ADVANCES IN PRODUCTION MANAGEMENT SYSTEMS

Proceedings of the 4th IFIP TC5/WG5.7 International Conference on Advances in Production Management Systems - APMS'90
Espoo, Finland, 20–22 August, 1990

Edited by

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FOREWORD

APMS '90 was the 4th international conference on Advances in Production Management Systems, held August 20 ... 22, 1990 in Espoo, Finland. It was organized by IFIP Working Group 5.7. "Computer-Aided Production Management" under the IFIP T.C. 5 "Computer Applications in Technology". IFIP (International Federation of Information Processing) is affiliated under UNESCO. The first APMS conference was held 1982 in Bordeaux, the second 1985 in Budapest and the third 1987 in Winnipeg. APMS '90 had a world-wide coverage in the state-of-the-art and the future of production management.

Production management, as a business function as well as a scientific discipline is faced with a multitude of change drives from different sources, management, organisation, information technology and manufacturing technology.

From the managerial point of view the forecast based make-to-stock principles have proven insufficient in the pressure of market forces demanding fast and reliable deliveries of customer oriented products. The goals of production management have been re-evaluated.

Contemporary manufacturing organisations are making benefit of the focused factory concepts. Product oriented organisations (cells, workshops and factories) favour distributed decision making. As a by-effect co-ordination mechanisms are urgently required between factories, workshops and cells.

Small and medium scale industries (SME´s) have become consumers of information technology - but provided with their dedicated desires and problemacy. Factory information systems are evolving in the form of graphical, even multimedia user interfaces, simulation, artificial intelligence, micro computers, workstations and local / wide area networks.

New manufacturing technology has major impact on production management. Production management of CIM systems is a complicated art, where a complexity of human, mechnical and automated manufacturing systems ought to be intervowen as a smooth customer oriented control system. Problems of any level of control as well as the interfaces are addressed.

The proceedings of APMS´90 is divided into four sections: invited papers, principles, systems and techniques according to the format of the conference.

The invited papers cover an extensive overview about the state-of-the-art in production management in the early ´90ies. The themes range from the everlasting hunt for better productivity up to the implications of CIM architectures (particularly CIM-OSA) in production management. One of the characteristics of modern production management is the need for better principles, systems and techniques for interorganizational production management. Another topic of crucial relevance is the necessity to master not only repetitive manufacturing but also one-of-a-kind product manufacturing.

The section of production management principles focuses the following themes: strategy for production management, interfaces of product design, production flow, economics and organization, service factory, logistics, production management typologies and applications.

The section of production management systems deals with distributed production management, design process and methods, design tools, production management and CIM, sociotechnical viewpoints, systems for cells and product oriented workshops, new architectures, SME-systems and JIT systems.

The section of production management techniques cover the following topics: simulation, distribution and co-ordination, expert systems, transportation problems, networking and scheduling.

In the preparation of the proceedings I am strongly indebted to each individual of the international program committee of APMS '90 about their major contribution to review the multitude of manuscripts proposed to the Conference. I shall also express my gratitude to Ms. Varpu Sassi for her immense efforts in the preparations of these proceedings in every single phase of the project.

Espoo, September 18, 1990

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The Working Group 5.7 : Computer Aided Production Management

A LONG STORY ...

by Professor G. DOUMEINGTS
Chairman of the WG 5.7

On behalf of IFIP (the International Federation for Information Processing) and Working Group 5.7 "Computer-Aided Production Management" I have the great honour to introduce this APMS' 90 Conference here in Espoo.

APMS' 90 is the fourth APMS Conference, and this year our group is eleven years old. I am the third chairman, succeeding to my colleagues and friends, Asbjörn ROLSTADAS, who had the great merit of creating this Working Group, and Peter FALSTER who consolidated the initial work. For such a Working Group, being eleven means reaching maturity.

Before evoking in a few words this already long process, I want to express my deep emotion.

First because this is the first event I chair since I was elected chairman last year in Barcelone, and more particularly because this event is APMS : I was the first organizer and chairman of APMS in Bordeaux in 1982.

