

EAPSTRA - EurAsian Network for Product Lifecycle Support & Training

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EAPSTRA, das bevorstehende Eurasische Projekt und Netzwerk zielt ab auf die Demonstration der Vorzüge, die mit dem Einsatz von hochentwickelten Technologien und intelligenter Fertigung zur Unterstützung des Produkt-Lebenszyklus verbunden sind, wie z. B. Künstliche Intelligenz, Multimedia, Computer-basiertes Training, Produkt-Lebenszyklus Management sowie weitere verwandte fortschrittliche Konstruktionsmethodiken. Dadurch soll besonders das Bewusstsein für moderne Methoden zur Unterstützung und Wartung eines Produkts während seines Bestehens bei klein- und mittelständischen Unternehmen, sowie Lehr- und Forschungsinstitutionen im asiatischen Raum (speziell in Thailand und Malaysia) gesteigert werden.

EAPSTRA, the forthcoming Eurasian project and network aims to demonstrate the benefits associated with advanced technologies and intelligent manufacturing for Product Lifecycle Support such as Artificial Intelligence Tools, Multimedia, Computer Based Training, Product Lifecycle Management and related progressive design methodologies. Thereby increasing the awareness amongst Small and Medium Enterprises (SMEs) and research institutions in Asia (Thailand, Malaysia in particular) of advanced methods for the support and maintenance of a product throughout its life.

1 Introduction

Based on the success of the Asia IT&C project APoST – Advanced Product Support Technologies Network (ASI/B7-301/97/0126-15), it has been achieved to get the support of the European Commission for a continuation of the co-operation of the partners from Asia and Europe within the Asia IT&C programme component. /1/ Currently under contract preparation, EAPSTRA - EurAsian Network for Product Lifecycle Support & Training (ASI/B7-301/3152-94/71548) aims to introduce advanced technologies and intelligent manufacturing methodologies for the Product Lifecycle Support such as Artificial Intelligence Tools (AIT), Multimedia (MM), Computer Based Training (CBT), Product Lifecycle Management (PLM) and related progressive design methodologies to the academic and industrial institutions of the Asian partner countries. The forthcoming project will build up on the existing infra-

structure to cover additionally the domain of advanced methods for the support and maintenance of a product throughout its life additionally to the APoST domain of Virtual Manufacturing and Rapid Prototyping technologies.

The project consortium (**Figure 1**) consists of two Asian partners from Malaysia (Universiti Teknologi Malaysia, Johor Baru) and Thailand (School of Information Technology, King Mongkut's University of Technology Thonburi, Bangkok), as well as three European partners from Greece (University of Patras), United Kingdom (University of Wales, Cardiff) and Germany (Institute of Mechanical Engineering, Clausthal University of Technology). The IMW as co-ordinator expects again a fruitful and successful collaboration during the project duration of 24 months, also as the composition of the consortium is unchanged.

2 Objectives

The main objective of this initiative is to provide support, know-how and training for the adoption of advanced product lifecycle support technologies within Asian SMEs, and to conduct pilot applications to show how they may benefit from the utilisation of advanced product lifecycle support and training systems. As target regions for the implementation of the objectives, the project aims at the countries of the involved Asian partners Thailand, and Malaysia, called *Asian partners* in the following. The individual objectives are given below:

- *To continue the successful co-operation of the Asia IT&C project APoST, that focused on Rapid Prototyping and Virtual Manufacturing, to cover also the different domain of advanced product lifecycle support and training including AIT, MM, CBT and PLM technologies; to create a new separated network of excellence.* The predecessor APoST provides basic infrastructure, basic contacts and basic experiences to make sure that the additional target domain will be conveyed successful to the Asian partners' academic and industrial community.
- *To extend the Technology Demonstration Centres (TDCs) in Malaysia and Thailand; to do feasibility study of advanced product lifecycle sup-*



Figure 1: EAPSTRA partner map

port and training techniques; to disseminate knowledge about these techniques and underlying progressive methodologies. The establishment of the TDCs has shown that they support the stabilisation of the Research and Technological Development (RTD) potential in the Asian partners' academic and industrial communities, providing the training and updating that is required by introducing and supporting the implementation of advanced product lifecycle support and training technologies, especially for SMEs. So, this approach will be followed up within EAPSTRA.

