criteria mentioned in ABET, ASIIN, and on the National Academic Reference Standards [NARS]). It was found to be difficult to adopt both formats of our national accreditation agency (NAQAEE) and ASIIN resulting in duplication of work. Furthermore, the NARS had 2 versions; the first was issued in January 2009 and updated in September 2009. ASIIN also changed its criteria issued in 2006 to another updated version with removed specified curriculum structure in June 2011. GUC decided to apply for accreditation by ACQUIN especially that GUC management is going for ACQUIN System Accreditation. ASIIN workshops gave to the attendees more insight into engineering criteria and helped markedly in developing the quality culture at EMS faculty.

Although different agencies have apparent differences in their criteria for accreditation, they all agree on covering two essential requirements namely strategic planning and process approach. In addition to accreditation criteria set by accreditation agencies (ASIIN and ACQUIN), GUC will also adopt models for continuous educational enhancement (EFQM model for organizational excellence (European model) and Baldrige award model. Adopting one of these two models will in fact assist GUC in pursuing its goal to achieve a newly introduced system accreditation by the German accreditation council.

Too many concepts can not be introduced to the staff at the same time, so the focus was on the processes of teaching learning and assessment to ensure full implementation of the concepts.

The EMS curriculum committee together with QMAC carried on the continuous quality improvement cycle (plan-do-check-act) where the planning part was done by filling the students' workload template including the learning outcomes, teaching & learning methods, and assessment methods together with the estimated workload (written in the updated course description template). The do part of the cycle was to follow what was written in the form. The check part was done by using different surveys (course evaluation survey, fresh graduate survey) the act part was done by using the course report where survey analysis was done and course assessment results analyzed an action

plan was written for the next delivery of courses.

Implementation of appropriate quality assurance system is a precondition for international accreditation of engineering studies. Committee for quality assurance can permanently propose new improvements, but faculty management is responsible for implementation of quality assurance and enhancement system. Implemented quality assurance and enhancement procedures at beneficiary faculties/departments are printed as public document (on the web site <http://tempus.mas.bg.ac.rs>).

The most obvious proofs of the implementation are finalizations of accreditation processes and getting of the appropriate certificates for University of Belgrade, Faculty of Mechanical Engineering for the study program in Naval Architecture Engineering (MSc level), and for German University in Cairo for the study program Engineering and Materials Science (BSc and MSc levels). But, for finalizing accreditation the following processes took place:

- Preparing policies & procedures of the EMS curriculum committee
- The policies & procedures of the CC were made by the QMAC & revised with the heads of the CC in the different faculties
- Forming the curriculum committee in EMS
- Holding meetings in the QMAC office with the staff participants.
- Preparing materials to help in explaining new educational concepts
- Forming the flow chart explaining the old concept of education (teacher centred/ content oriented) versus the new concept (student centred/ learning outcomes oriented) and explaining Bologna process.
- Preparing materials, handouts and power point presentations about ECTS , learning outcomes ,Bloom's taxonomy, unified format for proper writing of course aims

Several material was studied to prepare handouts

Preparing templates

Course description template

Student workload template 1 (detailed per session ,modified from Tuning Approach template)

Student workload template 2 (Collective workload calculation for the course as a whole)

Course report

Several drafts of the student workload templates were tried as a pilot in order to choose the most suitable one

A collective course description template was formed satisfying the requirements of NAQAAE, ASIIN ACQUIN & ABET.

Other technique was to hold meetings with CC members, then departmental meetings were tried but due to the fact that the staff is busy & couldn't attend collective meetings another technique was used:

- Where QMAC used training of trainers technique
Trainers were trained on the methodology of writing the learning outcomes using Bloom's taxonomy
- Trainers held on job training for the busy staff

Estimation of students' workload, allocating the credit points, & comparing it to the previously allocated credit points.

During the on job training with the courses instructors and their assistants', there discussions about how to estimate the students workload and then to allocate the credit points for each course.

The second step was to compare the newly allocated workload with the previously allocated one.

Involvement of students in EMS curriculum committee

Start of students' meetings to have their feedback concerning courses, workload, etc...

Collect student suggestions.

Links with society

Did the project help to strengthen the role of higher education institutions in society at large (contributing to the development of lifelong learning, addressing the knowledge triangle, establishing links with the labour market, etc.)? If yes, please describe how these links have been institutionalised.

Beneficiary faculties have developed different forms of partnership with enterprises: 1. Quality assurance procedure for student practice organization is established and adopted, 2. Partnership based on infrastructure development for better education (different donations of enterprises have been implemented), 3. Partnership based on employment of students & graduates in accordance with defined of enterprises needs (for example, Center for Applied Automatic Control at University of Kragujevac has selected 10 students & graduates for Muehlbauer Technologies doo, and at the same time has got donation from Muehlbauer (for infrastructure needs).

Life long learning courses are also supported by this project or more exactly by new teaching laboratory infrastructure. Three different courses are offered and organized for training of non-university teachers: 1)

Introduction in Circuits, Sensors and Actuators, 2) Introduction in Object Oriented Programming and Mobile Robotics, 3) Introduction in Programming and Applications of PLC/HMI Devices and Industrial Computer Networks. Teaching activities at these LLL courses aren't paid from Tempus budget. Practically, this project has given equipment and LLL courses which were consumed within different LLL programs and projects for training and retraining.

This project has outcomes which are useful for primary and secondary education also. For example, the software solution *(<http://cpa.fin.kg.ac.rs:30/Home/EPublishing>) for web tutorial building system is gifted as a public good and some workshops have been organized for non university teachers. Use of this software is possible for different disciplines. The course Introduction to object oriented programming is developed and implemented within this tutor system, but developed tutor system can be useful for implementation different courses. These implementations are useful for problem oriented teaching/learning, better knowledge absorption and more objective knowledge evaluation. Different multimedia teaching materials can be implemented.

The most important impact at society will be realized by internationally accredited study programs which be more competitive in the increasingly-contested education market.

Mobility and training activities for staff and students:

- Please describe how the mobility and training activities have contributed to the achievement of the project objectives.
- Please describe the selection criteria used for mobility and training and indicate how the home institutions evaluated and recognised this mobility or took it into consideration, once it had been carried out.
- In the framework of student mobility and with regard to the recognition of study periods abroad, have agreements been signed between the universities? Was the mobility part of a credit transfer system comparable to the ECTS system? Was it in the framework of a double, multiple or joint degree? If yes, please provide details. If it was not, please indicate on what basis the results achieved by the students were officially recognised?
- Please comment on the assessment of the students' performance by the hosting universities/enterprises and on how the students assessed their stay at the host institution.

Staff (re)training

Immediately upon project acceptance and signing, project coordinators and deans of beneficiary faculties informed the faculty and university staff, explained the project goals and the most important activities that will be performed, and sent invitations for cooperation. Moreover, only the idea that a non-EU faculty can do enough within accepted project and be able to reach international accreditation as like as a respective EU faculty, was very useful for the promotion of the idea and project. At beneficiary faculties/universities, university/faculty staff awareness about quality assurance arouse and also the motivation of university staff to apply EU models and principles. A lot of meetings and TV broadcasts were performed and all of them were a part of retraining staff activity concerning wide span topics we have to do in order to reach international accreditation

Our concrete activities started even before the kick-off meeting (April 3-4). On Wednesday Feb.18th, National Tempus Office in RS organized a Tempus day on Faculty of Mechanical Engineering in Belgrade. The project has been presented to the audience of about 100 people. To dignify the meeting, welcome speeches have been addressed by H.E. Mr Josep Loveras, Ambassador of European Commission delegation in Serbia, Mr. Bozidar Djelic, Vice-president of the Government in charge for European integration (and, at the same time, Minister for science and technological development), Prof Dr. Zarko Obradovic, Minister of education, representatives of NTO and others

Prof. Dr. Milos Nedeljkovic as a responsible Project leader and at same time Government secretary in the Ministry for science and technological development, used every appropriate occasion within his official visits to RS universities and media, to explain the necessity of quality assurance and enhancement system based on the best international practice

Especially, Committees for quality assurance at beneficiary faculties/universities have been informed about project goals and possibilities for personal participation in this project. Large number of interested teachers and collaborators responded positively with the intention to support the project activities. Project coordinators have informed and trained each interested person who had clear wish to contribute to project realization. Talks were made with faculties' managements who will contribute to project activities. Teams for project management were formed according to the project plan. The project involvement of the professors and collaborators who can significantly contribute to the project results and its sustainability was more intensive than for the other projects. Also, there is a suggestion of National Tempus Offices that active Tempus projects should collaborate in order to reach synergetic

effects

There were at least four Tempus projects in realization concerning with quality assurance improvement at university level: 1) 158999 "Strengthening Quality Assurance System within West Balkans HEIs in support of National and Regional Planning", 2) 145677 "Internal Quality Assurance at Serbian Universities" (*all universities in RS are included*), 3) 144856 "International Accreditation of Engineering Studies", 4) 158926 "Governance and Management Reform in Higher Education in Serbia"

Because of the fact that project budget was cut and this suggestion of NTO, we were more oriented onto the main goal of this project: to reach international accreditation for selected study programs in engineering

Nevertheless, persons who lead project actions are mainly members of faculty and university Committees for quality assurance. Also, representatives from non engineering faculties who belong to Committee for quality assurance at university level were closely included in this project concerning with knowledge dissemination actions

Transfer of the knowledge and experience (organization, quality control implementation, making up to date and internationally harmonized study programmes and contents of the study courses, educational methods, upgrade of the laboratory support for subjects, teaching materials, selection of the reference literature for subjects, etc.), control and advisory role in the planned activities, are the essence of the role of the EU part of the consortium. Project representatives from beneficiary faculties have spent some time at participating EU universities in order to gathering of necessary knowledge. After their visits they held meetings for colleagues and students and presented their experiences

Also, Internet based communication technologies were used as the cheapest and the simplest connection between beneficiary and EU partners. These resources are also very useful for consultations, discussions and insight in well developed educational materials of the EU partners as well as great help for the development of quality assurance mechanisms, contemporary engineering curricula, new subjects and the reform of existing ones.

Developed new teaching facilities like web tutor system and e-published material in Object oriented programming implemented within this tutor software solution spread to wider education community and we have encompassed training of secondary school and Ministry for Education representatives (software solution of web tutor system with implemented course in OOP is available at - <http://cpa.fin.kg.ac.rs:30/Home/EPublishing>).

Staff mobility

The staff mobility scheme was precisely given in the description of project activities. Regarding selection criteria, those teachers and collaborators who can significantly contribute to the project activities and project sustainability were chosen as the main participants in the project. Each member of the project team or the group representative, upon completed stay, is obliged to perform public presentation at the level of faculty/university, as well as to do personal consultations with interested project members. At the faculty of Faculty of Engineering at University of Kragujevac *(Faculty Mechanical Engineering in Kragujevac up to 28th July 2011.) this was accepted as a general rule, and Teachers' Council supported it as a significant factor for improvement of education and dissemination of project results. EU to Partner Country visits were also significant for staff (re)training and dissemination activities. In some period of the project we had a smaller number of mobilities than planned was performed for the following reasons: 1) Financial support from the partner universities was late for administrative reasons 2) Project budget is cut and we would like reorganization of the budget in order to reach main project goals. 3) Problems with UK visas, 4) Period of summer holidays was not available for tempus activities, and thus made organisation more difficult. However, lower number of planned mobilities in some project periods had no adverse effects on the planned project outcomes.

