



COST 526

“Automatic Process Optimization in Materials Technology”

APOMAT

### Half-Yearly Report

|                             |   |
|-----------------------------|---|
| <b>1. Reporting Period</b>  | <b>1.7.2003 – 31.12.2003</b>  |
| Project title               | <b>Distributed simulation-based Optimization in Sheet Metal Forming</b>   |
| Project leader              | Prof. Dr.-Ing. Manfred Grauer   |
| Organization                | University of Siegen<br>Dept. of Information Systems  |
| Main collaborators involved | Fischer & Kauffmann GmbH & Co KG, Finnentrop, Germany<br>GEDIA Gebrüder Dingerkus GmbH, Attendorn/Germany<br>GNS GmbH, Braunschweig/Germany<br>INPRO GmbH, Berlin/Germany<br>Linde+Wiemann Profiltechnik GmbH, Dillenburg/Germany |

### 2. Funding Situation

Amount of money received specifically for COST  
Other resources partially used for the project

120 kEuros  
kEuros

### 3. International Collaboration

(mention group and type of work done in collaboration during the reporting period)

Participation in the Working Group Meeting in Krakow + project progress report  
NO

- communication with Dr. Hediger and Dr. Jakumeit from ACCESS Aachen/Germany about integration of CASTS in OpTiX environment

### 4. Industry participation

(mention name of companies and work done in collaboration during the whole project)

- **Fischer&Kauffmann**  
cases studies for collaborative engineering of automotive supplier parts
- **GEDIA**  
cooperation on the field of collaborative engineering based on simulation and remote visualization of automotive supplier parts
- **GNS**  
further development of INDEED V7 in order to introduce additional interfaces for the integration of INDEED in OpTiX
- **Linde+Wiemann**  
analysis of knowledge-intensive business processes in concept planning and bid engineering to be supported by virtual prototyping

|  |                       |
|--|-----------------------|
| <b>5. Meetings, visits, exchange of scientists, short-term scientific missions</b>   | <b>Location, date</b> |
|  |                       |
| <b>6. Progress within the reporting period</b><br>(Not exceeding 3 pages, including tables and figures)  |                       |
| <ul style="list-style-type: none"> <li>- further analyses of scenarios in automotive supplier industry for support of product and process engineers in offering and construction phase</li> <li>- identification of knowledge-intensive processes in the early phases of the product life-cycle</li> <li>- evaluation of alternative simulation codes to be utilized in different phases of the product life cycle; analyses considered runtime, precision, functionality for multi-stage vs. single-stage manufacturing processes</li> <li>- concept for a 256 CPU-cluster system at the University of Siegen to be used for simulation and optimization</li> <li>- analysis and development of optimization strategies for the solution of multi-stage optimization problems based on the Distributed Polytope method and branch&amp;bound strategies</li> </ul> |                       |

|   |
|---|
| <b>7. List of publications</b><br>a) Published  |
| <p>M. Gerdes, T. Barth, M. Grauer, <b>About Performance-Models for the Distributed Solution of Simulation-Based Optimization in Computational Engineering</b>, Journal of Computational Methods in Science and Engineering (JCMSE), Vol. 3, No. 3, S. 463-474, 2003</p>   |
| <p>M. Grauer, T. Barth, <b>Kollaboratives virtuelles Prototyping</b>, industrie management 5/2003, GITO Verlag, pp. 29-32, 2003 (in german)</p>   |
| <p>M. Grauer, T. Barth, G. Stuff, <b>Verteilte simulationsbasierte Produkt- und Prozeßoptimierung in der Umformtechnik - Virtuelles Prototyping für mittelständische Unternehmen</b>, in: H. Eschenauer, W. Wiechert (eds.), „10 Jahre FOMAAS - Festschrift zum Jubiläums-Kolloquium am 8. November 2002“, pp.86-96, University Press Siegen, Siegen 2003 (in german)</p> |
| <p>M. Grauer, G. Stuff, T. Barth, P. Neuser, O. Reichert, M. Gerdes, <b>Virtual Prototyping in Manufacturing based on Complex System Modeling</b>, in Proc. 17<sup>th</sup> JISR-IIASA Workshop on Methodologies and Tools for Complex System Modeling and Integrated Policy Assessment (CSM'2003), IAASA, Laxenburg/Austria, 2003</p>                                    |
| <p>M. Grauer, T. Barth, M. Gerdes, <b>Concept and First Experiences in Simulation-Based Optimization</b>, in: Proc. "4th International Conference on Intelligent Processing and Manufacturing of Materials (IPMM '03), Sendai/Japan, 2003</p>   |
| <p>M. Grauer, M. Gerdes, T. Barth, <b>Performance-Analysis for Distributed Approaches to Simulation-Based Optimization</b>, in Proc. 21st IFIP TC 7 Conference on System Modeling and Optimization, Sophia Antipolis/France, 21.-</p>   |

25.7. 2003

b) Submitted for publications

M. Grauer, T. Barth, **Distributed Simulation-based Optimization in Decision Support and Management**, contribution to track "Quantitative Methods in SCM and ERP", MKWI'2004, Essen/Germany

c) In preparation

M. Grauer, T. Barth, **Grid-based Computing for Multidisciplinary Analysis and Optimization**