The second reason is that we are here in Espoo, at the Technical University of Helsinki, with which we have such friendly relationships and cooperation, and also in North Europe where the group started.

When I look back, on these eleven years, I feel a little overwhelmed by the responsibility I received from my colleagues : to maintain and to improve the high standard of our Working Group. We were seven, on this 31st of August 1979, when A. ROLSTADAS created the group officially : P. FALSTER (DK), R.B MAZUMDER(CH), E.P MOE (N), SVARDON (S), H. WILDEMANN (D) and myself. We immediately took the decision to organize a Working Conference. The second meeting took place in Zurich : we were received by R.B MAZUMDER at Brown Boverie. We were six at this meeting, with a newcomer : H. HUBNER from AUSTRIA. The location of the Working Conference was then decided : it would be Trondheim, A. ROLSTADAS's home town. We immediately started discussing various themes :

"Production Planning and Control Systems in the 80^{ies}" was presented by A. ROLSTADAS. You can see the result : now there is an International Journal on the subject, with ROLSTADAS as Editor-in-chief.

"A method for structuring Production Planning and Control Systems" by D. BREUIL, myself and an industrial representative : this was the first presentation of GRAI Method.

The "Interactive Prototype Design of Factory Management System" by FALSTER, was the ANNOUNCEMENT of the Base Operation. Bjorke, ROLSTADAS's colleague, talked about "Interface between technology and management Systems".

"Centralized/decentralized Production Planning" which was already an important theme, as well as "Cost-estimating approach".

Meanwhile, the number of members kept increasing regularly. By the end of 1980 we were 15 members, and we had a discusion on a cooperation with CAM.I (Computer Aided Manufacturing International) which is a non-profit organization : it was also at the same time that WG 5.7 decided to create APMS "Avances in Production Management Systems". It was a great honour for the GRAI Laboratory to be chosen to organize this first event.

It was quite a success, with its 285 participants, 40 % of which originated from various countries outside France, 27 countries altogether. So you will understand my emotion, eight years later, to participate here to the opening session. I don't want to continue this long enumeration, but you must know some statistics about our Working Group :

- WG 5.7 includes 52 members representing 23 countries from Europe (73 %), Asia (17 %), America (North and South 10 %).

- APMS' 90 is the fourth conference after the one in Bordeaux (France, 1982), Budapest (Hungary, 1985), Winnipeg, (Canada, 1987). Next Wednesday we will make the final decision concerning the location of the fifth APMS, but we already have three candidates : Athens (Grece) Berlin (Germany), and Tel Aviv (Israel)*.

- The 18th meeting of our Working Group will take place, and we will make major decisions concerning the location of not only the next APMS, but also of the Working Conference which takes place each year in between two APMS.

The difference between APMS and the Working Conferences is that the participation is only on invitation. The number of attendees is reduced to about 60 people, with more time for discussion. For example, next year in November we will hold our 9th Working Conference in Bremen (D), after Trondheim (N, 1980) , Vienna (Aus, 1983), Copenhague (DK,1984), Munich (FRG, 1985), Tokyo (J, 1986), Gaithesburg (NBS-USA, 1987), Galway (IRL, 1988), Barcelone (ESP, 1989).

The 10th will be organized in May 1992 in China while the 11th will take place in August of the same year, in Eindhoven (NL).

But our Working Group does not only produce conferences and Working Conferences. We also publish books. Majority of the books are connected with our events, because each conference and working conference produces a book with a few exceptions : it could be a special issue of the International journal of our I.F.I.P Technical Committee : "Computer in Industry".

I would like to draw your attention to two books. The first one, edited by our chairman, A. ROLSTADAS entitled "Computer-Aided Production Management, State of the art", in 1987. The second one, written and edited by one of our more distinguished Members, Professor John BURBIDGE was entitled : "Terminology in Production Management".

