



Executive Agency, Education, Audiovisual and Culture



## **Reshaped Partnerships for Competitiveness and Innovation Potential in Mechanical Engineering (RePCI)**

Final Report

Public Part

## Project information

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Beneficiary organisation:	JAMK University of Applied Sciences
Project coordinator:	Anneli Kakko
Project coordinator organisation:	JAMK University of Applied Sciences
Project coordinator telephone number:	+358 40 071 9531
Project coordinator email address:	anneli.kakko@jamk.fi

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## Executive Summary

The final report of the Reshaped Partnerships for Competitiveness and Innovation Potential (RePCI) project is mainly aimed at the Agency's benefit and use. Furthermore, the public part of the report is aimed at peers and also for wider public dissemination of the project.

The general objective of the RePCI project was to improve the cooperation between mechanical engineering industry and related High Education Institutions (HEIs). The project targeted to change scattered university-enterprise cooperation to goal oriented and strategic managed walking hand-in-hand.

The main partner institutions of the project were four HEIs and five companies from four European countries (Romania, Hungary, Germany and Finland). In addition, 11 associated partner companies were involved in the project. The fundamental principle was to develop the forms of cooperation to the level that the companies start to recognise benefits of this cooperation as "a resulting mechanism". The companies learn what are the possibilities to improve their operational prerequisites and how to get gains based on the resources of HEIs. The companies' awareness to utilise the services provided by HEIs (with and/or without charge) has improved during the project. In addition, during this joint project, the companies have got new international contacts, have become acquainted with new international students and professors from their own and other countries. Moreover, they have explored and became familiar with the technical skills of international students and professors and in the same time they have become more international themselves. The gains for the companies may vary from modest analyses to strategic joint development.

Consortium of HEIs and companies is among the strongest in the field of mechanical engineering in their countries. The consortium has solid academic base and practical problem solving capability created by combining theoretical knowledge and industrial cooperation. All the HEIs have dynamic network of partner companies and strong will to be leading engineering educators also in the future. Together the partners have excellent capability to meet different needs arising from industry and to create location related solutions for companies.

The RePCI project consisted of eight work packages (WPs): 1) management, 2) re-engineering of company-HEI cooperation based on the novelty factors, 3) competency coaching concept, 4) resource alliance, 5) real life problem solving, 6) quality assurance, 7) dissemination and 8) exploitation of results.

After the project, the target is that the novel cooperation model will be expanded to new companies. In addition, the partner HEIs will communicate about the novel cooperation model in their own existing HEI networks. The aim is that there will be growing number of HEIs adapting the new models for industrial cooperation as well as commitment of SME-associations and decision makers to support the model.

The webpage of the RePCI project is available at: <http://www.repci.eu>.

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## 1. Project Objectives

The general objective of the RePCI project was to improve the cooperation between mechanical engineering industry and related High Education Institutions (HEI). The project targeted to change scattered university-enterprise cooperation to goal oriented and strategic managed walking hand-in-hand. The fundamental principle was to develop the forms of cooperation to the level that the companies are able to recognise benefits of this cooperation for them (resulting mechanism). The companies learn what are the possibilities to improve their operational prerequisites and how to get gains based on the resources of HEIs. The more specific objectives were to ensure that after the project:

1. There is developed a business line driven and strategy based cooperation management model for enterprises and HEIs.
2. Development of staff of companies is continuous and based on the strategic choices relative to the competitiveness.
3. International resource pool is easily available and improving the competitiveness of companies.
4. Real life problem solving is based on company-student-staff HEI triangle.

During the project, the HEIs and enterprises targeted to establish and test the cooperation, which is based on the strategies of both parties guided by the shared aim to improve the competitiveness. Leading principle was to conclude the cooperation plans based on the business line management instead of the traditional discussions with the human resource department. This is the “mechanical way” to change the emphasis away from the human resource production to wide range cooperation, which also supports the learning of HEI personnel. This management model of HEI-enterprise cooperation was structured in such a manner that it is coherent, clear to communicate and easy to multiply to other HEIs and enterprises.