Realized staff mobility:

1. 2008-12-09 - Belgrade - Rectorate Meeting with NTO
2. 2009-02-18 - Belgrade - TEMPUS Info Day - FME (NTO)
3. 2009-03-19 - Brussels - Representatives Meeting
4. 2009-04-03 - Kick-off meeting in Belgrade (in parallel [The World University Presidents Summit](#) was also held in Belgrade, so participants joined rectors and Nobel prize winners for some happenings and cocktails). Prof.Gabi appeared in prime time news on National TV (see Photo Gallery)
5. 2009-06-17 - Belgrade - Lecture on Jupiter Conference
6. 2009-09-21 - Belgrade - Visit of Munich participant
7. 2009-10-29 - Belgrade – HRK
8. 2009-12-16 - Belgrade-TEMPUS Info Day - FON (NTO)

9. 2010-01-18 - Cairo - TEMPUS Info Day (NTO)
 10. 2010-03-01 - Kopaonik, RS, TREND conference
 11. 2010-04-26 - Munich and Karlsruhe - consortium meeting with seminars
 12. 2010-06-15 - Cairo - consortium meeting with ASIIN seminar & workshop
 13. 2010-10-15 – University of Kragujevac – *I Conference for Quality Assurance in Higher Education*
 14. 2011-03-22 – Karlsruhe – staff retraining
 15. 2011-05-20 - Cairo - consortium meeting with ASIIN seminar & workshop
 16. 2011-07-08 - London - consortium meeting/staff retraining
 17. 2011-07-15 - Barcelona - consortium meeting/staff retraining
 18. 2011-09-04 – Belgrade, Nis, Kragujevac - consortium meeting with seminars and ASIIN seminar & workshop
 19. 2011-11-04 – Munic – staff retraining
 20. 2011-11-06 – Slovenia (Robotina) - staff retraining
 21. 2012-28-02 - Kopaonik, RS, TREND conference
 22. 2012-09-24 – Belgrade, – Days of Future: Robotics
 23. 2012-11-16- Belgrade, TEMPUS Info Day (NTO)
 24. 2012-11-20 – Kragujevac – IMP Mechatronics seminar
 25. 2012-11-28 - Cairo - consortium meeting
 26. 2012-12-10 - Barcelona - consortium meeting
 27. 2011-08-20 - Kragujevac – staff retraining (IMP seminar)
 28. 2012-08-29 - Kragujevac – staff retraining (IMP seminar)
 29. 2011-09-01- Kragujevac – staff retraining (IMP seminar)
 30. 2012-06-25- Kragujevac – staff retraining (IMP seminar)
 31. 2011-07-18- Kragujevac – staff retraining (IMP seminar)
 32. 2012-09-20 - Kragujevac – staff retraining (IMP seminar)
- + at least forty of inter-Serbia travels, mostly within one day consultations

Transfer of the knowledge and experience (organization, quality control implementation, making up to date and internationally harmonized study programmes and contents of the study courses, educational methods, upgrade of the laboratory support for subjects, teaching materials, selection of the reference literature for subjects, etc.), control and advisory role in the planned activities, are the essence of the role of the EU part of the consortium. Project representatives from beneficiary faculties have spent some time at participating EU universities in order to gathering of necessary knowledge. After their visits they held meetings for colleagues and students and presented their experiences.

All consortium meetings as well as dissemination activities are used for training activities for staff and students. ASIIN seminars were especially useful during consortium meetings in Cairo (2010, 2011) and Belgrade (September, 2011 – ASIIN presentations and workshop concerning learning outcomes).

Student mobility

Purpose of student mobility was preparation the best students for teaching assistant position in new laboratory supported environment. Also, representatives from Institute Mihailo Pupin were organized workshops and presentations for students and teaching staff at University of Kragujevac.

The participating students for the next period will be chosen with four criteria in mind: 1) Efficiency of studies (GPA, number of passed exams per year), 2) Area of interest, 3) Language skills and 4) Willingness to spend some time abroad

Realized student mobility

1. 2010-01-24 – London – student training
2. 2011-02-03 - London – student training
3. 2011-06-25 – London – student training
4. 2011-08-01 – Belgrade – student training
5. 2012-09-15 – Belgrade – student training

Students have participated in one month robotics science festival in Belgrade (September/October 2012 – “Days of Future: Robotics”) which is used for promotion of use robotics in engineering education and IAES Tempus project also.

Equipment

- How has the equipment been used during the project lifetime and how has it contributed to the project outcomes?
- What are the future plans for the use, maintenance and insurance of all the equipment purchased in the framework of the project?

Adequate educational laboratories are expensive, but necessary for contemporary engineering education. We had a difficulty that our financial support is very limited and, at the same time, laboratory work and very well organized educational laboratories are needed and are important part of any respective engineering study program. Planned concepts and procurement of laboratory equipment is explained in detail under description of the 3.1-activity in the project proposal.

Namely, at all beneficiary faculties, laboratory equipment is planned to support education in Mechatronics as an interdisciplinary engineering field which is a part Mechanical Engineering education too. New laboratory facilities are showed at <http://cpa.fin.kg.ac.rs:30/Home/EquipmentUniversity>, and some illustrations of a new laboratory supported teaching/learning methodology are showed at: <http://www.youtube.com/watch?v=cBVfc3Gwv1Y>, <http://www.youtube.com/watch?v=ACziG6gIygo>, <http://www.youtube.com/watch?v=QgzGUVxm4ck>, <http://www.youtube.com/watch?v=pS4kRwyNqOE&feature=g-upl&context=G255f9b4AUAAAAAAAAAAAA> and so on.

At Faculty of Mechanical Engineering University of Belgrade is formed new laboratory for 25 students, and procured laboratory equipment for individual student's work.

At Faculty of Engineering (former FME) at University of Kragujevac, two laboratories with 8 and 20 student places are improved. Additional donation resources from industry are used in order to improve some laboratory aspects (furniture, and so on).

At Faculty of Mechanical Engineering at University of Nis, existing Mechatronics educational laboratory is improved.

Laboratory equipment at RS beneficiary faculties is available for teachers and students in accordance with adopted quality assurance system. Notice that equipment is a part of teaching laboratories.

The Mechatronics Department at GUC purchased two educational equipments that are used in the Mechatronics Lab. These two equipments are:

- a. LDS 100 lb Shaker,
- b. Two workstations model HP Z800

The shaker that was bought is used in two main directions. The first one is for demonstration purposes for the students in the Vibrations of Structures course where simple structures like a cantilever beam is excited both directly and parametrically at different frequencies and students can see different mode shapes existing at different frequencies. Hence, they can relate theory with experiment. Another important use of the equipment is that several students do their B.Sc. theses utilizing the equipment, along with a spectrum analyzer to obtain and analyze experimental frequency response functions.

The Computational Fluid Dynamics (CFD) lab is heavily used for the research activities of the EMS graduate students as well as for the B.Sc. theses of the undergraduate students in the area of thermofluids including renewable energy and fluid dynamics. Moreover, the lab may be used for other engineering programs in their applications including modeling and simulation.

Uses:

-Used for designing and reading surveys, providing statistical analysis reports to survey responses, so it's a powerful indirect tool for program assessment and development.

-Also it is used in correcting exam answer sheets and providing statistical analysis reports about students' responses, so it is also used as a direct assessment tool for courses, as the statistical reports provided can help instructors write and implement their action plans depending on the statistics of students' responses.

Access:

- The Scantron device was located in the QMAC office.
- Regarding using the Scantron device in program assessment and development; the Scantron device was mainly accessed by the QMAC team.
- Regarding using the Scantron device in correcting exam answer sheets and providing statistical analysis reports; all the GUC faculties were welcomed to access the Scantron device after having training sessions provided by the QMAC team about the scanning procedures, and about how to

consider the exam statistical analysis reports of students' responses in the instructors' action plans.

Namely, laboratory hardware has been organized for the education of laboratory use at partner country faculties and for the right to access upon completion of manuals and safety procedures for teaching and laboratory staff and students.

Partner country faculties have laboratory infrastructure and experience with the building of laboratory setups, trained students, teaching staff and technicians who can continue with laboratory building and student project organization.

Laboratories are a necessary part of contemporary engineering education.

Established laboratory setups can be used upon completion of manuals and safety procedures.

Practically, the project equipment will be used in the future for usual everyday activities at the faculties where installed, and will be treated – usage, insurance and maintenance as the other equipment not from the project. Although the project is officially over, some activities will continue, especially the activities concerning the laboratory building and study program development. Accordingly, even after the project is over the project activities will continue, and the equipment will partly be used for those continuing project activities

Academic and administrative management of the project

- Could you please describe to what extent the institutions from the European Union and partner country(ies) participating in the project were involved and the support they provided, be it academic or administrative?
- Did you encounter any difficulties in the management of the project? If yes, please indicate the type of problems and the solutions identified to address them.

Under the items III.5.3. QUALITY CONTROL AND MONITORING and III.5.4. MANAGEMENT OF THE PROJECT within the project proposal, the planned Project Management structure, academic co-ordination activities, and decision making process are explained in detail. Upgrading of the Project Management structure is performed by making the presidents of the university Committee for quality assurance, rectors, deans of the consortium universities, the obligatory members of the Local Committees. This was necessary within the first part of the project realization because of the curriculum development and quality assurance issues. Coordinators/Contact persons for each partner university are responsible for administrative management of this project. Also, administrative/financial services of partner universities have been helping the project realization as part of the project participation (co-financing).

GUC: According to the authority levels at the German University in Cairo, the work load among faculty members is distributed and coordinated by the faculty dean. The load is divided among three groups: a group for quality assurance concepts and implementation, another group for a curriculum development and a third group for industrial relationships. Financial and administrative work is also supported by the corresponding university departments

Dissemination and Sustainability

- How did you achieve a multiplier effect of the project? Do you think that the successes will go beyond the immediate target group, for example to the wider education system, local economy and society?
- Do you think that the beneficiary institutions will be able to sustain and develop the achievements of the project? If yes, what measures were set up or are planned to support this continuation? What obstacles were there and what measures were taken to address them?
- Do you foresee any future co-operation with the partners of your project?
- How do you plan to use the results of the project in the future?
- What measures have been taken to formalise or institutionalise links with local non-university partners?

Dissemination analyzing & actions planning

The dissemination has included information exchange (using web publishing, marketing presentations, etc.), information sessions and workshops where outputs of the project are presented.

Some dissemination results – 16 TV broadcasts, 5 university presentations, 7 newspaper articles, <http://tempus.mas.bg.ac.rs/doc-1.html> , <http://cpa.fin.kg.ac.rs:30/Home/Home>, academic collaboration among WBC faculties and universities, secondary school presentations which are given with intention techniques popularization,

participation at TREND Conferences (about university education) www.trend.uns.ac.rs from 1st to 4th March 2010, and in March 2012. within sessions with university, faculty and government representatives from Western Balkan Countries.

Participation in one month robotics science festival in Belgrade (September/October 2012 – “Days of Future: Robotics”) is used for promotion of use robotics in engineering education and IAES Tempus project also.

CD "Introduction to Object-Oriented Programming - Collection of tasks with interactive software-testing system and support learning", 144,856-TEMPUS-2008-RS-JPGR, was presented at the Roundtable - "New concepts of learning and ICT technologies as a help or hindrance" Faculty of Engineering at University of Kragujevac

The presentation: “International Accreditation. Results and planned activities at 144856-2008-RS-JPGR Tempus project International Accreditation of Engineering Studies”, *I Conference for Quality Assurance in Higher Education*, 15th October 2010, University of Kragujevac

YouTube resources about some aspects of the Tempus results (some TV broadcasts, equipment use, master thesis presentations, new teaching methodology) are organized and have stayed a part of practice concerning with results sharing and promoting.

Four workshops were organized by ASIIN.

GUC (The dissemination of information about the project and its results):

Due to QMAC’s efforts to always disseminate the results of the activities carried, other faculties and departments in the GUC adopted the student centred approach. Where learning outcomes, Bloom’s taxonomy & ECTS were adopted The detailed student workload form was fully implemented in the Faculty of Pharmacy & the Faculty of Management where outcomes & ECTS credit points were written for every session of the course. This approach couldn’t be implemented in EMS so a shift took place to another approach where a general workload table was used for the average estimation for the student’s workload.

Also further dissemination will take place through the 10th national TEMPUS day and projects forum titled “TEMPUS in Egypt, 10 years”.

Sustainability analyzing and action planning.

All officially adopted documents which result from the project directly contribute and guarantee that the project results will be implemented and used for a long time after project completion: 1) documentation about adopted teaching quality procedures at faculty and university levels, 2) documentation about new curricula, courses and syllabuses, 3) documentation about equipment procurement, 4) documentation about publishing activities. 5) accreditation certificates, 6) adopted quality assurance system, 7) stable financial support to beneficiary faculties and developed infrastructure by this project (laboratories, QA system, and so on).

GUC example- Establishment of QMAC as a physical and political structure on the university level.