John is certainly the most fascinating member of our group. I met him for the first time in Bordeaux in 1982 for APMS : it was his first appearance in our community but he was adopted immediately. Since this time John has been the backbone of our group, but also our pride. Recently he was nominated Doctor HONORIS CAUSA of the University of Novi Sad (Yugoslavia) : congratulations to you John.

But our Working Group deals not only in conferences, Working Conferences, books, or meetings. It is also a thinking community with a lot of scientific exchanges, based on great friendship. It is not easy to explain this situation but I think I have never met such an environment before. Let me give an example. Two years ago, the Commission of European Communities launched a new program called Esprit Basic Research. Seven members of our group decided to make a proposal : the University of Bordeaux 1 (GRAI Laboratory) and myself, the Technical University of Denmark, with P. FALSTER, BIBA of the University of Bremen with B. HIRSCH, one of our recent but very active members, Helsinki University of Technology with our APMS chairman Eero ELORANTA, University College of Galway, with another backbone of our Working Group : Jim BROWNE, and SINTEF, Technical University of Trondheim with Asbjörn ROLSDATAS.

The theme is Factory of the Futur : Production Management for one-of-a-kind Production. Usually when you have to prepare such a proposal it takes a minimum of six months with at least ten meetings. In this case two meetings and one month's work were enough. I think it is remarkable and proves the existence of this thinking community.

So, now, you will certainly understand better the beginning of my talk when I express my anxiety about responsability I took on last year. Before I leave, I have to thank our conference chairman Eero ELORANTA and his whole team for the amount of work they did to organize this conference. I know very well this subject not only from my APMS'82 experience but also because we have started the preparation of the next event of our Technical Committee, namely CAPE'91 (Computer Applications in Production and Engineering) which will be held next year in Bordeaux (September 10.11.12).

Eero ELORANTA, the Chairman of this APMS'90 is also a backbone of our Working Group (but we have several backbones) and his contribution to our Working Group is all important. With his staff he has produced a big effort for the organization of this event. Thank you again Eero, but also thank you to the speakers, the chairpersons of the sessions and the participants, some of them coming from a faraway country after a long trip, and enjoy the conference.

* The next APMS will be organized in GREECE in 1993.

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INVITED SPEAKERS

Advances in Production Management Systems
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BREAKTHROUGHS IN MANUFACTURING TODAY

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The silent winds of change are sweeping through leading edge companies in every corner of the globe. These companies are making quantum leaps in productivity, quality and flexibility. The question is no longer if the underlying new concepts work, but rather why is it that only one to two percent of the our countries' industries have made the improvements possible? They have seen the way. Now they need the will.

1. INTRODUCTION

The new industrial revolution, like so many historic developments, is receiving comparatively little attention as it is occurring. That the benefits of the revolution will be to enhance the lifestyles of mankind is not debateable. The impacts of reducing every factory's size by at least 50 percent, while continuing to produce as much or more , using the same machines, but reducing the manhours required in half will eventually show up in sharply reduced prices for the consumer. Not that this is not already occurring. Glen Bloomer, one of our pioneer executives, recently told the press in Minneapolis that his 3M video tape plant had been able to reduce costs and, therefore prices, by 67 percent, using the new but proven techniques. Reinventing the Factory: Productivity Breakthroughs in Manufacturing Today, a book by Leroy D. Peterson, Andersen Consulting, and me (The Free Press, 1990) documents over 100 case examples of companies which have achieved these types of improvements. These cases include not only companies in the developed nations of the world, but also in nations struggling to upgrade their economies.

When one reads about the simple techniques of the reorganized factory layout, the machine and tooling modifications, the low cost automation principles, and the personnel organization structures applicable, one can not help but wonder why every enterprise in every country is not working at breakneck speed on the implementation of every aspect of these elements of the new industrial revolution. The fact is that there are innumerable roadblocks barring the way to the path towards superior manufacturing. For example, in the early years of the phenomena then commonly thought of as the Japanese methods, executives in every country found it convenient to view their success to be uniquely attributable to their culture. In the intervening 10 to 15 years, we have been able to adopt and to improve upon the original ideas and to do so