Another target of the project was to convert the development of know-how and skills in companies from occasional to systematic, continuous and natural part of the operation of companies. By implementing the Competence Coaching -training to selected persons, companies are able to identify the learning needs of their staff and to create and implement in cooperation with staff of HEIs flexible in-company education solutions that fit to the business idea and improve the competitiveness. Both staff of companies and HEIs get experience from different possibilities and ways of learning at work, and as a whole the actions strengthen the mutual understanding between companies and HEIs as well as deepen and broaden the relationships and cooperation in different levels of action.

In addition, in the project, HEIs and enterprises targeted to form an international resource pool by defining the special expertise on substance fields and related facilities they want to bring available. The aim was to find the capabilities to be combined for something better than any of the partner could provide alone. During the project there were piloted and evaluated how the resource pool is able to connect the expertise from different organisations and countries. As an outcome

this project formed the supply of productised activities which are based on the needs and demand of the industry. The term “productised activities” means activity, which is defined, described and can be repeated in similar way. If the activities are productised it will be easier to communicate the cooperation possibilities far better.

Finally, the elements of the project fundamentals were created to ensure the lifelong learning at the individual and organisational level both in the HEIs and enterprises as long as the defined cooperation continues. During the project, there was tested and exploited an operational model, which intensively connects students, staff of companies and staff of HEIs into real life problem solving processes. For the students, this provides motivation for studies and practical understanding related to substance studied as well as improved social skills. For companies this model brings fresh ways of problem solving and new possibilities for recruiting and deepen the cooperation with staff of HEIs. For the staff of HEIs this makes possible to get up-to-date know-how from industrial needs and to have natural chances to get in cooperation with companies.

## 2. Project Approach

The following actions were needed to achieve the four specific objectives (1-4) of the RePCI project.

1. There is developed a business line driven and strategy based cooperation management model for enterprises and HEIs created. Actions needed:
  - Sharing the needs and experiences about cooperation between companies and HEIs.
  - Defining the fields of cooperation of companies and HEIs based on the strategies.
  - Creating strategic commitment at organisational levels.
  - Outlining joint cooperation targets with the companies.
  - Ensuring the sufficient variety of the elements to commit operational personnel to cooperation activities.
  - Agreement of joint cooperation strategy and the management of cooperation.
  - Collecting the learning outcomes.
  - Monitoring the depth and nature of established cooperation.
  
2. Continuous development of staff of companies is based on strategic choices relative to the competitiveness. Actions needed:
  - Selecting persons from companies and HEIs to be trained as Competency Coaches.
  - Planning the training for selected persons to be trained as Competency Coaches.
  - Implementing the training to the selected persons.
  - Planning the Competency Coaching -programs for participating companies.
  - Guiding and monitoring the planned implementation of the Competency Coaching -programs.
  - Collecting, reporting and evaluating the experiences and benefits about the Competency Coaching.
  
3. International resource pool is easily available and improving the competitiveness of companies. Actions needed:
  - Identifying the collaboration potential with companies.
  - Selecting the potential fields of expertise for this project.
  - Analysing the expertise, facilities and related activities.
  - Categorizing the productized activities for the operation potential.
  - Creating the supply of knowledge/resource pool.
  - Planning and monitoring pilot services.
  - Evaluating the service availability and effectiveness.



4. Real life problem solving is based on company-student-staff HEI triangle.  
Actions needed:
  - Planning a real life problem solving process.
  - Involving companies and staff of HEIs.
  - Scheduling and planning the implementation.
  - Selecting students.
  - Process implementation.
  - Reporting and evaluating the results.

In the project, each WP had its own leader, who helped the coordinator in the management and reporting of the WPs. Each HEI partner led at least one WP and the coordinator had several, mostly management related WPs to lead. The WP leaders were responsible for managing and monitoring the tasks in the WP according to the project plan and reporting the progress to the coordinator. Effective communication between the partners was ensured by project meetings. Virtual meetings were held between the “physical” project meetings. The execution of the plan was monitored regularly.