The QMAC will carry an ongoing process of training the trainers and staff of different faculties on different quality concepts including enhancing the implementation of TQM and CQI. Also the central QMAC unit will guarantee applying the state of art national and international accreditation standards and models and to distribute the TQM culture all over the GUC faculties.

Establishment of **EMS curriculum committee** as a physical structure. EMS curriculum committee will carry on an on going process of revising the programs’ objectives and learning outcomes. Prof. Imam Morgan; the head of the **EMS curriculum committee**, will be the ECTS coordinator for the faculty.

Involvement of students in curriculum committee in all the GUC faculties.

Where an on going process of collecting students’ feedback and suggestions regarding workload, curriculum, instruction, and assessment is to take place to be used in enhancing the educational process.

Forming courses’ syllabi catalogues for 4 engineering programs.

Four courses’ syllabi catalogues were prepared by revising the program learning outcomes and the students’ workload ,namely:

- Mechatronics Engineering Bachelor of Science Program
- Mechatronics Engineering Master of Science Program
- Design & Production Engineering Bachelor Program
- Design & Production Engineering Master Program

This process is to be carried out for all the GUC programs on regular basis by the curriculum committees of the different GUC faculties.

Preparation and initiation of assessment committee

The QMAC started the assessment process on the university level, by preparing and implementing course evaluation survey, fresh graduate survey, alumni survey, & employer survey where the reports about the surveys will be used for continuous quality improvement.

The QMAC prepared for the initiation of the assessment committee to be responsible for the previously mentioned tasks as on going processes, including the direct and indirect assessment.

Using technology transfer and physical infrastructures in

Continuous quality development based on direct and indirect assessment statistics provided by Scantron (iNSIGHT 4) scanner hardware and software, and Intelligent Item Bank (IIB) software.

Scantron (iNSIGHT 4) scanner hardware and software was bought for continuous process of designing and reading surveys, providing statistical analysis reports to survey responses, so it's a powerful indirect tool for assessment of the different programs and continuous development on the GUC level.

Also it is used in correcting exam answer sheets and providing statistical analysis reports about students' responses, so it is also used as a direct assessment tool for courses, as the statistical reports provided can help instructors write and implement their action plans depending on the statistics of students' responses fulfilling the continuous quality improvement of courses.

Intelligent Item Bank (IIB) is an item banking application; it provides extensive information regarding test development and psychometric characteristics of the items (questions).

It is a software used to build question banks for each course, in which the questions are listed under the categorization of learning outcomes, and after building a question bank, the instructor can put as example that he/she needs (according to the courses learning outcomes) the exam to be of 30 % in the level of knowledge and understanding, 50 % in the intellectual level, and 20% soft skills, then the software will export automatically the exam with the required structure and levels. So, this software is used in the project to deepen the concept of learning outcomes in the instructors' minds, and to link the written learning outcomes to the courses' assessment.

Also the continuous quality improvement cycle was adopted

These activities and approaches are to ensure the future sustainability of the results as long as there is always measuring & improvement.

Gender balance

Please explain to what extent the principle of equal opportunities has been taken into account in the project implementation (i.e. gender analysis carried out, presence of women in decision-making bodies, balanced percentage share of women among the teachers or the enrolled students, etc.). Describe how the project helped to promote gender balance and to identify and address factors influencing gender discrimination.

This project could not explicitly help gender balance promotion. Established quality assurance mechanisms do not touch this issue. It is interesting that there is much better balance between women/men among teaching than student population at all beneficiary engineering faculties.

Unexpected outcomes/ spin-off effects

- Did the project implementation produce any unexpected outcomes or spin-off effects, either positive or negative? If yes, please describe them.

There was a suggestion of RS National Tempus Office that all active Tempus projects should collaborate in order to reach synergetic effects. There were at least four Tempus projects in realization dealing with quality assurance improvement: 1) 158999 "Strengthening Quality Assurance System within West Balkans HEIs in support of National and Regional Planning", 2) 145677 "Internal Quality Assurance at Serbian Universities" (*all universities in RS are included*), 3) 144856 "International Accreditation of Engineering Studies", 4) 158926 "Governance and

Management Reform in Higher Education in Serbia”. To meet the suggestion, on 16. October 2010 “The First Quality Assurance Conference in Higher Education” has held in organization of University of Kragujevac and Committee for quality assurance. At this manner potentials and impacts of the mentioned Tempus projects were discussed and disseminated. Concerning the quality assurance development in this project, it represents only one important part in order to reach the relevance for international accreditation.

Beneficiary faculties also had to reach relevance of engineering studies. Appropriate education laboratories are necessary for accreditation and quality assurance of any relevant engineering study program. Life long learning courses are also supported by this project or more exactly by new teaching laboratory infrastructure. Three different courses are offered and organized for training of non-university teachers.

We are expecting positive decisions about submitted study programs for international accreditation.

The GUC has submitted applications for international accreditation to ACQUIN for two study programs:

1. Mechatronics Engineering International Bachelor of Science Program (in English)
2. Mechatronics Engineering International Master of Science Program (in English)

After accreditation of international Mechatronics study programs by ACQUIN, it is planned agreement about these programs improvements as a Joint degree study programs between GUC and University of Ulm. This project is opened the door for all beneficiary institution for future developments in this direction. Joint degree programs are excellent solution for university internationalization and shared resources among universities. International accreditation study program in Mechatronics was precondition for next steps of developments of these programs as joint study program among German universities and GUC (possible and Serbian universities after getting international accreditation).

Also, we had to provide coherency of three group project results: a group for quality assurance concepts and implementation, another group for curriculum development (including education laboratory development) and a third group for industrial relationships. Synergetic results of mentioned three group project results are international accreditation of selected study program

Beneficiary faculties have developed different forms of partnership with enterprises: 1. Quality assurance procedure for student practice organization is established and adopted, 2. Different donations of enterprises have been implemented, 3. Partnership based on employment of students & graduates in accordance with defined of enterprises needs (for example, University of Kragujevac has selected 10 student & graduates for Muehlbauer Technologies doo, and at the same time has got donation from Muehlbauer (for infrastructure needs).

Statistics and Indicators

This section aims to gather statistical data and indicators of performance covering the entire project duration

Main targets

Please tick the appropriate box

YES NO N/A

Teacher training

Please indicate whether your project has links, targets or objectives related to teacher training

X		
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VET

Please indicate whether your project has links, targets or objectives related to Vocational Education and Training

	X	
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Education levels addressed by the project

Please indicate whether your project has links, targets or objectives related to programmes at :

- Bachelor level
- Master level
- Doctorate level

X		
X		
		X

Training and mobilities

Enter the code of the partner country concerned in the first lines and figures in the second and third:

Training of partner country staff and students

Number of academic staff from the partner country's Higher Education Institutions trained/retrained

Please indicate the number of teaching staff (professors, assistants with teaching tasks, etc.) trained and/or retrained during the project lifetime:

(Country of origin)

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	110	75			
Number Female	70	30			

Number of non-academic staff from the partner country's Higher Education Institutions trained/retrained

Please indicate the number University administrative staff (librarians, staff from the International Office, IT specialists, etc.) trained during the project lifetime:

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	10	4			
Number Female	10	10			

Number of staff from the partner country's non Higher Education Institutions trained/retrained

Please indicate the number of staff of non HEI (enterprises, NGOs, Chambers of Commerce, Government, local administration, etc.) trained during the project lifetime:

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	40	15			
Number Female	21	0			

Number of students from the partner countries who have attended programmes/courses developed in the framework of the project

Please indicate the number of students from the partner countries that have been trained and/or retrained in the programmes/courses developed by the project during the project lifetime:

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	800	800			
Number Female	400	200			

Academic/administrative staff mobility

Number of partner country - EU mobility flows of more than 2 weeks

Please indicate the number of partner country staff mobility flows from the partner country to the European Union during the project lifetime:

(Country of origin)

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	0	0			
Number Female	0	0			

Number of EU - partner country mobility flows of more than 2 weeks

Please indicate the number of European staff mobility flows from the European Union to the partner country during the project lifetime:

(Host country)

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	<u>0</u>	<u>0</u>			
Number Female	<u>0</u>	<u>0</u>			

Number of partner country – partner country mobility flows of more than 2 weeks

Please indicate the number of staff mobility flows within the same partner country during the project lifetime:

(Country of origin)

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	<u>0</u>	<u>0</u>			
Number Female	<u>0</u>	<u>0</u>			

And between two different partner countries:

Number Male	<u>0</u>	<u>0</u>			
Number Female	<u>0</u>	<u>0</u>			

Student mobility

Number of partner country - EU mobility flows of more than 2 weeks

Please indicate the number of partner country student mobility flows from the partner country to the European Union during the project lifetime:

(Country of origin)

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	<u>1</u>	<u>10</u>			
Number Female	<u>4</u>	<u>10</u>			

Number of EU - partner country mobility flows of more than 2 weeks

Please indicate the number of European student mobility flows from the European Union to the partner country during the project lifetime:

(Host country)

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	<u>0</u>	<u>0</u>			
Number Female	<u>0</u>	<u>0</u>			

Number of partner country – partner country mobility flows of more than 2 weeks

Please indicate the number of student mobility flows within the same partner country during the project lifetime:

(Country of origin)

	RS	EG	Country Code:	Country Code:	Country Code:
Number Male	<u>2</u>	<u>0</u>			
Number Female	<u>2</u>	<u>0</u>			

And between two different partner countries:

Number Male	<u>0</u>	<u>0</u>			
Number Female	<u>0</u>	<u>0</u>			

Links to European Higher Education policies

Please tick the appropriate box

Diploma supplement

Please indicate whether the project contributes to the introduction of procedures for the issuing of diploma supplements in the partner country university/ies. For information on the diploma supplement:

http://europa.eu/comm/education/policies/rec_qual/recognition/diploma_en.html

YES NO N/A

X		
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Adoption of a system based on three main cycles, undergraduate (Bachelor), postgraduate (Master) and Doctorate

Please indicate whether your project contributes to the adoption of a system based on three main cycles.

X		
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Introduction of double/multiple or joint degrees

		X
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Please indicate whether in the framework of your project the institutions involved plan to develop/issue double/multiple or joint degrees.

Establishment of an ECTS system

X		
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Please indicate whether your project contributes to the introduction and/or development of the European Credit Transfer System at the consortium partner university(ies). For information on ECTS:

http://europa.eu/comm/education/programmes/socrates/ects/index_en.html

Promotion of quality assurance procedures at institutional or national level

X		
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Please indicate whether the project contributes to the enhancement of the partner country university/ies strategies for quality assurance. For information on the 'Standards and guidelines for quality assurance in the European higher education area': http://www.bologna-bergen2005.no/Docs/00-Main_doc/050221_ENQA_report.pdf

Qualification frameworks

X		
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Please indicate whether the project contributes to the development of national qualification frameworks and implementation at university level, in line with the European Qualification Framework's principles. For information on the European Qualification Framework: http://ec.europa.eu/education/lifelong-learning-policy/doc44_en.htm

Lifelong learning policies and approaches

	X	
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Please indicate whether your project contributes to developing lifelong learning approaches

For information on Life Long Learning European policy: http://ec.europa.eu/education/lifelong-learning-policy/doc28_en.htm

Modular curriculum structure

X		
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Please indicate whether your project contributes to the promotion of modular curriculum structure.

New teaching and learning methods

X		
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Please indicate whether the project contributes to the development of new teaching/learning methods at the partner country university/ies.

E-Learning

X		
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Please indicate whether the project contributes to the development of an e-learning strategy at the partner country university/ies.

University/Enterprise cooperation

X		
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Please indicate whether the project foresees the implementation of co-operation activities between the partner country university/ies and the private sector.

Links to the labour market in degree programmes

X		
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Please indicate whether the new/restructured curriculum/curricula is/are being developed in order to respond directly to the needs of the local and national labour market, i.e. through internships, intensive training in the field, etc.

