

Chapter 5.10

Enterprise Information Systems for Business Integration in Global International Cooperations of Collaborating Small and Medium Sized Organisations

P. H. Osanna

Vienna University of Technology, Austria

N. M. Durakbasa

Vienna University of Technology, Austria

M. E. Yurci

YILDIZ Technical University, Turkey

J. M. Bauer

National University of Lomas Zamora, Argentina

ABSTRACT

The importance of small and medium sized enterprises (SMEs) is today far beyond any discussion in countries all over the world - in European countries as well as in Asia and in USA, in Africa as well as in Latin America. To meet market demands in the present and future global industrial world, manufacturing enterprises of any kind and any size must

be flexible and agile enough to respond quickly to product demand changes. With the support of artificial intelligence and modern information technology, it is possible to realise modern cost-effective customer-driven design and manufacturing taking into account the importance and basic role of quality management and metrology. This will be especially possible on the basis of the innovative concept and model for modern enterprises the so-called “Multi-Functions Integrated Factory – MFIF” that makes possible an agile and optimal industrial

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production in any kind of industry and especially in up-to-date SMEs.

THE GLOBAL IMPORTANCE OF SMES

To meet high-level demands both from industrial and from private customers in the future, manufacturing enterprises must be flexible and agile enough to respond quickly to product demand changes. New models for alternative configurations of future industrial organisations in general which are usually applied and especially for small and medium sized enterprises (SMEs) need to be investigated.

Those new models can be developed on the basis of intelligent production technologies and extensive use of the internet, of distributed computing environment (DCE) technology, parallel-processing computing and advanced engineering data exchange techniques - Osanna & Si (2000). By these means global competitive associations of factories as well as of collaborating SMEs with intelligent, associative, concurrent, interactive, modular, integrative, learning, autonomous, self optimising and self organising functions are already under development and the world wide application of such associations and cooperations will be possible in the near future.

COOPERATION AND COLLABORATION OF MODERN INDUSTRIAL PLANTS

Multi-Functions Integrated Factory MFIF is an innovative concept and model for future enterprises and collaborations which is initiated with the aim to provide cost-effective, agile and optimal ways to produce customer-driven Multi-Functional Products MFPs in the near future (see Figure 1). By means of information technology and artificial intelligence, factories which for instance produce

cars, aircrafts and ships respectively could be linked to form a new kind of collaboration with all three functions according to needs. The product - MFP - will be produced in such a way that the above mentioned different function tasks of the product should be manufactured in adequate function factory or function SME, and then assembled and integrated to realize the combination of the functions. The collaboration works by using its advantages of multi-functions, and produces high efficiently and agilely low cost high quality customer-driven multi-functional products - Si & Osanna (1995).

Such MFIF or SME collaboration has the potential to improve industrial competitiveness. Additionally comprehensive manufacturing automation and optimal production of customer-driven MFPs will be made possible worldwide. Intelligent manufacturing systems (IMS) are the basis for realization of such a collaboration in which individual functional enterprises or functional SMEs are functionally and configurationally integrated with other functional units located in different parts of the world to produce MFPs respectively. This new concept of SME collaborations or MFIFs will come into existence in the near future and will be realised step by step. One of its specific features is the use of cross-functional design and manufacturing teams, in which the small engineering teams or single engineers of the units or SMEs with different skills and expertise work together on a MFP project concurrently and interactively.

Such a system is based on the assumption that it works under the condition that each single-functional factory or SME has a possible full-scale IMS working environment and is an integration of intelligent manufacturing machines, cells and systems for manufacturing and other tasks to be carried out. Concurrent, interactive, modular, integrative, learning, autonomous, self optimising and self organising functions are the main features of the MFIF or SME cooperation respectively.

The factories are reconfigurable to take advantages of agile manufacturing production for the

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