For the evaluation purposes of the project, following tasks were conducted:

1. Action plan for the quality assurance of the RePCI project was defined.
2. Feedback was collected from partners and companies involved during the project and it was carefully analysed, too. According to the feedback the corrective actions were discussed and agreed.
3. Two facilitated self-evaluation workshops were executed with the partners. The workshops were reported and the results were compared to the quality actions.
4. The quality improvement activities were discussed and decided in each project meeting.
5. Two external evaluations of the project were carried out during the project, one for the progress reporting and another for the final reporting purposes.

For the dissemination purpose, separate dissemination plan was produced. An overall plan for exploitation of the activities done within the project was also prepared. Dissemination activities of the project were started at the beginning of the project and they continued throughout the implementation of the project and beyond the end of the project, thus supporting the longer-term impact and sustainability of the project results. Dissemination activities were adapted suitable for the project goals and beneficiaries. Dissemination channels were planned to be adequate to the target groups. All the project partners shared the responsibility for dissemination. Roles and tasks were defined and allocated according to the WPs. Dissemination activities were organised at local, regional, national and European as well as at sectorial level.

### **3. Project Outcomes & Results**

Short description of the outcomes and results of the project are presented here work package by work package.

#### **WP1 Management**

The activities carried out and outcomes/results reached in the WP1 included overall management of the project with financial and reporting issues included. Making project contracts between the coordinator and participating institutes as well as organizing the project meetings have been part of the WP activities. The kick-off meeting was organised in Esslingen, Germany in November 2013, second partner meeting in Cluj-Napoca, Romania in May 2014, third in Jyväskylä, Finland in November 2014, fourth in Miskolc, Hungary in June 2015 and the final in Esslingen, Germany in September 2015. In addition, altogether three online project management video conference meetings were organised between the university partners. Moreover, many separate online video conference meetings were organised inside different WPs. As a video conferencing tool, the Connect Pro system was used.

The internal reports of the project were, in practice, the memos of the above mentioned meetings between the project partners. One of the main tasks of the WP1 was to produce the progress and final reports of the project including the collection of the needed information from the partners. Furthermore, other activities carried out in this WP were the management of work plans for each WP based on the original project application, together with the WP leader. As a project management tool (PMS), the “ELMO” platform was used for the project documentation and version management of the documents. Each partner received user names and passwords for the access to “ELMO”.

#### **WP2 Reengineering of Company-HEI Cooperation Based on the Novelty Factors**

The aim of the WP2 was to improve strategic cooperation between companies and HEIs. This was based on the shared understanding about the requirements of global competitiveness. The reengineering of cooperation consisted of issues as present situation analysis, opening negotiations, reporting of the bottlenecks and solution possibilities, strategic development plans, university-enterprise agreements and analysis of the obstacles based on individuals, institutions and legislation. The achieved cooperation has been reported and analyzed.

The HEIs and partner companies have found common areas for cooperation based on present situation analysis and meetings concerning strategic development plans. Based on these, the action plans have been created. In addition, cooperation agreements between universities and enterprises have been made. To make the cooperation more effective the individual, institutional, structural, administrative and legislative obstacles against “lean” and direct university-enterprise cooperation have

been specified. Towards the end of the project, the activities reflected against the table of novelty factors. Good practices and recommendations found together with enterprises in these activities have been reported and analyzed and reflected as factors towards industrial competitiveness and cooperation management successfulness.

### **WP3 Competence Coaching Concept**

The aim of the WP3 was to provide tools and the know-how to develop competence management and leadership for competence coaching in organizations. A critical factor in success and competitiveness of organizations is exploiting and developing of employees' competences. Competence development is an increasingly vital part of the companies' management and requires a new kind of leadership. In WP3, a training programme for the training of the Competency Coaches was created. Feedback concerning the contents of the programme was received from each participating organization and this had some impacts to the content of the programme.

In addition, training materials for Competence Coaches were developed in a form of a "Handbook for Competence Coaching". This handbook presents a competence management model, which companies and organizations can use. The model starts from identifying the needed competences and ends up with developing of the specific competences. The handbook includes instructions and examples as well.