Links with other EU education programmes

	X	
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Please indicate whether your project is directly linked to EU educational Programmes other than Tempus such as Erasmus Mundus or the Life Long Learning Programme. For information on the EU educational programmes:

http://ec.europa.eu/education/index_en.htm

If yes, please indicate to which EU educational programme your project is linked:

EXAMPLE
USE ONE TABLE PER OUTCOME: PGR
ADD AS MANY TABLES AS NECESSARY

Table of achieved Outcomes

Insert the title and reference number as indicated in your project proposal

<u>Title and reference number of the outcome:</u>	
<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	

Insert the indicators of achievement and/or performance as indicated in your project proposal

Activities carried out for the achievement of this outcome (entire project period):

Activity N	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement

Activity number as indicated in the project proposal

Insert the activity title as indicated in the project proposal

State where and when the activity took place

Provide a brief description of the activity carried out

Insert specific indicators (qualitative and quantitative) which measure the achievements of the activity result

Changes that have occurred in this outcome since the previous approved report:

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Describe any change to the activity plan described in the previous approved report

Table of achieved/planned Outcomes

<u>Title and reference number of the outcome:</u>	I. Quality assurance and enhancement system for engineering education
<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	Committee for quality of engineering education is established. New quality procedures are adopted and old ones are updated

Activities carried out for the achievement of this outcome (over the entire project period):

Activity N°	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement
1.1.	Review of existing national and international quality assurance and enhancement systems for engineering education	January, 2009.	April, 2009.	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>1) All necessary information about national and international quality assurance and enhancement systems for engineering education are collected</p> <p>2) Exchange of all relevant information between the consortium members</p> <p>3) Preparation of project staff for the next activity</p> <p>4) The project offices at beneficiaries universities are established</p> <p>5) The project website http://tempus.mas.bg.ac.rs is established</p> <p>Accreditation agencies requirements are compared by including objectives, learning outcomes, & the different credit systems, etc. In meanwhile, kick off meeting is organized at Faculty of Mechanical Engineering, University of Belgrade, Serbia. A part of its content was:</p> <ul style="list-style-type: none"> - An overview was given about the outlines of the project, overall project goals, outputs & outcomes - Also the exchange of ideas about the national & international accreditation agencies namely; ABET, ASIIN, ACQUIN, NAQAAE, KAPK took place in the kick off meeting - During the kick off meeting, introducing the delegates to each others took place, where they discussed the different aspects and the implementation procedures of the project. 	<p>Information, materials and elaborates about international quality assurance.</p> <p>The Project Tempus Offices at beneficiary universities and the project web site are established.</p> <p>GUC Report :“Comparing the accreditation agencies background ABET, ASIIN ACQUIN”</p> <p>GUC Report ”Comparison of educational objectives requirements of accreditation agencies ABET, ASIIN , ACQUIN, NAQAAE”</p> <p>GUC Report “Comparison of learning outcomes approach requirements of accreditation agencies; ASIIN, ABET, NAQAAE, ACQUIN”</p>

					<ul style="list-style-type: none"> - Presentation and discussion about European Standards and Guidelines (ESG) http://www.eqar.eu/fileadmin/documents/e4/050221_ENQ_A_report.pdf - ASIIN presentations about QA and ASIIN - Presentations and discussions of EU partners 	<p>GUC Report “ Comparing accreditation requirements of ASIIN, ACQUIN, ABET, & Egyptian accreditation agencies regarding curricular structure & content”</p> <p>GUC Report “Comparisons for accreditation agencies requirements regarding; students admission, examinations, facilities & support, & staff“</p> <p>GUC Report “Comparison between ECTS & Credit hour system“.</p> <p>Report “Report on the kick off seminar”</p>
1.2.	Establishment of Committee for quality of engineering education	February, 2009.	May, 2009.	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>The aim was to establish Committee for quality of engineering education. It is done at GUC (EG), and in RS - Committee for quality of engineering education is established by project representatives as a service for faculty/university authorities and colleagues in realization Tempus projects with complementary aims. In RS, Committees for quality assurance on university level are established, and they encompass quality of engineering education issues, also.</p> <p>This activity was encompassed following:</p> <ul style="list-style-type: none"> - Reviewing of the adequate central quality system that already existed within the whole university - Study of accreditation agencies and the excellence models adopting TQM, and the global shift from the inspection concept to the concept of TQM, meaning the involvement of everybody - Proposal for Re-organization of the Quality Assurance System in GUC - Two proposals were prepared; the first one was to develop a central quality assurance department at 	<p>Committee for quality of engineering education at GUC. Committee for quality of engineering education is encompassed by Committee for quality assurance on university level in RS.</p> <p>Report “Review of quality managements for CQI “</p> <p>Report “Proposal for re-organization of the Quality Assurance system in the GUC”</p> <p>The first QMAC meeting in the GUC Presentation of D. Magdy to the meeting attendees.</p>

					<p>the university level with corresponding quality assurance units at the faculties' level, the second one was to develop a central quality assurance department at the university level, with corresponding central functions, managed by persons from each faculty or by committees within each faculty. (Curriculum committee and assessment committee)</p> <ul style="list-style-type: none"> - Establishment of quality management and accreditation committee (QMAC) on the university level. - The upper GUC management approved the second proposal. A quality management and accreditation committee (QMAC) was established at the university level with a representative unit in each faculty. - Establishment of the EMS Curriculum Committee for quality of engineering education has been done. 	
1.3.	Proposal of quality assurance and enhancement system for engineering education,	April, 2009.	July, 2010.	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>The aim was to propose improvements existing quality assurance system on faculty and university level at beneficiary universities.</p> <p>Proposed improvements are based on Comparisons for accreditation agencies requirements regarding; students admission, examinations, facilities & support, & staff as well as QA standards from EU partner universities.</p> <p>GUC *(EG) procedures:</p> <p>The central QMAC took a decision for taking the approach of compliance to standards - A decision was taken for adopting the compliance to standards approach based on the previous studies made and on the NARS.</p> <p>Adoption of the best models for continuous quality enhancement: Studying the EFQM (the European model for organizational excellence), & Baldrige award model</p> <p>Based on the previous studies, the QMAC adopted more TQM implementation (leadership, process approach).</p> <p>Continuous quality improvement using PDCA cycle (Plan-Do-Check-Act).</p> <p>At RS beneficiary universities quality assurance system dominantly depends on top management of faculties and</p>	<p>Comparisons for accreditation agencies requirements regarding ; students admission, examinations, facilities & support, & staff</p> <p>GUC comparison between ECTS & Credit hour system.</p> <p>Adopted quality control rules at faculty and university level.</p> <p>Report "Guidelines for quality assurance and enhancement in engineering education"</p> <p>TREND (www.trend.uns.ac.rs) papers</p> <p>Presentation of Dr. Magdy</p> <p>Presentation of Dr. Mohamed</p>

					<p>universities, as well as its Committees for QA. One of duties of QA Committee is continuously improvement of quality assurance system. This project has gave its contribution related with improvements of quality assurance system at Serbian faculties and universities.</p> <p>Some results are presented by Prof. Matijevic at TREND www.trend.uns.ac.rs from 1st to 4th March 2010, within sessions with university, faculty and government representatives from Western Balkan Countries. In addition to accreditation criteria set by accreditation agencies (ASIIN and ACQUIN) GUC will also adopt models for continuous educational enhancement (EFQM model for organizational excellence (European model) and Baldrige award model). Adopting one of these two models will in fact assist GUC in pursuing its goal to achieve newly introduced system accreditation by the German accreditation council.</p>	<p>Shohaieb Report "Review of quality managements for CQI " Presentation of Dr. Magdy (Leadership, quality concepts).</p>
1.4.	Promotion of necessity of quality assurance and enhancement system based on the best international practice	April, 2009.	March, 2011	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>During whole the project span the necessity of introducing of quality assurance and enhancement system based on the best international practice has been promoted.</p> <p>Moreover, participation in this project are often used for faculty promotion in media by deans and vice deans in Belgrade, Kragujevac and Nis. Comparative advantage of engineering profession is internationality and because of that it is necessary to apply international standards in engineering education. To implement the excellence model we need to have a culture of TQM in which everyone is involved and committed, to continuous enhancement. A lot of events are organized in order to promote these facts. Also the project participants have took place within different occasions (conferences, workshops, TV broadcasts, local newspaper, lectures, meetings, publications, and so on). For example:</p> <ul style="list-style-type: none"> - Participation at The First Quality Assurance Conference in High Education, University of Kragujevac, Kragujevac, Serbia, 15/10/2010. - Participation in one month robotics science festival in Belgrade (September/October 2012 – "Days of Future: Robotics") is used for promotion of use robotics in engineering education and IAES Tempus project also - A lot of presentations were organized - Meetings with the members of the EMS quality unit. 	<p>Up to now, the project has been presented to the audience of about 1500 people (or much more, including promotion within manifestation "Days of Future: Robotics" in Belgrade).</p> <p>One to one meetings and group discussions</p> <p>The pilot projects of Dr. Mona Osman</p> <p>Presentation of Dr. Ihab Ahmed "Review of Key Performance Indicators"</p> <p>Presentation of Prof. Ibrahim El-Demiry "Faculty of Postgraduate Studies & Scientific Research <i>Strategies and Progress</i>"</p> <p>Presentation of IT department ."State-of-the-Art IT</p>

					<p>Several meetings and discussions took place with the EMS quality unit members discussing the project progress and requirements, also an introduction about the ECTS and the learning outcomes concept were discussed.</p> <ul style="list-style-type: none"> - QMAC meetings & discussions with Dr Mona Osman, the head of the English & Scientific Methods department in the GUC. Several meetings and discussions took place between the QMAC team and Dr. Mona Osman introducing to her the TQM concepts and approaches, and she decided to implement these new concepts in one of her courses as a pilot. - Preparing materials to be presented in the third consortium meeting. Internal meetings and discussions were held between QMAC members & Dr. Mona Osman to discuss the TQM concepts and applications and to prepare the materials and handouts to be discussed during the third consortium meeting. Also internal faculty meetings and discussions in the faculty of EMS took place to prepare for the third consortium meeting. - Presentations and workshops of the 2 consortium meeting held at the GUC in 6/2010. Four presentations were given by the representatives of the GUC and the faculty of EMS about the GUC's performance indicators, postgraduate studies & research, faculty of EMS, and the IT infrastructure. Two presentations were held by Dr. Mona Osman , the head of the English department in the GUC ; in the first one, she gave brief idea about quality, learning outcomes concept, difference between course assessment & program assessment . She also referred to Bloom's taxonomy, workload, ECTS & the Tuning project. In the second presentation, she explained the concept of learning outcomes' assessment in the course objectives survey. A presentation and a work shop were given by Ms. Jana, the ASIIN's consultant. - Introducing the total quality management concepts 	<p>Infrastructure GUC”</p> <p>Presentation of Prof. Ibrahim Mansour “Faculty of Engineering and Materials Science”</p> <p>Presentation 1 of Dr. Mona Osman “Quality Revisited: Educational Tools Optimization Approach- Program Outcomes’</p> <p>Presentation 2 of Dr. Mona Osman “Quality Revisited: Educational Tools Optimization Approach: Learning Objectives Survey”</p> <p>Presentation of Ms. Jana “The importance of outcome-orientation-International Accreditation of Engineering Studies”</p> <p>Work shop of Ms Jana “Characterize the mechanical, physical and electrochemical behavior of materials.</p> <p>Presentation of Dr. Magdy to the meeting attendees</p> <p>Presentation of Dr. Mohamed Shohaieb</p> <p>Presentations of RS university and faculty representatives</p>
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					<p>to the different faculties on the university level through a presentation. Two presentations were held by Dr. Mohamed Shohaib, & Dr. Magdy Mansour to the different faculties' representatives, introducing Total quality management concepts.</p> <ul style="list-style-type: none"> - RS presentation at TREND conferences, to students and professors at organized occasions, and so on. 	
1.5.	Implementation of quality assurance and enhancement system at beneficiary faculties	January, 2010	January, 2013	<p>University of Belgrade, University of Kragujevac, University of Nis, GUC</p>	<p>Implementation of appropriate quality assurance system is a precondition for international accreditation of engineering studies. Committee for quality assurance can permanently propose new improvements, but faculty management is responsible for implementation of quality assurance and enhancement system. Implemented quality assurance and enhancement procedures at beneficiary faculties/departments are printed as public document (on the web site). All beneficiary partners are adopted a few essential procedures for this project realization.</p> <p>An example of a lot of sub-activities with instances of QA improvements & implementations at GUC:</p> <ul style="list-style-type: none"> - Preparing policies & procedures of the curriculum committee. The policies & procedures of the CC were made by the QMAC & revised with the heads of the CC in the different faculties. - Forming the staff curriculum committee in EMS. Initiating the EMS staff CC. Holding meetings in the QMAC office with the staff participants. - Preparing materials to help in explaining new educational concepts. Forming the flow chart explaining the old concept of education (teacher centered/ content oriented) versus the new concept (student centered/ learning outcomes oriented). - Preparing materials, handouts. Several material was studied to prepare handouts. 	<p>Adoption of new quality control mechanisms at faculty and university level.</p> <p>CC policies & procedures.</p> <p>Meetings minutes of the Staff CC</p> <p>The flow chart .</p> <p>Materials/ handouts. Employability. Student workload. Tuning approach</p> <p>On going presentations & workshops with all courses' instructors and their assistants.</p> <p>Templates prepared: Student workload template. Course description template. Modified template. Course report.</p> <p>The filled courses' syllabi templates.</p> <p>The filled students' workload template.</p> <p>Minutes of the meetings</p>

