

## Short summary report: E36 “Modelling and Simulation in the Pulp and Paper Industry”

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### 1 E36 – A SHORT OVERVIEW

Within a lifetime of more than 4 years (2004-2008), the COST Action E36 has brought together most of all European scientists active in modelling and simulation in the pulp and paper industry. They have been working closely together in exchanging knowledge within the meetings and in organising conferences. A specific focus was given the software use and applicability. In the meantime the topic of modelling and simulation is recognised as an important tool in companies throughout the industry. Extensive efforts resulted in its establishment in national research agendas. Researchers exchange (STSM) has facilitated the development of research partnerships throughout the scientific community.

### 2 E36 WORKING ON THE INNOVATION CYCLE OF MODELLING AND SIMULATION

The usage of the various key modelling and simulation techniques in pulp and paper is not developed to the same “degree” and one could take the product life cycle as a mould to picture this (Fig. 1): The sales number could be understood as being the usage of the technology concerned. Presuming this, it is obvious that the various techniques are located all along the graph in all different phases from introduction to decline. E36 has in this sense for four years been driving the product cycle a little further in performing activities in three different fields: scientific achievements, networking and dissemination / training. The work focus (“Action activities”) of E36 is indicated in Fig. 1.

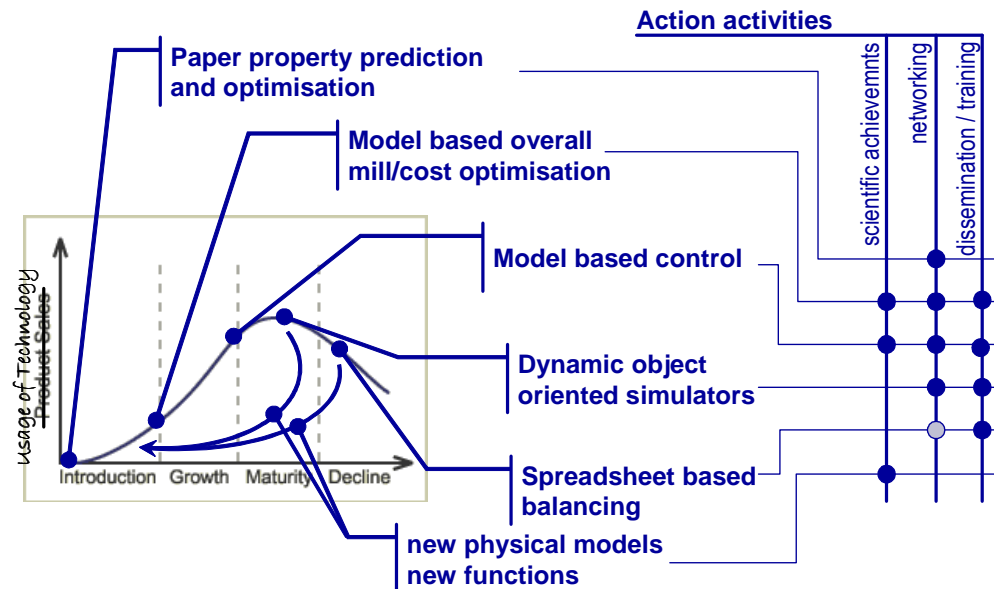


Fig. 1 Activities of E36 within the „life cycle“ of modelling and simulation

The most important output of the Action is the scientific results achieved by the participants involved. The second major achievement of the Action is the networking that took place within the meetings, short term scientific missions and other collaboration activities performed, lending themselves to an improved exchange and subsequent use of the scientific knowledge and lab and pilot facilities throughout Europe. The third part of activities of E36 was related to dissemination and training. Scientific achievements have been collected in a dedicated book [i]. Knowledge around simulation software and its use has been collected, documented and made available to the general public ([www.coste36.org](http://www.coste36.org)); young scientists have used various software packages to rebuild predefined models for training reasons and systematic comparison. These results will be described to more detail in the following sections.

### 3 SOFTWARE USE EVALUATED

Simulation software, being the key technology to be used as a basis has been studied in detail. The work completed covers software for data acquisition, data analysis and simulation. Based on replies given by the participants of the Action and attendees of the various conferences a series on reports on modelling and simulation software has been prepared.

Sample models have been set up and rebuilt in various software packages. These sample models cover a cleaner model, a washer model and a dynamic model of the constant section of the paper machine (**Fehler! Verweisquelle konnte nicht gefunden werden.**). These exercises provided a practical basis for a direct exchange of knowledge and expertise. Most of the models have been built by young scientists thus providing opportunities for education and training.

### 4 BENEFITS PROVIDED TO THE INDUSTRY

As impact of the Action, a raised attention on modelling and simulation in the European pulp and paper industry can be observed. Some of the major paper companies, namely Sappi, initiated targeted activities. Suppliers present in the Action have elaborated service offers based on modelling and simulation and/or developed new simulation and model based optimisation tools.

### 5 R&D ON SIMULATION IN EUROPE: THE FUTURE PERSPECTIVE

An important focus of future research is to better perform process based product optimisation in order to predict and control paper properties based on process variables. Activities have to lead to a more reliable and precise paper property prediction. The task is to calculate paper properties based on the properties of all relevant components (pulp, fillers, chemical additives etc.) and the boundary conditions present during sheet forming, pressing and drying. Finally this should lead to master both process performance and product properties. As one important precondition, it is needed to interweave the first to two threads into a common web of knowledge. In addition random effects, margin errors and process limitations have to be more clearly understood. Another challenge will be to master the complex pulp and paper value chain. By integrating process models with cost models it will be possible to unveil currently hidden factors that impact the economic balance of the individual mill. Thus it will be possible to calculate on the socio- and macroeconomic level the effect, all various sub processes have on the paper chain performance.

### 6 REFERENCES

- [i] Erik Dahlquist ed., Use of modeling and simulation in pulp and paper industry, Mälardalen University Press, 2008; 331 p.