# CPM GmbH

**An early „Spin Off“ of the RWTH Aachen went international**

**(under the special aspect of activities in Brazil)**

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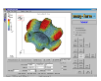
*CPM GmbH, Herzogenrath*

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***Be ahead in competition by consequent use of latest engineering techniques***

**Aim of this presentation**

In the global world of today technology and development is spread around the world.

Result:
- as a company that works in the interface between research and industrial application you have to be orientated global
- you have to overcome traditional structures in your own country
- you have to find ways to integrate yourself into other countries industry and culture
- you have to work in international co-operations
- …….

**The problem was to find our way as there were no guidlines and we were one of the very first to start such a business**

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**Aim of this presentation**

Using the example of our company we would like to give an idea about what it meant to start up such a business from zero at a time when these things were not at all established.

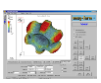
We will explain our development and will describe our activities in Brazil in particular to explain the obstacles to overcome.

We hope that this presentation may be interesting and entertaining.

The information is serious and the cases mentioned are real but names may not be given for confidentiality reasons.

We want to give as much insight as possible to show up the difficulties.



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**History of CPM**

| | |
|---|---|
| 1987 | CPM was founded in Aachen<br>(shareholders: 6 members of the University and an external company)<br>Business on case to case basis and preparation of products to offer |
| 1990 | CPM changed to Herzogenrath<br>(Two of the shareholder left University and became CEOs)<br>Focussing the business on hot and cold forging<br>Research with cold forging companies and Universities in Germany |
| 1993 | Change of shareholder structure<br>Extending business in Europe<br>Reasearch on European level as well |
| 1990`s | Focus on R&D and selling software in Europe and trying in Brazil and India |
| 2000 | Change of Strategy : Focussing on engineering support and participating in practical orientated R&D<br>Extending the business to further continents |
| from 2010 | CPM is active in all continents except Australia. |

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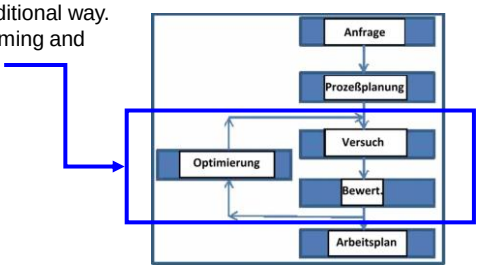
**What are we doing in particular?**

- We develop and market simulation software, participate in R&D projects and integrate latest developments in our products
- As specialist in metal forming we provide latest forming technology together with simulation
- Simulation software helps to substitute the „trail and error“ procedure to develop a process in the traditional way. It helps to better understand the metal forming and enables the engineer to optimize the process before making any tooling even
- We help the customer to strengthen its engineering skill to take advantage in international competition



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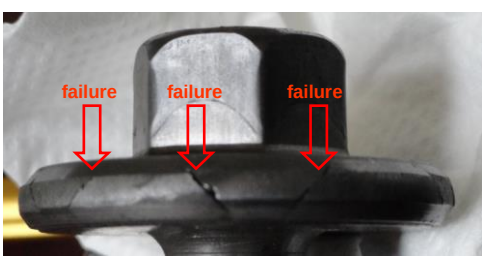
***Technologievorsprung durch konsequente Anwendung von Simulationstechniken***

**Example I:** Cracks in a screw head due to purely empirical design

(Traditional engineering in cold forging industry):

Production on the machine:




Result: Part shows failures, periodical cracks

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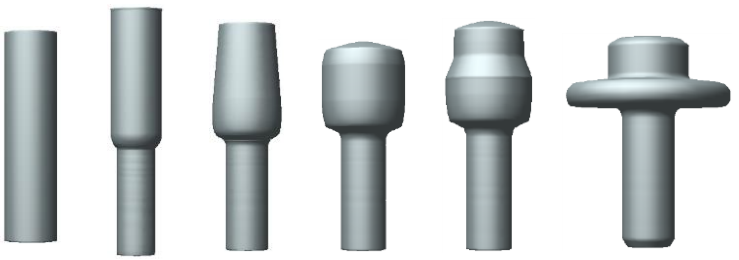
**Example I:** Cracks in a screw head due to purely empirical design

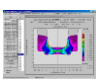
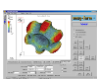
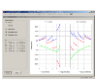
(Traditional engineering in cold forging industry):

Design of the progression (purely geometrical) based on expierience,
by comparison with similar parts or by using existing design support software.



Result: Progression (purely geometrical)



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•**Example I:** Cracks in a screw head due to purely empirical design

(Traditional engineering in cold forging industry):

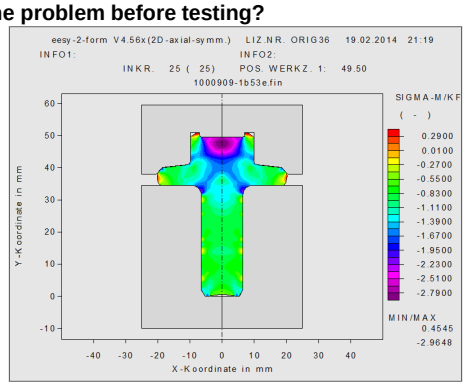
**Could the engineer have found the problem before testing?**

Answer: Yes by studying the progression in simulation

The relation between hydrostatic pressure and yield stress is a value to be checked. Negative values would be not critical. But in this case we see values up to 0.45.