					<ul style="list-style-type: none"> - Explaining the new educational concepts. Several presentations held with staff members explaining the difference between the 2 concepts, the learning outcomes concept, & the ECTS. - Collecting materials required to prepare the templates. Revising all the available materials and accreditation agencies requirements. (Tuning project, Egyptian agency, ASIIN ,ACQUIN, & ABET). Collective requirements template (collective good practices). - Preparing templates. Student workload template. Course description template. Modified template. Course report. Several drafts of the student workload templates were tried as a pilot in order to choose the most suitable one. A collective course description template was formed satisfying the requirements of NAQAAE, ASIIN ACQUIN & ABET. - Implementing the learning outcomes Concept & using Bloom’s taxonomy in writing the outcomes. Several techniques were used to adopt the concept of learning outcomes. General meetings were held between the QMAC members & the EMS quality unit to explain the learning outcomes concept & Bloom’s taxonomy Other technique was to hold meetings with CC members, then departmental meetings were tried but due to the fact that the staff is busy & couldn’t attend collective meetings another technique was used: Where QMAC used training of trainers technique. Trainers were trained on the methodology of writing the learning outcomes using Bloom’s taxonomy. Trainers held on job training for the busy staff. - Estimation of students’ workload, allocating the credit points, & comparing it to the previously allocated 	<p>Action plan</p> <p>Part I & Part II Report about discussion and evaluation of activities in “Mechatronics Engineering” during the visit to the GUC, commencing Sunday, 13th until Thursday, 17th March 2011</p> <p>15 presentations were prepared</p> <p>Decision to implement new surveys(FGS, AS, ES, CES) together with the previously implemented surveys</p> <p>Report on analyzing the FGS using the SPSS software</p> <p>Report on analyzing the FGS using the surveying machine</p> <p>Report on analyzing the alumni survey Timetable for the coordination between the Fresh Graduate Survey (FGS) and the Alumni Surveys</p> <p>3templates were prepared Filled in employer survey Proposal for enhancing the process</p> <p>Presentation by Dr. Mona Osman in the third consortium meeting Presentation & report presented by Dr. Mona Osman in the fourth consortium meeting</p>
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					<p>credit points. During the on job training with the courses instructors and their assistants', there were discussions about how to estimate the students workload and then to allocate the credit points for each course. The second step was to compare the newly allocated workload with the previously allocated one.</p> <ul style="list-style-type: none"> - Forming the student's curriculum committee in EMS. Start of students' meetings to have their feedback concerning courses, workload, etc. Collect student's suggestions. - Linking the learning outcomes concept with assessment by using the item analysis bank software. This soft ware is bought & is to be implemented to deepen the use of the concept of learning outcomes. - Training sessions are to be held in the QMAC office by the service providers to the trainees including courses' instructors, teaching assistants & some of the QMAC assistants - Action plan for the implementation of the use of the item bank for Mechatronics program. - Action plan for the implementation of the use of the item bank for other programs. Action plan is to be prepared for implementing the use of the software. - External evaluation of the Mechatronics program. Professor Dr.-Ing. S. Helduser visited GUC and evaluated the Mechatronics programs <p>26 March 2011</p> <ol style="list-style-type: none"> 1- Program & suggesting adding new elective courses to the master level (semesters 9 & 10) 2- Final exams for 5 courses where complete analysis was 	<p>Proposal of posting the course objectives achievement survey on the website</p> <p>Statistics of course evaluation survey.</p> <p>Course report template (first version) Course report template (simplified version)</p> <p>Filled course reports</p> <p>Implementation of quality assurance and enhancement system at Faculty of Engineering at University of Kragujevac (former Faculty of Mechanical Engineering) is described on http://fink.rs/index.php?option=com_content&view=article&id=917&Itemid=438</p> <p>Implementation of quality assurance and enhancement system at Faculty of Mechanical Engineering at University of Belgrade is described on http://www.mas.bg.ac.rs/</p> <p>Implementation of quality assurance and enhancement system at Faculty of Mechanical Engineering at University of Nis is described on http://www.masfak.ni.ac.rs/sitegenius/index.php?done</p>
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					<p>given & a comparison to the exams held in Dresden was done</p> <p>3- Research activities</p> <ul style="list-style-type: none"> - Preparation of materials for the initiation of the assessment committee. Preparing presentations using a reference book “Developing Effective Assessment in Higher Education”: A Practical Guide as a main source together with other materials. - Collecting materials from different national & international universities concerning surveys to adopt good practices. National & international surveys were studied & GUC made its own survey including its own areas of interest. - Differentiating between fresh graduate survey & alumni survey. Comparing surveys of different universities. Concluding that the fresh graduate’s survey is to be answered by graduates within 6 months of graduation. The alumni survey is to be answered by graduates after 6 months of graduation. - Implementing fresh graduate survey. The fresh graduate survey(FGS) was prepared, collected & analyzed. It is a survey that students have to fill right after their graduation ceremony. The FGS is implemented in 2010, 2011.2012 and it is an on going process where it is to be implemented every year. A surveying machine was bought to be used in surveys analysis. - Implementing alumni survey. The alumni survey was prepared, collected & analyzed in 2010 It was implemented in a certain ceremony held at the GUC (Sohour gathering). 	
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					<ul style="list-style-type: none"> - Implementing employer survey. A brain storming session was held and the recommendations were to implement 3 templates, one for the HR, the other one for the supervisor of the employee, and the last one for the manager. The process included 3 phases; preparation, proposing, & implementation. - Implementing course objectives achievement survey. The course objectives achievement survey was formed & implemented in the ABSK course as a pilot. It was then implemented in this course every semester to detect the degree of achievement, improve, etc. It will be implemented in other courses. - Implementing course evaluation survey. The course evaluation survey was first prepared in Dec. 2010. It is an online survey that students have to fill by the end of each semester. - Collecting materials from different national & international universities concerning the course monitoring. National & international reports were studied & GUC made its own report including its own areas of interest. The report was tried as a pilot. This resulted in deciding to simplify the template. - Implementing course report. QMAC held presentations to show the importance of the report & to explain the methods of filling the report. QMAC set deadlines for the instructors to fill the reports & write their action plans. 	
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Changes that have occurred in this outcome since the previous approved report

No essential changes.

Table of achieved/planned Outcomes

<u>Title and reference number of the outcome:</u>	2. New flexible study program models in order to reach interdisciplinarity and new qualifications frameworks
<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	New possibilities within traditional study programs. Recognition of new professional qualifications. New interdisciplinary study programs

Activities carried out for the achievement of this outcome (over the entire project period):

Activity N°	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement
2.1.	Review of current standards in engineering education and contemporary qualifications frameworks	June, 2009	January, 2010	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>This activity was encompassed</p> <ol style="list-style-type: none"> 1) collection of all necessary information about contemporary engineering education 2) exchange of all relevant information between the consortium members 3) preparation of project staff for the next activity <p>GUC staff members have revised</p> <ul style="list-style-type: none"> -the National Academic ReferenceStandards (NARS): - the European Qualification Framework (EQF) & - the German Qualification Framework (GQF) <ul style="list-style-type: none"> - QMAC members studied the NARS published in January 2009 - QMAC members studied the NARS published in August 2009 - QMAC members studied the EQF & the GQF - The QMAC held several meetings with CC staff members to discuss NARS, EQF & GQ <p>GUC staff members were done a comparison of</p>	<p>Information, materials and elaborates about contemporary engineering education</p> <p>GUC revised documents:</p> <ul style="list-style-type: none"> • NARS published in January 2009 • NARS published in August 2009 • EQF • GQF <p>Report of the “Review of study plan for Mechatronics Engineering Education and some contemporary qualifications for national and international based frameworks”</p>

					<p>Mechatronics study programs of 5 different degree awarding institutions. Namely, the staff CC compared the GUC Mechatronics program to those of:</p> <ul style="list-style-type: none"> • Ain Shams University (Egypt) • University of Waterloo (Canada) • Festo Germany/Marroco • University of Wollongong (Australia) <p>RS staff members have revised the European Qualification Framework (EQF) & interdisciplinary engineering programs contents and organization at Imperial College London (UK), TU 9 German Institutes of Technology (especially at TU Munchen, and KIT). Also, have been reviewed and discussed principles of engineering education at the most recognized U.S. universities like MIT, Stanford or Harvard. MIT visiting professor V.M. Stojanovic at University of Kragujevac had been helped to Serbian colleagues to better understanding of U. S. engineering education system nad organization at MIT and Stanford University. Some organizational concepts could be used at Serbian universities, also.</p>	
2.2.	Creation of new flexible study program models in order to reach interdisciplinarity and new qualifications frameworks	July, 2009	November, 2010	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>To provide lacking interdepartmental and interfaculty collaboration and flexible frameworks for new engineering curricula in order to reach new engineering qualifications and degrees.</p> <p>Faculty of Mechanical Engineering, University of Belgrade has established new system curricula building as a part of quality assurance mechanisms. This solution is accredited by national Committee for accreditation and quality assurance. It is a unique accredited solution in Serbia at BSc study level with inherent flexibility for students to collect elective subjects from different areas engineering, science and soft skills. Professors can offer new elective courses in each year and propose new modules with defined line of courses (within different old modules, with both new and old courses). Students have opportunity to expand their qualification framework related to elected subjects within one or more modules.</p> <p>At this manner at Faculty of Engineering (Faculty of</p>	<p>New possibilities within traditional study programs (wider spektrar of elective courses.from different areas and more possibilities for getting of different specialization or wider engineering education).</p> <p>New flexible study program models in order to reach interdisciplinarity and new qualifications frameworks.</p> <p>Recognition of new professional qualifications. New interdisciplinary study programs</p> <p>Two courses' syllabi</p>

					<p>Mechanical Engineering up to 28.07.2011.) are formed new study programs from old courses within different study modules of Mechanical Engineering study program at both BSc and MSc study level. At this faculty had been majority opinion that “new” study programs like Automotive Engineering, Military-Industrial Engineering, are more attractive for enrolment of new students than proposed elective path inside Mechanical Engineering study program like solution of Faculty of Mechanical Engineering at University of Belgrade.</p> <p>Faculty of Mechanical Engineering at University of Nis is introduced Engineering Management (at both BSc and MSc level) as a new interdisciplinary engineering study program.</p> <p>At GUC: Two study programs (namely Design and Production Engineering, and Mechatronics Engineering) were under modification to conform with the ASIIN requirements, taking into consideration the modular structure and flexibility.</p> <ul style="list-style-type: none"> - Modifying the learning outcomes - Verifying the allocated student workload - Forming the courses' syllabi catalogues <p>Using data collected in the previously filled course description forms, the student workload form courses syllabi catalogues are formed, edited & printed.</p>	<p>catalogues at FME-UNIBG:</p> <ul style="list-style-type: none"> - Mechanical Engineering Bachelor of Science Program - Mechanical Engineering Master of Science Program <p>Templates filled with the modified learning outcomes & the verified workload</p> <p>Four GUC courses' syllabi catalogues namely:</p> <ul style="list-style-type: none"> • Mechatronics Engineering International Bachelor of Science Program • Mechatronics Engineering International Master of Science Program • Design & Production Engineering International Bachelor Program • Design & Production Engineering International Master Program
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Changes that have occurred in this outcome since the previous approved report

No changes.