In the WP3, the training programme for training of Competency Coaches was piloted in Romania and Hungary and partly in Finland. The training programme was tailored for each organization accordingly to their needs. The framework of the training materials for Competence Coaches has been developed in the form of the "Handbook for Competence Coaching". This handbook presents a competence management model, which companies and organizations can use and adapt. Using the Handbook as a starting point, the Competence Coaches can then create processes and tools for competence development for their organization.

### **WP4 Resource Alliance**

The aim of the WP4 was to form an international resource pool with the participation of enterprises and HEIs, which is easily available and it helps to improve the competitiveness of companies. During the spring and summer 2014, HEIs collected the information of their key expertise and facilities.

Based on this, the role of each university in the international resource pool was defined. It was important to create a resource pool in which every university has a clear and supportive expertise. Also the cooperation with the enterprises has to be easily taken in use and competences must be sufficient for a high level in order to improve enterprises competitiveness.

## **WP5 Real Life Problem Solving**

The aim of the WP5 was to demonstrate real life problem solving process developed by university partners JAMK and HE for the wider audience and to entrench the process into everyday practice of partner HEIs. This WP opened doors to new versatile cooperation between HEI's and companies and made it possible for companies to utilize HEIs in solving their business challenges.

During spring 2014, JAMK and HE had a pilot case with company Festo. In this pilot there were created e.g. concept, checklist, timetable, initial assessment tool and initial survey documents for two autumn 2014 real life problem solving implementations of WP5: Bosch Tool and Leon Group cases. Both of these implementations were involving the leader HEI, one other partner HEI and one company. The project was in both cases an international product development case in which the problem was given by the company and which included one intensive week in both partner countries. In both implementations students formed two international groups which competed against each other. The groups had access to product development and testing facilities of HEIs and companies. At the end, the results were presented by the groups and the company representatives chose the winner. The company utilizes the results in its future products. The teachers/professors graded the groups based on requirements of each HEI.

In addition to promised, JAMK and HE had an additional "post" project (spring 2015) with Heller company to verify the implementation of the concept.

## **WP6 Quality Assurance**

The main task of the WP6 was to ensure that the RePCI project maintains a high quality implementation. The tasks of the WP6 included the overall quality processes as well as the detailed quality processes of the administration. The detailed actions were described in the documented realization plan of this WP.

In the project, all the partners provided evaluation information which was summarized and shared. The information gathered was used to improve the processes and outcomes of the project as well as to the dissemination of the project (good practices and critical incidents). Face-to-face as well as video conference meetings were evaluated by the participants. The procedure was that the information was summed up and shared with the project partners. The information gathered was used to improve the transnational collaboration especially between the partners of the project, but also to develop the good practices of international projects in general.

The first self-evaluation workshop was executed with partners in Cluj-Napoca meeting in May 2014. In the workshop project's "twists and turns" (the positive and negative issues so far) were explored in the groups. Areas included were 1) results and outcomes, 2) processes and 3) people/partnership of the project. The workshop was reported and the results were compared to the quality actions. The second self-evaluation workshop was executed with partners in Miskolc meeting in June 2015. Areas evaluated were 1) objectives, results and products, 2) workplan and activities,

3) partnership, 4) general management, 5) financial management, 6) quality assurance and 7) dissemination of the project. This workshop was also reported and the results were compared to the quality actions.

Concerning the quality assurance procedures of the project, the proposed EUR-ACE quality system was found out not to be suitable for the RePCI project as it is focused mainly on degree programme evaluations. The first round of external evaluation (progress report) was been carried out by Ms. Päivi Korhonen. The evaluation report covers the project implementation phase since beginning. The objective of the external evaluation was to produce analytical but practical information about the project's implementation to the partner organisations by assessing the adopted processes, target group engagement, project management, and partners' cooperation. The coordinating organisation and the partner organisations were presented with further development ideas and concrete recommendations based on the general view constructed during the evaluation. The purpose was also to support the maintenance and rooting of achieved results and further development. The development ideas and concrete recommendations were compared to the quality actions of the project and, if needed, corrective actions were carried out based on them. The second external evaluation by Ms. Korhonen was carried out for the final reporting purposes. During this phase, the coordinating organisation and the partner organisations were presented with further development ideas and concrete recommendations based on the general overview formed during the valuation. The purpose was also to support the consolidation of achieved results and further development beyond the project implementation period. In this second external evaluation, also statement by Ms. Marita Aho was written to support the final reporting of the project.