- To develop two pilot applications, focusing on applying the related technologies to provide a product lifecycle support and training system incorporating a technical/ user manual and a CBT system. Before the adoption of advanced product lifecycle support and training systems can be realised widely among Asian SMEs, it is important to gain their confidence in these technologies. This will be achieved by conducting pilot applications that will demonstrate the potential of these technologies. During these pilot applications, valuable experiences will be acquired with regard to applying these technologies and to the needs of SMEs in Malaysia and Thailand.
- To demonstrate/train how advanced IT technologies, i-Manufacturing and progressive methodologies for an advanced product lifecycle

support can be applied within advanced technologies/ tools such as AIT, MM, CBT and PLM systems to i.e. support the installation, usage and eventual disposal of a product, to increase the awareness of SMEs in the Asian partners' countries of the capabilities of using these techniques. Artificial Intelligence Tools refer to an advanced set of techniques for machine reasoning often applied to fault diagnosis and automated detection of equipment faults, to speed up fault location. Multimedia is the presentation of graphics, text, moving images, sound and interactive features within a single application in a user-friendly manner, to create an effect greater than the sum of the parts. Computer Based Training is an interactive instructional approach in which the computer takes the place of an instructor, providing a series of stimuli to the user to assist them in learning how to use a product, ensuring the appropriate use of a product. Product Lifecycle Management systems realise both immediate and long-term operational efficiencies within the products' life. To use these technologies efficiently, affiliated innovative techniques will be conveyed for a better acceptance and awareness of local Asian SMEs.

- To enable SMEs in the Asian partners' countries to estimate the benefits associated with the implementation of advanced product lifecycle support and training technologies; to establish and expand contacts with European research activi-

ties. The advanced support and training systems once implemented will be used to assist the maintenance and training for the use of the products. The two pilot studies will specify procedures for compiling the content of the systems. Additionally, the content and media created for the systems may be reused to create publicity information for the products. The time and cost savings achieved by applying these technologies will be evaluated. The awareness of advanced technologies and creation of the network enables connections and contacts to related current research activities, Networks of Excellence and Integrated Projects conducted in Europe.

3 Fundamentals

During the last few years industrial companies in the local areas of the Asian partners Thailand and Malaysia, especially SMEs, are being put under increasing pressure to meet customer demands and compete successfully in global markets. The current market trends are: increasing international competition, reduced time of design and production, shorter product lifecycle, improved product lifecycle support (training and maintenance), higher quality requirements and higher delivery reliability. In addition to these market trends, new technological developments also play an important role offering new opportunities for applying advanced IT solutions, i-Manufacturing and innovative methodologies for the advanced product lifecycle support and user training.

The ability of Asian SMEs to adapt these advanced technologies and methodologies for the improved support of their products throughout its life and improved user training facilities is vital in today's dynamic global market. The application of IT tools and i-Manufacturing for the PLCS and training increases the efficiency and competitiveness of the Asian SMEs. The integration of up to date technologies and methodologies can give SMEs a major opportunity to improve the quality of their products, reduce the costs throughout the products' life and reduce support times and costs for their customers resulting in a better maintenance and utilisation. Their customers will also benefit from the reduction in time required to train a person to use the product. The introduction of these new technologies can also help to improve the performance, reliability and serviceability of a product.

However, SMEs in the Asian partners' countries face difficulties in relation to the adoption of these advanced PLCS methods and technologies. Problems are often caused by the initial outlay in terms of manpower and money required to implement these technologies and also a lack of knowledge regarding their capabilities and benefits. Therefore, these SMEs need to be able to obtain guidance and assistance in implementing these technologies in an efficient manner. Additionally, SMEs in the target areas would benefit from being able to attend trainings, seminars or workshops where they would be able to learn about and estimate the benefits, uses and implementation of these technologies. Manpower related problems, in particular finding suitably qualified personnel, will be assisted by the transfer of knowledge to the universities who will then be able to utilise it in the teaching of students thereby producing a technologically aware workforce.

So, EAPSTRA offers the possibility to the local Asian SMEs to benefit directly by this co-operation from the technical/ knowledge transfer by the European partners. The participating educational institutions will also benefit enormously, as the trainings and seminars that will be organised, and the establishment of a network of foreign and local experts will put them in a first class position of the academic standards. These factors will provide academic staff in Asian countries with up to date knowledge.