Please add as many tables as necessary.

Table of achieved/planned Outcomes

<u>Title and reference number of the outcome:</u>	3. New laboratory, library, learning and teaching facilities as well as administrative/student services improvement
<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	New laboratory facilities installed. Legal software use. Library and student services are updated. Local international offices establishment as a part of student services. Partnership with enterprises through student practice organization is developed.

Activities carried out for the achievement of this outcome (over the entire project period):

Activity N°	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement
3.1.	Selection, procurement and installation of lab. software and equipment	November, 2009	November, 2011	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>At all beneficiary faculties, laboratory equipment is planned to support education in Mechatronics as an interdisciplinary engineering field. New laboratory facilities are showed at http://cpa.fin.kg.ac.rs:30/Home/EquipmentUniversity – At Faculty of Mechanical Engineering University of Belgrade is formed new laboratory for 20 students, and procured laboratory equipment for individual student’s work.</p> <p>At Faculty of Engineering (former FME) at University of Kragujevac, two laboratores with 8 and 20 student places are improved. Additional donation resources from industry are used in order to improve some laboratory aspects (furniture, and so on).</p> <p>At Faculty of Mechanical Engineering at University of Nis, Mechanotronics educational laboratory is improved. The Mechatronics Department at GUC purchased two educational equipments that are used in the Mechatronics Lab. These two equipments are:</p> <ul style="list-style-type: none"> c. LDS 100 lb Shaker, d. Two workstations model HP Z800 <p>These equipments will enhance the education and</p>	<p>Invoices</p> <p>New laboratory facilities</p> <p>Installed. Legal software use.</p>

					<p>research for the following courses:</p> <ul style="list-style-type: none"> - Fluid Mechanics: 5th semester Mechatronics, Materials Engineering and Design and Production. - B.Sc. theses - Graduate research <p>Engineering education laboratories are improved and established.</p>	
3.2.	Library facilities and administrative/student services improvement	November, 2009	November, 2011	<p>University of Belgrade, University of Kragujevac, University of Nis, GUC</p>	<p>Aim of this activity was to improve administrative/student services;</p> <p>GUC: Purchase of administrative equipments (copiers, laptops, PCs, printers, etc). These equipments are used in preparing and presenting the orientation materials used by QMAC in doing orientations and workshops. GUC had developed administrative/student services according to ASIIN standards.</p> <p>RS-beneficiary faculties: Printed textbooks were gifted to RS faculties and universities libraries. Software for teaching/learning support in engineering education with some e-publishing materials are produced and it has gave to public use by the cite: http://cpa.fin.kg.ac.rs:30/Home/EPublishing</p> <p>Also, e-learning teaching support is organized by LMS Moodle with adopted quality assurance standards concerning with a subject Moodle portal content. Software solutions for the following student statistics and attendance to lecturing are also developed. Basic software authors are Nenad Zahar and prof. Vladimi Cvjetkovic. Practically they have gifted their solutions to ICT office of Faculty of Engineering. Now, all beneficiary faculties have developed ICT service and its software solutions for documentation management and trace of all essential processes related to administration and student services.</p> <p>One published paper describes administrative/student service improvements based on ICT which is presented at TREND conference in 2010.</p> <p>Some international office functions are transferred as a part of local student services.</p>	<p>Library and student services are updated.</p> <p>Invoices.</p> <p>New-printed books</p> <p>New software and e-publishing</p> <p>Library and student services are updated.</p> <p>Some international office functions are transferred as a part of local student services.</p>

3.3.	Developing of partnership with enterprises through student practice organization	November, 2009	November, 2011	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>Partnership model with enterprises through student practice organization are developed. Partnership with enterprises through student practice organization is developed.</p> <p>Developed and another kind of partnership with enterprises: the firm Muehlbaur has asked Center for Applied Automatic Control at University of Kragujevac to select young engineers for them. Also, Muehlbaur donated 5000EUR for laboratory infrastructure needs.</p> <p>Student career and development office (SCAD) at GUC already exists and is responsible for supporting students in their internships and training. The SCAD office contributes to the statistics of graduates employability</p>	Agreements among faculties and firms about partnership activities and student practice organization.
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Changes that have occurred in this outcome since the previous approved report

No essential changes.

Please add as many tables as necessary.

Table of achieved/planned Outcomes

<u>Title and reference number of the outcome:</u>	4. Pilot project of international accreditation of engineering studies
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<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	Self-assessment reeports. Accreditation certificate by ASIIN.
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Activities carried out for the achievement of this outcome (over the entire project period):

Activity N°	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement
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4.1.	Accreditation of at least two selected study program with ASIIN	July, 2010.	January, 2013	University of Belgrade, University of Kragujevac, University of Nis, GUC	<p>According to the project time plan, beginning of this activity was planned in July 2010, but the Faculty of Mechanical Engineering, University of Belgrade before this term reached international accreditation in Naval Engineering. It is result of good study program including teaching organization, quality of education laboratories, excellent teaching staff, and it is result of administrative efforts to do it concerning this project idea. Also, before submission of intermediate report of this project, GUC reached international accreditation for</p> <ul style="list-style-type: none"> • Engineering and Materials Science, Bachelor of Science Program • Engineering and Materials Science, Master of Science Program <p>A few study programs (namely Design and Production Engineering and Mechatronics Engineering) at GUC had been under modification to conform with the ASIIN requirements, taking into consideration the modular structure and flexibility.</p> <p>The GUC has submitted the applications for accreditation to ACQUIN. Two courses' syllabi catalogues namely:</p> <ul style="list-style-type: none"> • Mechatronics Engineering International Bachelor of Science Program • Mechatronics Engineering International Master of Science Program <p>The Faculty of Mechanical Engineering at University of Belgrade has submitted the applications for accreditation to ASIIN. Two courses' syllabi catalogues namely:</p> <ul style="list-style-type: none"> • Mechanical Engineering - Bachelor of Science Program (in Serbian and English) • Mechanical Engineering - Master of Science Program (in Serbian and English) <p>At Faculty of Engineering, University of Kragujevac (former Faculty of Mechanical Engineering) from different resources were developed teaching laboratories in Mechatronics (now, it is the best teaching laboratory infrastructure at Faculty). Regardless to developed resources, self-assessment reports, the dean prof. M.Babic and the vice rector prof. B.Jeremic haven't answer positively at request of prof. Matijevic to submit the applications for accreditation to ASIIN like to the</p>	<p>Accreditation certificate for</p> <ul style="list-style-type: none"> • Engineering and Materials Science, Bachelor of Science Program • Engineering and Materials Science, Master of Science Program • M.Eng. in Mechanical Engineering Dipl. Ing. in Serbian; Spec. module: Naval Architecture <p>Documentation for international accreditation is submitted for</p> <ul style="list-style-type: none"> • Mechatronics Engineering International Bachelor of Science Program • Mechatronics Engineering International Master of Science Program • Mechanical Engineering Bachelor of Science Program • Mechanical Engineering Master of Science Program <p>Self-assessment reeports. Applications to ACQUIN and ASIIN with detailed documents.</p>
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					Faculty of Mechanical Engineering at University of Belgrade. The Faculty of Mechanical Engineering at University of Nis has not has intention to reach international accreditation for any its study program. They used this project in order to improve overall processes and resources at its institution.	
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Changes that have occurred in this outcome since the previous approved report

No essential changes.

Please add as many tables as necessary.

Table of achieved/planned Outcomes

<u>Title and reference number of the outcome:</u>	5. Management of the project
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<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	Consortium meetings held on schedule
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Activities carried out for the achievement of this outcome (over the entire project period):

Activity N°	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement
5.1.	Consortium and TEMPUS meetings (future activities planned)	January, 2009	January, 2013	At academic project partners	All the consortium meetings were held on time. The progress reports were discussed at the meetings.	Agendas of meetings
5.2.	Project coordination and project reports generation	January, 2009	January, 2013	At academic project partners	The progress reports are prepared by each consortium member institution semi-annually, and presented at consortium members meeting. The progress reports are discussed at the meeting.	Project coordination and project reports as well as meetings reports

Changes that have occurred in this outcome since the previous approved report:

Activities were performed in accordance with their description in the project plan. Prolongation of the project and some modifications were made due to Egypt revolution in 2011, and delay in money transfer caused by administrative difficulties; however that did not influence the outcomes of the planned activities.

Table of achieved/planned Outcomes

<u>Title and reference number of the outcome:</u>	6. Quality control and monitoring
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<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	<ul style="list-style-type: none"> • Establishment of Committee for quality of engineering education • Rulebook of the Committee for quality of engineering education will be published • Proposal of quality assurance and enhancement system for engineering education (based on the best international practice as well as national accreditation standards) • The report “Guidelines for quality assurance and enhancement in engineering education” is published • New quality assurance and enhancement system at beneficiary faculties is established • New flexible study program models in order to reach interdisciplinarity and follow EU qualifications frameworks are created • Laboratory facilities installed • Administrative/student services are improved. Administrative staff retrained. • Model of partnership with enterprises through student practice organization are developed • Documentation for international accreditation of study programs is prepared • Certificate about accreditation of study programs • Consortium meetings held on schedule • Students’ involvement in decision making and teaching processes. Students’ satisfaction with conducted reform processes. • Reports on performed activities and achieved results.
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Activities carried out for the achievement of this outcome (over the entire project period):

Activity N°	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement
6.1.	Quality control and monitoring ensured	January, 2009	January, 2013	University of Belgrade,	Quality control and monitoring of project activities and results are performed continuously throughout the lifetime of the	Quality control and monitoring ensured: 1) Semi-annual quality

				<p>University of Kragujevac, University of Nis, GUC</p> <p>project. Intermediate report - Preparing report about the activities carried out to date to achieve the project outcomes. GUC-Report of December 2010 - A delegation from European Commission and TEMPUS Egypt visited GUC on Wednesday 22nd of December 2010 to get information about project Status GUC - Report of May 2011 - Action plan and activity outcomes. Quality control and monitoring of the project has been doing by the project management, by the beneficiary faculty and university management and representatives, and by national TEMPUS Office teams. Indicators of achievement and/or performance as indicated in the project proposal are reached for this project.</p>	<p>control reports are prepared by each beneficiary university. 2) Faculty and university official documents concerning with project realization are gathered. 3) Reports about the visit of TEMPUS team to beneficiary faculties and universities.</p> <p>GUC: Report about the visit of TEMPUS team to GUC on Wednesday 22nd of December 2010</p> <p>Intermediate report 7-2010</p> <p>Report about the current status of the project (5-2011)</p>
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Changes that have occurred in this outcome since the previous approved report:

Activities were performed in accordance with their description in the project plan. Prolongation of the project and some modifications were made due to Egypt revolution in 2011, and delay in money transfer caused by administrative difficulties; however that did not influence the outcomes of the planned activities

Table of achieved/planned Outcomes

<u>Title and reference number of the outcome:</u>	7. Dissemination and sustainability
<u>Indicators of achievement and or/performance as indicated in the project proposal</u>	Workshop organized, Adoption of proposed reform processes.

