The fundamental goal of the R&D activities in this field is the research and elaboration of techniques applicable for handling complex production and business systems working in an uncertain, changing environment, balancing the aspects of optimization, autonomy and co-operation. The research necessitates an interdisciplinary approach with special emphasis on computer science, operation research, manufacturing science and knowledge-based techniques.

Main R&D topics
- modelling, control and optimization of technical and business processes
- management of changes and disturbances in complex systems
- distributed modelling of production and supply networks
- simulation-based modelling of large technical and business systems, Digital Factories

The laboratory designs and develops systems and turn-key solution which are based on the results of basic research published in significant international journals of this field. The research activities are partly pursued in the framework of EU-supported projects – some of them coordinated by the institute.

International scientific partnerships

Researchers at the laboratory take part in the management and working groups of the most significant international scientific organizations International like Academy for Production Engineering (CIRP), European Academy of Industrial Management (AIM), International Federation of Automatic Control (IFAC). Several of the colleagues are members of Editorial Boards of leading international journals like CIRP Annals, CIRP Journal of Manufacturing Science and Technology, Computers in Industry, Advanced Engineering Informatics, International Journal of Computer Integrated Manufacturing or the European Journal of Industrial Engineering.

In 2010 the Fraunhofer Institute for Manufacturing Engineering and Automation (IPA), Stuttgart, the Computer and Automation Research Institute, Hungarian Academy of Sciences (SZTAKI), Budapest, and the Fraunhofer Austria Division for Production and Logistics Management (FhA-PL) established the Fraunhofer Project Center for Production Management and Informatics at SZTAKI which is coordinated by our Laboratory.
Industrialsolutions

The Research Laboratory on Engineering & Management Intelligence develops solutions for different industrial partners in the frame of direct or supported R&D projects. Some examples from the near past are as follows:

- The results achieved in a multi-year bilateral project with the Japanese HITACHI are the new solution of automatic recognition and reuse of real production parameters from big industrial logs and the new system integrating the parameters of both the process planning and the short- and mid-term scheduling.
- The new production scheduling system developed at the Hungarian Bosch Rexroth site, which provides optimized short-term production plans in almost real-time taking the human and machine resources, the raw material availability, the real-time status of currently on-line orders as well as the new production orders into consideration.
- Multi-criteria planning system taking the maintenance requirements, available resources and weather conditions into consideration has been developed for GAMESA wind turbine manufacturer.

Both the implementations mentioned above and the other solutions already in daily use developed by EMI are not industry dependent solutions they can be applied in other fields in new deployments or e-services as well.

Most important R&D projects


Educational activities

Regular education is in progress at the Budapest University of Technology and Economics (BME) and Eötvös Loránd University (ELTE). Talented students may join the R&D activities of the EMI laboratory during the second phase of their studies or even as PhD students. Our leading researchers are supervising PhD works on both Hungarian and foreign universities.

Staff

The leader of EMI is Prof. László Monostori and his deputy is Dr. József Vánca. Around half from the close to 30 EMI colleagues hold PhD degree. The yearly scientific outcome of our laboratory is around 30-40 publications, ca. 300 independent citations and 1-2 PhD degrees.