FOCAL ISSUES IN PRODUCTION PLANNING & CONTROL (CIM applications)

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The introduction of a CIM (Computer Integrated Manufacturing) system reveals many problems with the use of engineering and production process information. The automation of in-house processes has stimulated the development of increasingly complex production systems. The ongoing demand for quality, shorter delivery times (JIT) and client specific products invokes the need for more concurrency in planning, engineering, production control and logistic information.

There are now computer systems on the market, which help improve the production flow, quality and use of engineering information throughout a company. These systems provide improved management of the engineering and manufacturing process through better control of engineering data, engineering activities, engineering changes, product configuration, process control and planning. They provide support for the activities of product teams and for techniques such as concurrent engineering. From the experience in the use of these systems it appears they help:

- Reduce engineering costs by at least 15%
- Reduce the product development cycle by at least 20%
- Reduce engineering change handling time by at least 30%
- Reduce the number of engineering changes by at least 40%
- Reduce the time and the cost to introduce and develop new products
- Improve the quality of products and services (TQM)

TECHNIKA PLASTIKA is experienced in the field of plastics, aiming the production of plastic and pres-sure die-casting quality industry parts, using advanced materials (engineering plastics). Within an engineer-to-order production environment, co-ordination of activities concerning decision-making about delivery dates, prices and product demands is indispensable. In order to meet company's global goals, it is important to use experts on a specific manufacturing subject merely focusing on local optimisation.

To schedule the production plan, to increase productivity, to improve quality by using SPC tools and to monitor ''real time'' the production process in greater detail and increase efficiency, TECHNIKA PLASTIKA, an ISO 9002 certified company, decided to integrate OPUS and Q-TERM products. The programme includes a ''real time'' new Production Planning and Control system by using Barcode and Data Collection Terminals. These services have been offered to TECHNIKA PLASTIKA, by MOTION Hellas and its partners under TRANSTECH programme.

MOTION Hellas is a Hi-Tech company with activities in the fields of Real Time Control Systems, Engineering, Manufacturing and CIM Software applications, services and products for SMEs. It is an ISO-9001 certified company for Design, Development, Manufacturing and Integration of Information Technology Systems and Data Collection Terminals. The company provides services, as well as Hardware and Software products in the business and engineering sectors to Hellas enterprises, covering both the private and public sectors including Defence. **MOTION Hellas** is co-operating closely with Universities and European companies in order to solve actual problems and to establish a long term collaboration in International Market. It has expertise, know-how and experience in R&D programs such as ESPRIT, BRITE EURAM, CRAFT, DRIVE, RECITE II (TRANSTECH), TIDE etc.

Why do CIM?
The systems are known generically as Computer Integrated Manufacturing (CIM) systems. Within the generic class of CIM systems there are many types of systems, such as CAD systems, CAE systems, CAM systems, PDM & EDM (Product & Engineering Data Management) systems and Computer Aided Quality (CAQ) systems. CIM systems manage all the engineering data related to a product and to the processes used to design, manufacture and support the product. CIM systems also manage the flow of work through those activities that create or use engineering data. They support techniques and technologies aiming to improve engineering and production workflow, such as concurrent engineering, production planning (PPS) and Statistical Quality Control (SQC).

Production planning and control involves developing and using information to forecast market requirements and production goals. This enables the efficient managing of material flow, co-ordination of internal and supplier activities, and the effective use of people, equipment and machines. Planning and controlling operations occur in three phases: creating and overall operations plan, developing detailed plans for material (inventory) and capacity (machines, labor) and finally executing these plans. A production planning and control system, such as OPUS PPS&PQC is designed to support execution of a firm's operations strategy. As new processes-automation, simplification and production cells – and competitive pressures have reshaped strategy, new planning and control systems with optimisation algorithms and real time control have emerged.

Engineering Data and Process Workflow
The term "Engineering Data" includes all the data related to a product and to the processes that are used to design, produce and support it. In the past, systems have not been available to manage all of this data and only parts of them have been managed. Typically, the MIS or the IT department have implemented systems to manage "business data" such as sales data, financial results, corporate plans and personnel information. Technical and engineering data are managed either on paper or within the computer systems, such as CAD, that have produced it. Engineering data is difficult to manage because:

- There is a large amount of it
- It is used by numerous staff in different functions and often at different sites
- It is used by many computer programs and often on different computer systems and databases
- It often has different definitions and versions

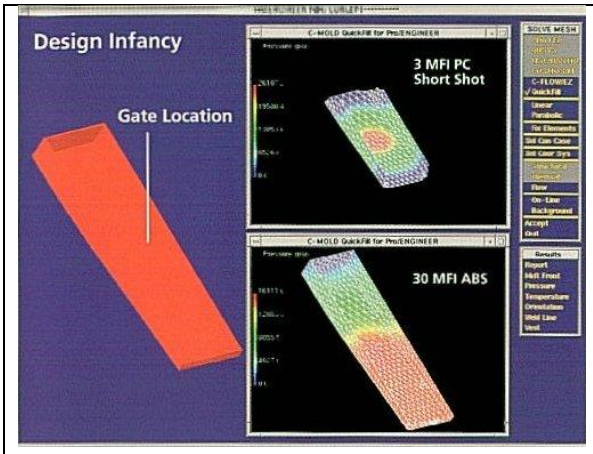
The term “Process Workflow” refers to the flow of work through those activities that create or use engineering data. Process workflow is not limited to the flow of work through the engineering department. It also includes the flow through additional departments, inside the company, that make use of engineering data (quality control, stock control etc) and others externally, for instance, by suppliers and customers.