4 Intended Implementation

EAPSTRA is the continuation of the good experiences and approved relationships made within APoST. The APoST project /2/ has shown that the methods applied are successful. So, the EAPSTRA project will build on similar structures and activities. The already established infrastructure in Malaysia and Thailand will be supplemented and extended, as it is necessary for the new applied domain. The centres' scope will expand to advanced product lifecycle support and training. To accelerate the creation of a separated, new network, a corresponding circle of the target audience can be gained out of and with the support of this existing APoST network.

Throughout the project, introductory seminars on the technologies of the target domain will be held on site in Asia for industrial companies, especially SMEs, and educational establishments, like universities, by lecturers and researchers from the EU

and Asian partner institutions involved in the project. Together with selected SMEs interested in adopting advanced technologies, two pilot applications will be developed: one based in Malaysia, one in Thailand. Upon completion of the pilot applications, complementary seminars and workshops will be held to disseminate the results to a wider range of local Asian SMEs. The pilot projects will be managed by the Asian partners and it will be their responsibility during the setting up of the TDCs to find suitable SME partners with whom to carry out the pilot project work. The concentration on single TDCs on site in Asia will offer the best possibilities to transfer the necessary know-how and practice. Well-educated trainers who are familiar with the innovative technology and the customary practices and languages have the best possibility to convince and to produce a new generation of local trainers that will further disseminate the related knowledge.

In addition, a network of interested parties will be established, a regularly newsletter will be available for information about the progress of the project and current developments and applications related to the EAPSTRA domain. The network will be open to establishments taking part in EU (and nationally) funded research projects whose results may be relevant to EAPSTRA, and establishments and SMEs that have an interest in advanced product lifecycle support and training technologies. Especially the new instrument within the 6th framework, the Network of Excellence (NoE), wherein the EU partners intend to be involved (i.e. I*Proms, Concordance – currently in evaluation phase), offer a new and improved possibility to promote a network of high-quality. Additionally, an information portal will be installed. Such a portal makes only sense if there is the possibility for interaction. Therefore, a central database is necessary to enable the possibility to get in touch with innovative know-how and to enable to exchange of information or to liaise for new partnerships

The European project partners represent a high-grade of excellence in the applied area of i-Manufacturing. In particular, as relevant for this project could be mentioned the projects KARE – Knowledge Acquisition and sharing for Requirements Engineering (EP28916), SEDRES-2 – Systems Engineering Data Representation and Exchange Standardisation (EP20496), and SIMNET – Workflow Management for Simultaneous Engineering (EP26780), which had a major impact within the IST programme component ESPRIT and

covered fundamental sections of the PLCS. KARE aimed at the development of a knowledge based requirement engineering approach to support the highly knowledge intensive requirements engineering process of complex products. Among others, a prototype implementation has been realised within a PDM-System as approach for SMEs. Sedres-2 concentrated on the development of a standardised monolithic data model for the Systems Engineering domain, that resulted in PAS 20542 of ISO 10303 - STEP AP233. SIMNET featured an approach of a Parameter based Engineering Workflow for an improved and controlled product development. This has been implemented as demonstrator in a PDM-System.

The domain of AI has been dealt with i.e. in the projects REHAROB - Supporting rehabilitation of disabled using industrial robots for upper limb motion therapy (IST-1999-13109), and SYNERAGH - Systems Neuroscience and Engineering Research for Anthropomorphic Grasping and Handling (BRITE-EURAM PROJECT BRPR980797). The REHAROB project focussed on developing a system for upper limb motion therapy methodology for the disabled, driven by industrial robots utilising intelligent identification of the required physiotherapy motions. This has been achieved by a robotic rehabilitation system called REHAROB. The aim of the SYNERAGH project has been to create and control a robot arm which may be attached to a wheelchair and used by disabled people to automatically grasp objects.

5 Conclusion

EAPSTRA represents the ongoing university-cooperation with Asian institutions. EAPSTRA will mainly cover the domain of advanced product lifecycle support technologies and training. The intention is to demonstrate/ train how i-Manufacturing for an advanced PLCS can be applied within advanced technologies/ tools such as AIT, MM, CBT and PLM systems to SMEs and educational institutions in Thailand and Malaysia. This should increase the awareness on site of the capabilities of using these techniques to improve their marketability.

6 Literature

- /1/ <http://www.asia-itc.org>; EU Asia IT&C programme web-site
- /2/ <http://www.apost-project.org>; the project web-site