

**The future prospects of productivity improvement
in European SMEs:
roadmap proposals dedicated to the car,
aerospace and agro-food equipment sectors**

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ABSTRACT

Under the management of TECHNOFI (France), a consortium of five firms has completed an eight month study for the "Growth" Initiative (Fifth Framework Programme), which complemented earlier work by the same partners (contract G1MA-CT-2001-00007) dealing with process improvement techniques in Europe. Focusing on five countries – France, Germany, Italy, Spain and the United-Kingdom -, the consortium recommends roadmaps up to 2010 in order to reinforce productivity investments in European manufacturing SMEs. Whereas they make 50 % of the investment performed by USA companies to-day, they reach only 20 % of French and German enterprises and 10 % of the Spanish enterprises¹. **There is a need for a step-change in European companies, which still look at production capacity increase rather than innovative approaches to increase productivity.**

Based on interviews and coordinated works with national experts, as well as two expert seminars in Brussels held on March 2003 (involving players from large industrial firms and technical research centers), the study results have been checked and amended through five national events which gathered more than 150 stakeholders.

A global roadmap is proposed which combines:

- ✓ Training at process improvement increasing the basic competence and skills to manage cross functional process improvement projects
- ✓ Networking technical research centers in order to deliver to European SMEs a coherent picture of the players and research results dealing with process variability and stability
- ✓ Implementing coherent RTD efforts on the stability of plastic processing, an area where all three sectors and Europe as a whole must increase its competitiveness
- ✓ Improving the stability of welding processes, an area where the security of the end-user is to-day still ensured by quality control checks at the end of the process.

The expected impact on this roadmap implementation will be maximised through EC support combined in the three sectors studied in this work, since their quality oriented approach of business will favour a fast implementation of process improvement approaches.

1. Training at process improvement

SMEs in Europe are facing three major issues:

- ✓ The pressure of large industrial groups, which are searching for quality/cost compromises all over the world for the part manufacturing that they subcontract
- ✓ The need for increased added value, including new design capabilities of the parts that they will manufacture

¹ Le Monde, Sunday July 6th 2003, p. 22 "Why European economic growth looks anaemic?"

- ✓ The lack of project managers which, in agreement with the general management, is able to gain authority and power at improving productivity

This leads to a lack of resources devoted to process improvement, which only external pressure will change. This external pressure will come from ISO standards (and the like) which large scale industrial groups impose on their subcontractors as a selection procedure. The needs for a European training cursus at process improvement in SMEs have been confirmed throughout this study, which must involve:

- ✓ Professional associations as advertising and dissemination bodies
- ✓ Public regional support to encourage the in-depth involvement of clusters of companies in order to train the project managers at supporting themselves further dissemination of the techniques within their own company
- ✓ Leading SMEs (size range 100/250 people) which can validate the contents and appropriateness of the training tools within an ISO 9000/2000 qualification procedure.

An in-depth description of the training course is proposed, pinpointing the needs for the development of modules which bridge the gap between the mere application of the ISO framework and the day-to-day life of process improvement within an SME manufacturing environment. Gap bridging includes a software tool which allows to collect data on the process to be improved and to detect process changes which deserve analysis for further improvement. This overall training development work will get support from key large industrial groups which have already implemented such approaches at a larger scale within their own group.

2. Networking research centers working on process variability

During FP5, the EC has funded about 250 research projects which, one way or another, address process variability and stability. The USA approaches (for instance Six-Sigma techniques) have demonstrated that process stability is a key feature which ought to be taken care of as early as in the design phase of products. Improving process stability has a direct impact on productivity, since a stable process is one which allows the stable manufacturing of parts within well controlled performance specifications for the product and for the process:

- ✓ it reduces drastically the cost of rework
- ✓ it avoids scrap.

The needs for a Network, linking leading research centers in Europe through the “process stability” banner have been identified.

Here again, the Network must aim at providing European SMEs with a clear cut expertise on process stability in key manufacturing technology areas. This expertise will consist in:

- ✓ e-learning modules which allows SME project managers be trained at implementing stability measurements, data analysis and corrective action implementation in order to reduce their own process variability
- ✓ knowledge creation and dissemination towards SMEs, based on current research work performed by leading research centers working on innovative manufacturing processes
- ✓ gathering real life issues from SMEs in order to build on future R&D work at a European level, favouring process stability improvement or new process development with improved stability characteristics.

In the end , more stable manufacturing processes will contribute to a more sustainable Europe.

3. Implementing coherent RTD efforts on the stability of plastic processing

Europe is a world player in plastic processing², thanks to its 30.000 enterprises (mostly SMEs) which transform 30 millions tons of plastic materials with a total yearly turn over beyond 100 billion Euros. The 8 % yearly growth of plastic material use in industry makes this area a key one for future European competitiveness. However, European SMEs are to-day experiencing breakthrough changes due to the arrival of new, cheap labour countries in the realm of plastic processing combined with the demand of integrators which require innovative design capabilities from their SME subcontractors. Plastic processing remains quite a low margin business: it requires SMEs to concentrate on major productivity efforts in the years ahead, combining innovative design and manufacturing technologies.

From the work completed so far, there is one area of plastic processing which should deserve more attention: plastic extrusion processing, which can be found in all the three sectors dealt with in the study, but also in the building industry. When compared to injection moulding, not enough efforts have been put on the coupling between the design of plastic products and their manufacturing based on extrusion techniques. An integrated project involving SMEs from France, Germany and Belgium has been identified which, in complement of the networking of research centers described above, would demonstrate how to develop an efficient field support towards hundreds of SMEs using as a core manufacturing process. This research project would end up with a regional research organisation linked to the above Network and dedicated to the optimisation of extrusion processes. Integrated research work need to cover material, process development work, end user applications and investors capable of waiting the validation of “new concept processes”.

4. Improving the stability of welding processes

Welding is a key joining process, used in the car, aerospace and agro-food equipment sectors. Non destructive control techniques (NDT) are currently implemented at the end of a welding process to check the integrity of the joined parts. Hence, the variability of a welding process is quantified once the process is over, not during the process itself. The importance of innovative NDT techniques which can be implemented during welding has been pinpointed, but needs to be further investigated with technical research centers that are involved in the understanding of such complex processes. Interestingly enough, this area of research address both metal and plastic welding, using non intrusive techniques such as real time holographic control, thermal or visible imaging, online welding parameter control of the welded parts. A RTD project involving SMEs has been identified which, in complement of the above networking of research centers, would demonstrate how to validate new NDT techniques which are proposed by innovative sensor SMEs in Europe. Integration needs to cover material, process development work, end user applications and investors capable of waiting the validation of “new stable welding concept processes”.

² « Compétitivité de la plasturgie française dans l'Union Européenne », a DIGITIP report (March 2003)