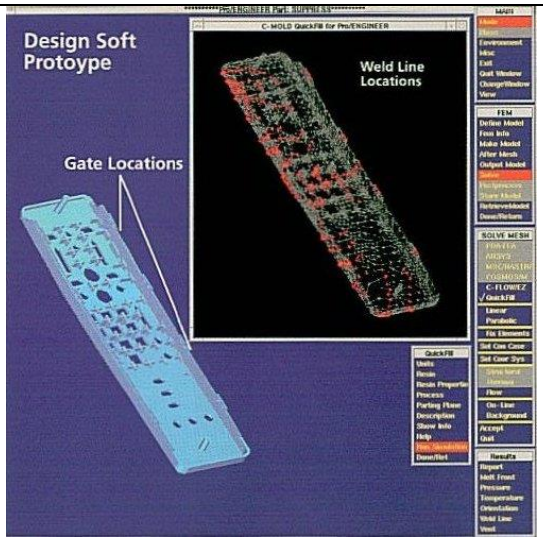
There is a close link between engineering data and production workflow. Each step of the workflow makes use of data. Individual items or sets of data are often used in many steps of the process workflow. The link between data and workflow implies that it is efficient to address them together with a user friendly and flexible CIM system such OPUS PPS&PQC.

Monitoring the production processes

Careful planning and monitoring of the production process aims to deliver the product or service to the customer at the right time (JIT) and at the lowest cost, and highest profit, by the efficient use of machines, resources, employees, plant and materials. The installation of new machines and transportation systems involves huge investments in the efficient use of equipment.

The production programmes are based on an estimate of sales. Consequently, there is a balance to be struck between the costs of under-production – when customers may be lost to other producers and over-production – with high storage costs or products that have to be sold off cheaply or even scrapped. So the production planner designs, implements and monitors production schedules. This involves materials specification, the establishment of quality limits and detailed costing. The link between process simulation, data capture and process control implies that it is efficient to address them together with a CIM system. The integrated system is possible to monitor the production process and the quality of the product and process by using sensors, PLCs and SCADA modules.





Quality Control and SPC Tools

A possible result of corporate management’s intention to reduce costs, reduce lead time and improve quality could be the recruitment of a CAQ (Computer Aided Quality) system. The CAQ system will be supportive of CIM. The objective of this new function is to improve the quality of the product and process (ISO 9000). The OPUS/PQC module is a Statistical Quality Control Software package and represents a comprehensive and practical approach to quality control and the support of quality control elements of ISO 9000. It supports the TQM and offers tools for management of QA/QC documents and reports. The program provides the user with the most essential on-line and off-line SPC tools for quality control. It adopts the latest in Graphical User Interface (GUI) technology to ensure a harmonic and ergonomic user interface. It monitors each operation/set of operations to immediately locate actual

problems when they occur and to locate possible problems before they arise, to facilitate preventative corrective action. It works real time together with the other CIM modules under a RDBMS system

Logistics Management

Logistics management, once thought of as warehousing and distribution, is another area undergoing growth and development. It is defined as the management of the entire supply chain and covers the whole flow system of materials and finished products. The Logistic system supported by the CIM application by using bar coding and data capture applications (Q-TERM embedded data collection terminals) and has on-line connection under a flexible RDBMS system. There are claims of a 20 per cent cost reduction by integration of these activities.

Goals and future building of a CIM system

CIM systems help improve the flow, control, quality and use of engineering information throughout the company. They provide support for the activities of product teams and for advanced techniques and technologies such as concurrent engineering, production scheduling, statistical process control and data acquisition.

A company becomes interested in CIM systems when it finds that it can no longer manage engineering, production and quality data by traditional manual methods, for example, when it can not control all its CAD and production data and when it can not control technical configurations or when it needs to reduce time-to-market (JIT production). However, many companies' experiences with CIM applications have identified the following problems with CIM systems:

- The system is integrated, but the organization is not
- Technology is only part of the solution
- The system is too complex and no one understands the complete system
- Implementation is a huge investment
- The system does not do all of the things that the company expects
- It is very difficult to access the data and the database is powerful but the reporting is weak
- Unfortunately for companies wanting to implement CIM, there are many employees in the company who will not understand why CIM is necessary and therefore be resistant to its implementation.

However, for companies with large engineering organizations and for those looking to gain competitive advantage through engineering activities, CIM will obviously be a key technology of the future.