### **WP7 Dissemination**

The separate dissemination plan was produced in the project. The partners have undertaken activities to disseminate the results of the project on the local, regional and national scale. One of the first actions was to design the logo and webpage of the project in English (<http://www.repci.eu>). The RePCI flyers in English, Finnish, Romanian, Hungarian and German languages as well as three separate project brochures (in English) have been designed and printed for each of the partners. The partners have delivered flyers and brochures to all institutions potentially interested in the project outcomes.

The WP7 leader has collected data on the partners' dissemination activities for the reporting purposes. Constant updating of the website and further press releases and articles as well as promotion of the project during various seminars and conferences in each partner's country have been carried out.

### **WP8 Exploitation of Results**

As mentioned, the RePCI webpage and portal has been designed. The development of the project has been accompanied by the webpage updates. An exploitation plan has been produced for the exploitation of the project outcomes after the project has finished.

## 4. Partnerships

The general objective of the RePCI project was to improve the cooperation between mechanical engineering industry and related HEIs. The main partner institutions of the project were four HEIs and five companies from four different European countries (Romania, Hungary, Germany and Finland). In addition, 11 associated partner companies were involved in the project. The consortium has solid academic base and practical problem solving capability created by combining theoretical knowledge and industrial cooperation. All the HEIs have dynamic network of partner companies. Together the partners have capability to meet different needs arising from industry and to create location related solutions for companies.

JAMK University of Applied Science's (JAMK) competences relevant to this project were in education of technology and further education for enterprise employees. JAMK has a long and wide experience in coordinating regional and international projects and has completed tens of R&D projects with enterprises. JAMK was the coordinator of the RePCI. JAMK has a strong link to Finnish industry, to one full Finnish company partner and to three Finnish associated partner companies of the project.

Technical University of Cluj-Napoca (TUCLUJ) is one of the top universities from Romania, being one of the four universities with technical profile that were classified in the category "Universities for advanced re-search and education", the highest rank for universities in Romania. The University's correlation to European standards is reflected by the international conventions and participation in a wide range of European education programs: TEMPUS-PHARE, SOCRATES, ERASMUS, LEONARDO, CEEPUS. There was one full Romanian company partner and two Romanian associated partner companies in the project.

The University of Miskolc (ME) is the largest higher educational institution in the north-eastern region of Hungary. The university has wide-ranging international relations in Europe and overseas. 102 cooperation agreements with foreign universities in 28 countries have been reached during the past few decades. The university, granted of the Erasmus Extended University Charter, has been an active participant in European educational and research projects (SOCRATES/LLP/ERASMUS, CEEPUS, Leonardo da Vinci, TEMPUS, Minerva, Grundtvig, Comenius, Erasmus Thematic Network, Erasmus Mundus, Jean Monnet, FP7, Marie Curie) since 1998. From Hungary, there were two full company partners and six associated partner participating in the project.

The role of Esslingen University of Applied Sciences (HE) in the project was to be a strong link to German industry. It also established a network of industrial companies operating in the field of Mechanical Engineering in Germany and contributed to the developing new methods of cooperation with all associated companies. There was one full company partner from Germany in the project.

Elomatic Oy (Finland) is a privately owned, globally operating consulting and engineering company. The focus of Elomatic's operations is on the provision of a comprehensive range of plant, ship and mechanical design, engineering and project management services that cover the initial investment and product development phase, as well as the entire life cycle of technical investments. In this project Elomatic was a full company partner who participated work packages 1-4 and other project activities and cooperated with all partner HEIs.

The SC PROTOTIP SRL Company (Romania) was set in 2004. The company offers a large variety of mechanical processing: shaping/turning on lath; shaping/turning on CNC; different milling; rectifications (internal, external, flat); accuracy processing (milling, piercing, boring out, rectifying); combined processing (milling, shaping, drilling, boring out), etc. In this project SC PROTOTIP SRL was a full company partner and took part in work packages 1-5 as well as collaborated with all HEI partners.