Activities carried out for the achievement of this outcome (over the entire project period):

Activity N°	Activity Title	Start date	End date	Place	Description of the activity carried out	Specific and measurable indicators of achievement
7.1.	Dissemination analyzing and actions planning	January, 2009	January, 2013	RS, EG	<p>The dissemination has included information exchange (using web publishing, marketing presentations, etc.), information sessions and workshops where outputs of the project are presented.</p> <p>Some dissemination results – 16 TV broadcasts, 5 university presentations, 7 newspaper articles, http://tempus.mas.bg.ac.rs/doc-1.html, http://cpa.fin.kg.ac.rs:30/Home/Home, academic collaboration among WBC faculties and universities, secondary school presentations which are given with intention techniques popularization, participation at TREND Conferences (about university education) www.trend.uns.ac.rs from 1st to 4th March 2010, and in March 2012. within sessions with university, faculty and government representatives from Western Balkan Countries.</p> <p>Participation in one month robotics science festival in Belgrade (September/October 2012 – “Days of Future: Robotics”) is used for promotion of use robotics in engineering education and IAES Tempus project also.</p> <p>CD "Introduction to Object-Oriented Programming - Collection of tasks with interactive software-testing system and support learning", 144,856-TEMPUS-2008-RS-JPGR, was presented at the Roundtable - "New concepts of learning and ICT technologies as a help or hindrance" Faculty of Engineering at University of Kragujevac</p> <p>The presentation: “International Accreditation. Results and planned activities at 144856-2008-RS-JPGR Tempus project International Accreditation of Engineering Studies”, <i>I Conference for Quality Assurance in Higher Education</i>, 15th October</p>	<p>Reports from the meetings, workshops, printed materials, TV and radio broadcasts, printed information booklets for students, newspaper articles, http://tempus.mas.bg.ac.rs/doc-1.html, http://cpa.fin.kg.ac.rs:30/Home/Home developed software and publishing delivery: http://cpa.fin.kg.ac.rs:30/Home/EPublishing Academic collaboration among faculties, and university and high schools. The posters prepared for the dissemination.</p> <p>Publications & Brochures.</p> <p>January 2013 CD "Introduction to Object-Oriented Programming - Collection of tasks with interactive software-testing system and support learning", 144,856-TEMPUS-2008-RS-JPGR, was presented at the Roundtable - "New concepts of learning and ICT technologies as a help or hindrance" Faculty of engineering Science, University of Kragujevac.</p> <p>The papaer and presentation: „International Accreditation of Engineering Studies“ (in Serbian), <i>XVIII Trends of Development Conference – University Internationalization</i>; Kopaonik, Serbia, 2012, 27.02.-01.03.2012, ISBN 978-86-7892-388-3</p> <p>The presentation: “International Accreditation. Results and planned activities at 144856-2008-RS-JPGR Tempus project International Accreditation of Engineering Studies”, <i>I Conference for Quality Assurance in Higher Education</i>, 15th October 2010, University of Kragujevac.</p> <p>The papaer and presentation: „ICT services for efficiency of Bologna process”, <i>XVIII Trends of Development Conference – Bologna 2010:state, dilemmas and perspectives</i>, Kopaoinik, Serbia, 1-</p>

					<p>2010, University of Kragujevac</p> <p>YouTube resources about some aspects of the Tempus results (some TV broadcasts, equipment use, master thesis presentations, new teaching methodology) are organized and have stayed a part of practice concerning with results sharing and promoting.</p> <p>Four workshops were organized 2 by ASIIN.</p> <p>GUC: Participation in Egypt Tempus day (January 18th, 2010) with a booth under the title of international accreditation of engineering studies explaining the activities of the project has been held in this well-attended conference. A booklet for all the tempus projects was published and distributed among attendees. Dissemination of knowledge within the different partners of the project was carried out through meetings held in Serbia, Germany, and Egypt. Also, five presentations were conducted during the partners visit to Cairo by the Egyptian partner.</p> <p>-</p>	<p>4.03.2010. pp. 121-124, ISBN 978-86-7892-236-7</p> <p>One month robotics science festival in Belgrade (September/October 2012 – “Days of Future: Robotics”)</p> <p>Presentations at beneficiary faculties and universities in order to promote interdisciplinary engineering education, quality assurance and international accreditation (included summer school and motivation and survey lectures in Robotics and Mechatronics by D.Katic and Z.Despotovic from Institute Mihailo Pupin, Belgrade).</p> <p>YouTube resources: http://www.youtube.com/watch?v=QgzGUVxm4ck http://www.youtube.com/watch?v=ACziG6gIygo http://www.youtube.com/watch?v=sF8LyvRGYtk http://www.youtube.com/watch?v=OGbV-P4ARI and so on about some aspects of the Tempus results (some TV broadcasts, equipment use, master thesis presentations, new teaching methodology)</p> <p>Four ASIIN workshops.</p>
7.2.	Sustainability analyzing and actions planning	January, 2009	January, 2013	<p>University of Belgrade, University of Kragujevac, University of Nis, GUC</p> <p>Quality management system has been established to ensure active involvement of faculty members in the continuous development and modernization of curriculums and its implementation. Top management representatives are also involved to support the implementation of the project outcomes.</p> <p>GUC example: Establishment of QMAC as a physical and political structure on the university level. The QMAC will carry an on going process of training</p>	<p>All officially adopted documents which result from the project directly contribute and guarantee that the project results will be implemented and used for a long time after project completion: 1) documentation about adopted teaching quality procedures at faculty and university levels, 2) documentation about new curricula, courses and syllabuses, 3) documentation about equipment procurement, 4) documentation about publishing activities. 5) accreditation certificates, 6) adopted quality assurance system, 7) stable financial support to beneficiary faculties and developed</p>	

				<p>the trainers and staff of different faculties on different quality concepts including enhancing the implementation of TQM and CQI. Also the central QMAC unit will guarantee applying the state of art national and international accreditation standards and models and to distribute the TQM culture all over the GUC faculties</p> <p>Establishment of QMAC unit as a physical structure in EMS. The QMAC unit of EMS together with the staff curriculum committee will carry on an ongoing process of revising the programs' objectives and learning outcomes. Prof. Imam Morgan; the head of the EMS unit, will be the ECTS coordinator for the faculty.</p> <p>Forming the student's curriculum committee in all the GUC faculties. Initiating the students' curriculum committee in EMS, and carrying on the same process in the different GUC faculties.</p> <p>The students' CC is to pursue an ongoing process of collecting students' feedback and suggestions regarding workload, curriculum, instruction, and assessment to be used in enhancing the educational process.</p> <p>Forming courses' syllabi catalogues for 4 engineering programs. Four courses' syllabi catalogues were prepared by revising the program learning outcomes and the students' workload ,namely:</p> <ul style="list-style-type: none"> • Mechatronics Engineering Bachelor of Science Program • Mechatronics Engineering Master of Science Program • Design & Production Engineering 	<p>infrastructure by this project (laboratories, QA system, and so on).</p>
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					<p>Bachelor Program</p> <ul style="list-style-type: none"> • Design & Production Engineering Master Program <p>This process is to be carried out for all the GUC programs on regular basis by the QMAC units of the different GUC faculties.</p> <p>Preparation and initiation of assessment committee. The QMAC started the assessment process on the university level, by preparing and implementing course evaluation survey, fresh graduate survey, alumni survey, & employer survey where the reports about the surveys will be used for continuous quality improvement. The QMAC prepared for the initiation of the assessment committee to be responsible for the previously mentioned tasks as on going processes, including the direct and indirect assessment.</p> <p>Using technology transfer and physical infrastructures in</p> <p>Continuous quality development based on direct and indirect assessment statistics provided by Scantron (iNSIGHT 4) scanner hardware and software, and Intelligent Item Bank (IIB) software. Scantron (iNSIGHT 4) scanner hardware and software was bought for continuous process of designing and reading surveys, providing statistical analysis reports to survey responses, so it's a powerful indirect tool for assessment of the different programs and continuous development on the GUC level.</p> <p>Also it is used in correcting exam answer sheets and providing statistical analysis reports about students' responses, so it is also used as a direct assessment tool for courses, as the statistical reports provided can help instructors write and implement their action plans depending on the statistics of students' responses fulfilling the continuous quality improvement of courses.</p>	
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					<p>Intelligent Item Bank (IIB) is an item banking application; it provides extensive information regarding test development and psychometric characteristics of the items (questions).</p> <p>It is a software used to build question banks for each course, in which the questions are listed under the categorization of learning outcomes, and after building a question bank, the instructor can put as example that he/she needs (according to the courses learning outcomes) the exam to be of 30 % in the level of knowledge and understanding, 50 % in the intellectual level, and 20% soft skills, then the software will export automatically the exam with the required structure and levels. So, this software is used in the project to deepen the concept of learning outcomes in the instructors' minds, and to link the written learning outcomes to the courses' assessment.</p>	
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Changes that have occurred in this outcome since the previous approved report:

No essential changes.

Please add as many tables as necessary

SUMMARY REPORT FOR PUBLICATION

Project title

144856-TEMPUS-2008-RS-JPGR – International Accreditation of Engineering Studies

Objectives (as indicated in the project proposal)

The goal of this project is to provide students at beneficiary universities with a forward-looking, promising, internationally-recognised and academically-founded education and training in engineering area by development of quality assurance and enhancement mechanisms based on the best international practices and by necessary reform measures. At least two study programmes at different faculties with similar structural characteristics were planned to be accredited by relevant European Accreditation Agency (like ASIIN). Accredited study profile should be more competitive in the increasingly-contested education market. The planned structural reform should comprise: 1) Introduction of quality assurance system based on the best practice of recognized European engineering schools; 2) Improvement of laboratory, library, learning and teaching facilities (to procure missing legal software, laboratory scale models, textbooks, blended learning facilities, etc.); 3) Local International Offices establishment (to expand standard function of national student services); 4) Local Student Office improvement by development of information system facilities; 5) Student practice organization through development of partnership with enterprises; 6) Indispensable curriculum corrections, and 7) New teaching staff employment *(if necessary). Interdisciplinary study programs at Mechanical Engineering faculties are more in focus within this project.

Outcomes

1. Quality assurance and enhancement system for engineering education, 2. New flexible study program models in order to reach interdisciplinarity and new qualifications frameworks, 3. New laboratory, library, learning and teaching facilities as well as administrative/student services improvement, 4. Pilot project of accreditation of at least two selected study programmes with ASIIN, 5. Management of the project, 6. Quality control and monitoring, 7. Dissemination and sustainability

Activities

- 1.1. Review of existing national and international quality assurance and enhancement systems for engineering education, Jan-Apr, 2009
- 1.2. Establishment of Committee for quality of engineering education, Feb-May, 2009
- 1.3. Proposal of quality assurance and enhancement system for engineering education, Apr.2009-Jul.2010
- 1.4. Promotion of necessity of quality assurance and enhancement system based on the best international practice, Apr.2009-Mar.2011
- 1.5. Implementation of quality assurance and enhancement system at beneficiary faculties, Jan.2010-Jan.2013.
- 2.1. Review of current standards in engineering education and contemporary qualifications frameworks, Jun.2009-Jan.2010
- 2.2. Creation of new flexible study program models in order to reach interdisciplinarity and new qualifications frameworks, Jul.2009-Nov.2010
- 3.1. Selection, procurement and installation of lab. software and equipment, Nov.2009-Jan.2013.
- 3.2. Library facilities and administrative/student services improvement, Nov.2009-Nov.2011.
- 3.3. Developing of partnership with enterprises through student practice organization, Nov.2009-Nov.2011.
- 4.1. Accreditation of at least two selected study program with ASIIN, Jul.2010-Jan.2013.
- 5.1. Consortium and TEMPUS meetings (future activities planned), Jan.2009-Jan.2013.
- 5.2. Project coordination and project reports generation, Jan.2009-Jan.2013.
- 6.1. Quality control and monitoring ensured, Jan.2009-Jan.2013.
- 7.1. Dissemination analyzing and actions planning, Jan.2009-Jan.2013.
- 7.2. Sustainability analyzing and actions planning, Jan.2009-Jan.2013.

Achieved results

The overall objective of this project is to enhance the quality and relevance of higher education in engineering area in partner countries and to reach the integration of partner country universities into the European university system by international accreditation of engineering studies.

The essential part of the project are the necessary improvements at beneficiary universities concerning all relevant faculty/university processes and relevant engineering study programs with all of its characteristics, in order to reach a new and relevant quality in engineering education verified by international accreditation of these study programs.