Festo Ltd. (Germany) is a leading world-wide supplier of automation technology. As a globally-oriented and independent family company with its headquarters in Esslingen, Germany. Today, the company provides pneumatic and electric drive technology for over 300,000 customers in 200 industries world-wide both for factory and process automation as well as cutting-edge training solutions. In this project Festo signed the Mandate Letter but did not want to sign the Consortium Agreement because they did not want to inform salaries of their staff members taking part in RePCI project. Festo still took part in the pilot case of WP5 and offered the topic and tutoring for the real life problem solving case during spring 2014.

Konecranes Kft. (Hungary) is a daughter company of the Konecranes group. Konecranes Kft. offers components, cranes, and material handling solutions for a wide range of industries, including process industries, the nuclear sector, industries handling heavy loads, ports, intermodal terminal, shipyards and bulk material terminals. In this project Konecranes Kft. was a full company partner who participated in work packages 1-5 and cooperated with all HEIs.

In December 1991 the FUX Ltd. (Hungary) was established. Manufacture and distribution of steel wire loops and slings for cranes constituted the main line of business in that heroic age. The company's showroom continuously carries a full selection of polyethylene hoisting and cargo fixing ropes and belts, equipment and accessories along with accessories and fittings for steel wire products and lifting ropes. In this project FUX was a full company partner who took part in work packages 1-5 and cooperated with all HEIs.

The co-operation between the project partners has been natural and each partner's special knowledge has been exploited. Thus it has been easier to create common understanding of the objectives in the project. Each university brought their best competence to this project and gave added value to the project to cover the whole scope of the field.

## 5. Plans for the Future

It is important that the main outcomes of the RePCI project will be sustained. This is achieved by agreeing with the partners on necessary actions and sharing the responsibilities. As part of the RePCI, HEIs and the partner companies have developed a novel systematic approach for cooperation. As base for this cooperation, we have agreed the annual meetings with a fixed agenda to discuss about the needs of future markets. Target is to be able to react the changes needed in industrial competencies in the future. To confirm the long-term cooperation the most of the partner companies and HEIs have signed the cooperation agreements during RePCI project.

Open dialog between all participants has improved understanding the need of the international network developed during the project. The understanding of challenges of other companies and HEIs helps understanding the way we need to approach future. The attitude and competence for international projects have developed positive way among the participants of the project.

Despite of the national differences of the participant countries, common factors have been found for successful cooperation. Flexible and fast enough reaction from HEIs is needed to meet the requirements of the companies. In addition, companies need to have long-term sight to cooperation. Unfortunately, the hectic business life does not always make the cooperation easy, but in long run the strategic cooperation will pay back with competent work forces in dynamic market.

The target is that the novel cooperation model will be expanded to new companies after the end of the project. In addition, the partner HEIs will communicate about the novel cooperation model in their own existing HEI networks. The aim is that there will be growing number of HEIs adapting the new models for industrial cooperation as well as commitment of SME-associations and decision makers to support the model.



## 6. Contribution to EU policies

The starting point of the RePCI project was to find the right and effective means to improve the competitiveness of European mechanical engineering industry. It should be clear for everybody that the global competition is not any more between countries but between larger economic areas. Foundation of the project was to co-operate together with enterprises and companies from several countries in order to find solutions to share knowledge and resources Europe wide for ambiguous targets in competition to overcome the nationally limited conclusions.

Furthermore, the target of the project was to form the management structure, clear processes and taxonomy for HEI-enterprise co-operation in international knowledge alliance. The dissemination/exploitation of the results will be easier as during the project there were pilots in every participating country. The fact that the enterprises were connected to the pilot cases ensured that the communication of the project fundamentals, implementation and results realised in local level. Thus, there are tangible means to spread information and facilitate exploitation of the project results on large geographical region in Europe.

Close cooperation in the real life problem solving processes exposed both company and HEI staff (and students) into new ways of thinking and new ideas creating a perfect environment for improving skills and new innovations. This can't be achieved without international cooperation. Most companies and HEIs either operate or want to operate in international markets. Therefore, it is important that all the cooperation activities between HEIs and companies have international point of view as a basis of them.