- Faculty of Mechanical Engineering at University of Belgrade (UB-FME) has reached international accreditation in Naval Architecture Engineering (MSc level) – study program in Serbian;
- German University of Cairo (GUC) has reached international accreditation in Engineering and Materials Science (MSc level) - study program in English (international study program);
- The GUC has submitted applications for international accreditation to ACQUIN for two study programs:
 1. Mechatronics Engineering International Bachelor of Science Program (in English);
 2. Mechatronics Engineering International Master of Science Program (in English);
- The Faculty of Mechanical Engineering at University of Belgrade has submitted applications for international accreditation to ASIIN for two study programs:
 1. Mechanical Engineering - Bachelor of Science Program (Serbian and English)
 2. Mechanical Engineering - Master of Science Program (Serbian and English);

The peers have visited UB-FME for two days and announced their positive decision, which is to be confirmed by the agency and officially declared on June 28th, 2013;

- Internal quality assurance and enhancement mechanisms based on the best international practice were implemented at all beneficiary faculties/universities;
- A new models of flexible curriculum structure are designed and implemented at UB-FME and GUC;
- New laboratory facilities have been installed at all beneficiary institutions fully supporting teaching process;
- Various forms of partnership with enterprises were developed: 1. Quality assurance procedure for student practice organization is established and adopted, 2. Partnership based on infrastructure development for better education (different donations of enterprises have been implemented), 3. Partnership based on employment of students & graduates in accordance with defined of enterprises needs (for example, Center for Applied Automatic Control at FE UNI KG has selected 10 students & graduates for Muehlbauer Technologies doo, and at the same time has got donation from Muehlbauer (for infrastructure needs).
- Administrative/student services including logistic support for international students are improved
- New teaching materials (textbooks, lab practicum, web presentations, ...) have published and in use via Moodle LMS;
- Teachers are (re)trained.
- New teaching methodology (PBL, etc), software support and new laboratory facilities in use;
- Life long learning courses are also supported by new lab-equipment. Three different courses are organized for training of non-university teachers.
- Project data available on WEB site <http://tempus.mas.bg.ac.rs> and in printed form
- New e-teaching services and e-shared resources are developed
- Laboratory technicians are (re)trained
- Consortium meetings were held on schedule
- Students' work at EU Universities
- Students' involvement in decision making and teaching processes.
- Student's satisfaction with revised courses and student exchange program.

Future developments

We are expecting positive decisions about submitted study programs for international accreditation.

Namely, the GUC has submitted applications for international accreditation to ACQUIN for two study programs:

1. Mechatronics Engineering International Bachelor of Science Program (in English)
2. Mechatronics Engineering International Master of Science Program (in English)

and, Faculty of Mechanical Engineering at University of Belgrade has submitted applications for international accreditation to ASIIN for two study programs:

- b. Mechanical Engineering - Bachelor of Science Program (in Serbian/ English)
- c. Mechanical Engineering – Master of Science Program (in Serbian/ English)

After accreditation of international Mechatronics study programs by ACQUIN, it is planned agreement about these programs improvements as a Joint degree study programs between GUC and University of Ulm. This project is opened the door for all beneficiary institution for future developments in this direction. Joint degree programs are excellent solution for university internationalization and shared resources among universities. International accreditation study program in Mechatronics was precondition for next steps of developments of these programs as joint study program among German universities and GUC (possible and Serbian universities after getting international accreditation).

International accreditation for Faculty of Mechanical Engineering at University of Belgrade (UB-FME) is very important because of FME UNIBG wants credible place in EU higher education area and expects enrolment both domestic and foreigner students. UB-FME also plans INSTITUTIONAL accreditation, which will allow all study programs newly developed to be automatically recognized and accredited, due to highly developed quality procedure.

Next steps for all beneficiary institutions in this project are

- Continually improvement laboratory resources and applying for new grants in engineering education
- Promotion of interdisciplinary engineering education and knowledge dissemination
- Promotion and improvements of quality assurance system and enhancement mechanisms based on the best international practice
- Internationalization – including relevant accreditation of new international study programs

Other remarks

This project gives a great opportunity to the management of beneficiary faculties and universities to include all staff by motivated question “What do we have to do in order to join our faculty/university to the family of recognized EU engineering schools by international accreditation process?”

Relevant engineering education is the most important item for the economic development of beneficiary countries. But for relevant engineering education a few issues are very important: excellent teaching staff, relevant engineering curricula, well equipped and organized laboratories for contemporary engineering education, partnership with industry, good internal organization, etc. A legal software use and building-up of educational laboratory which is very expensive are to be remarked. At the same time, these are necessary for the relevant engineering education.

The budget for this project has been cut by over 21% as compared to application and we were trying to find other financial resources in order to reach our project aims. Because of that we had need more time to realize our project aims in full capacity of our efforts. Activities are being performed strictly following the essence of the project proposal, but not strictly with the time table plan. Due to considerable budget cutting and seven months delay (nearly half of the period for this report) in transfer of the first installment of the money, then because of Egyptian revolution, our project was late in some of the activities, but far ahead with some concrete results. We have consumed the project funds very carefully in order to reach the overall project objectives.

FINANCIAL STATEMENT

Instructions

In addition to this form, you are requested to fill in the Financial Statement and accompanying financial tables in the "Financial Statement" Excel file published on the website.

Please note that the Excel file is composed of 9 different Excel worksheets. Please go through each one of these worksheets and fill in the financial tables. For each budget heading, you must declare all expenditure incurred by the project during the eligibility period, both paid by Tempus and co-financed.

The "Financial Statement" Excel file is composed of the following Excel worksheets:

Annex III/13:	Financial Statement and Request of Payment of the balance
Annex III/14:	Country codes
Annex III/15:	Staff Costs
Annex III/16:	Travel Costs and Costs of Stay
Annex III/17:	Equipment Costs
Annex III/18:	Printing and Publishing
Annex III/19:	Other Costs
Annex III/20:	Indirect Costs
Annex III/21:	Co-financing and exchange rate

The financial tables are not protected or pre-formatted, meaning that you can insert rows or use calculations according to your needs. Please check your calculations carefully and ensure that the declared amounts are correct. Amendments to the declared amounts will not be accepted after submission of the report.

Please note that for invoices in a currency other than EURO the equivalent amount in EURO must be indicated on the invoice. You may apply ONE of the following options for the conversion of all costs into Euro:

- A. The monthly rate published on the Commission's website <http://ec.europa.eu/budget/inforeuro>, taking as a reference the date of the invoice in question (meaning 24 or 36 rates, depending on the project duration).
- B. The monthly rate published on the Commission's website <http://ec.europa.eu/budget/inforeuro> applicable on the month of the first pre-financing until the second pre-financing is received, after which the rate of the month of the second pre-financing must be applied.
- C. Rule A until 26.08.2009 (the date that the simplified approach - Rule B – was announced), followed by Rule B for all for all conversions after this date.

Please note that each project should select one of the three rules listed above and apply it for the duration of the project. This option is only valid for 2008 Tempus projects (selected under the first call for proposals n° EAC/04/2008).

FINANCIAL STATEMENT

IMPORTANT NOTE: This Excel sheet is protected and pre-formatted, meaning that only buttons and the blue coloured fields are accessible for encoding data. TO AVOID ANY ERROR OF CALCULATION, PLEASE DO NOT COPY/PASTE DATA FROM OTHER SOURCES (DATA MUST BE ENCODED) and ensure that the declared amounts are correct.

- Column "1. Project Costs" and Column "3. Project Finance" refer to the Estimated Budget of the Action as indicated in Annex II of your Grant Agreement or in subsequent amendments to Annex II.
- Columns under "2. Project Expenditure" refer to expenditure made within the eligibility period (either paid from Tempus or co-financed).
- Under "2. Project Expenditure", the declared amounts must represent the amounts that have been actually paid (meaning that a disbursement has been made) and NOT committed amounts.
- Relevant supporting documents must be issued for both 'Expenditure Paid from Tempus' and 'Expenditure Co-Financed'.

		1. PROJECT COSTS (EUR)
		Estimated Budget of the action (Annex II)
I	Staff costs (including replacement costs)	234,596.00
II	Travel costs and Costs of Stay	160,838.00
III	Equipment	145,500.00
IV	Printing and publishing	54,700.00
V	Other costs	35,500.00
VI	Indirect Costs ¹	43,977.00
TOTAL ELIGIBLE COSTS ²		675,111.00

		3. PROJECT FINANCE (EUR)
	Co-financing	31,876.00
	Tempus Grant	643,235.00
TOTAL PROJECT FINANCE ²		675,111.00

2. PROJECT EXPENDITURE (EUR)		
Declared Paid from Tempus	Declared Co-financed	Total Declared
234,990.00	10,532.00	245,522.00
153,923.13	0.00	153,923.13
130,443.91	20,004.86	150,448.77
53,224.32	1,515.40	54,739.72
31,354.60	0.00	31,354.60
43,977.00		43,977.00
Total:	Total:	TOTAL:
647,912.96	32,052.26	679,965.22

4. DECLARATION OF BANK INTERESTS	
I hereby declare that the bank interests yielded by the pre-financings amount to:	
BANK INTERESTS (EUR)	0.00
Please indicate "0" if no bank interest has been yielded. This is an integral part of this form: failure to fill-in this part will lead to the rejection of the Request for Payment.	

REQUEST FOR PAYMENT

In accordance with articles I.4 and II.15 of the Grant Agreement (please mark the appropriate box):

I hereby request the payment of the balance to the following bank account:

IBAN³

RS35908504104000214518

I hereby do not request the payment of the balance.

Date and signature of the legal representative of the beneficiary institution:

Date: 14/01/13

Signature:

¹ Indirect costs may not be co-financed (art. 8 of the Guidelines for the Use of the Grant).

² As indicated in the Annex II of the Grant Agreement.

³ BIC code for countries where the IBAN code does not apply.



CO-FINANCING AND EXCHANGE RATE**PROJECT EXPENDITURE OF THE BENEFICIARIES (CO-FINANCING) AND EXCHANGE RATE**

1. Please report the total amount for project expenditure of the beneficiaries (co-financing) in the Financial Statement, Annex III/13 (Table 2 "Expenditure", second column), breaking it down under the respective budget headings (I. Staff costs, II. Travel costs and costs of stay, III. Equipment, IV. Printing and publishing, V. Other costs).

2. Please then provide all details of the co-financing expenditure under the respective tables in the financial statement (Annexes III/15-19) and ensure that related supporting documentation is provided with your Final Report where required, or retained with the project accounts.

3. As regards the exchange rate to be applied for the 2008 projects, please refer to Annex III-12 and FAQ. 78 published on the Tempus website. For invoices in a currency other than EURO the equivalent amount in EURO must be indicated on the invoice. Please tick the box of the exchange rate rule you have applied:

A. The monthly rate* taking as a reference the date of the invoice in question

B. The monthly* rate applicable on the month of the first pre-financing until the second pre-financing is received, after which the rate of the month of the second pre-financing.

C. Rule A until 26.08.2009 (the date that the simplified approach - Rule B – was announced), followed by Rule B for all conversions after this date.

Please note that each project should select one of the three rules listed above and apply it for the duration of the project.

* Monthly rate published on the Commission's website <http://ec.europa.eu/budget/infocoreuro>

4. As regards the exchange rate to be applied for the 2009/2010/2011 projects, please refer to art. I.11.1 of the Grant Agreement and FAQ published on the Tempus website. For invoices in a currency other than EURO the equivalent amount in EURO must be indicated on the invoice.

N.B. According to art. II.14.4 of the Grant Agreement, exchange losses are not eligible.

ACKNOWLEDGEMENT OF RECEIPT

Your name:
Complete address:

Prof. Dr. Miloš Nedeljković
Coordinator of 144856-TEMPUS-2008-RS-JPGR
Faculty of Mechanical Engineering, Univ. of Belgrade,
Kraljice Marije 16
RS-11120 Belgrade 35
Serbia

This page of the form will be returned to you on receipt of your implementation report and financial statement. Therefore please enter your name and address in the box above. Please remember to send in this page with each of your reports.

For internal use only

Tempus Project N°

144856-TEMPUS-2008-RS-JPGR

under the Tempus programme.

Yours sincerely,

Done at

Date

CHECKLIST

WHAT INFORMATION NEEDS TO BE SENT?

- Declaration: duly signed by the grantholder and the legal representative – Annex III/2
- Final report on implementation of the project – Annex III/3-5
- Statistics and indicators – Annex III/6-8
- Table on achieved outcomes – Annex III/10
- Summary report for publication – Annex III/11
- Financial statement: Annex III/13-21 (please complete the financial statement in the separate "Financial Statement" Excel file: make sure that all 9 Excel sheets are filled in)
- Supporting documents for expenditure 'Paid from Tempus' and/or 'Co-financed' only for equipment if the total amount of the invoice is more than EUR 25.000 (invoices) and for sub-contracts if the total amount is more than EUR 25.000 (conventions/contracts and invoices).
- Acknowledgement of receipt – Annex III/22