➡ nearly all principle stresses are positive

➡ clear indication of possible cracks!!!



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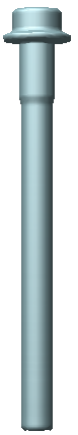
**Example II:** Crack in a screw head, provable material problem

**Situation:**

- progression designed
- filling, loads etc proved
- tools constructed and ordered
- parts produced

**Result:** severe cracks







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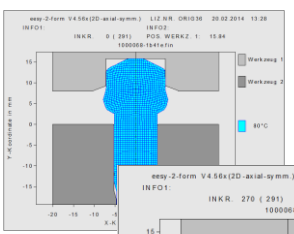
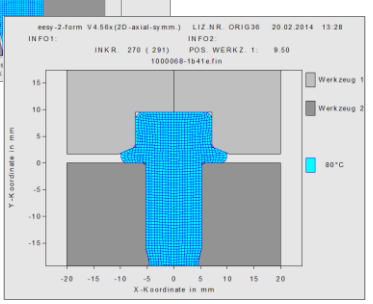
**Example II:** Crack in a screw head, provable material problem

**How to find out the reason?**



**Answer:**

Simulation of the production sequence



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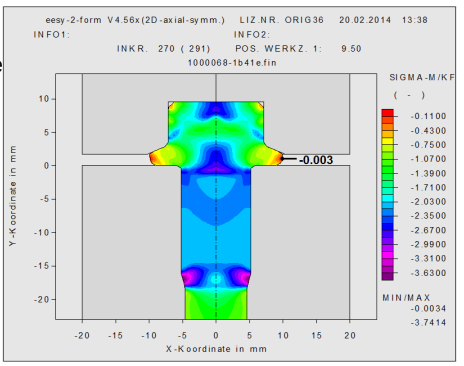
**Example II:** Crack in a screw head, provable material problem

Are there any critical situations that could indicate a crack?

Answer: No, because:

The relation between Hydrostatic pressure and yield stress is negative even

➡ no indication of any stress situation that could cause a crack during forming



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**Example II:** Crack in a screw head, provable material problem

**Result:**

Because the crack is not under 45° to the dominating tangential stress and
there are no indications in the stress analysis for any critical situation

➡ there is obviously a material quality problem

➡ the supplier has to replace the wire

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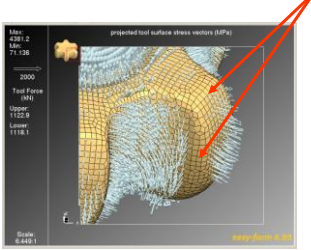
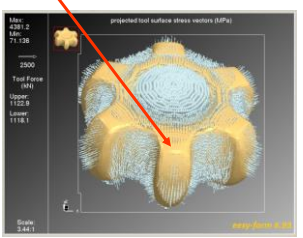
**More complex parts:** more complex design tasks for the engineer

Inner race showing
significant underfilling

Simulation has to show the underfilling, …





… has to show the material flow…

A new preform can be designed to get perfect filling





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Activities of CPM in Brazil

 

1990 First Contacts with a university
Attempt to contact industry through the contacts of the university
Regular visits and participation in a forging seminar

Problem: No sufficient knowledge in university about the processes in industry
University has no real contacts to industry – only to a few big companies
University has not enough skilled personal
University attempts to „deal“ with everything – but nothing in detail
Good: Possibility to make own contacts during the seminars

1995 Stop of the attempt to work with the university
Try to find other sources to get an overview of the industry
(no internet yet – so other approaches needed)

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Activities of CPM in Brazil

1996 Participation in an activity of the German Chamber of Commerce (Brazil Pool)
Approach to reach the market through contacts of other companies in the market (like machine suppliers)
Start a co-operation with a German-Brazilian Institute at the University of Sao Paulo (also an activity of the German Chamber of Commerce)
Presentations at industrial associations
Continue the participation in the SENAFOR to generate a „memory effect“

2000 Participation in Seminars organized by Suppliers to the target Industry (f.e. NEDSCHROEF from Belgium)





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Activities of CPM in Brazil

2000 Agreement of Co-operation with a Brazilian company run by an engineer who was educated in cold forging in Germany and was Technical Director of one of the big cold forging companies before
Consultec intended to consult cold forging companies and had an interest to use simulation software
Result: By this co-operation we got the final access to the market


Since 2000 we have a successful co-operation, we got the necessary contacts and serve industry directly

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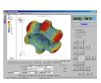
Activities of CPM in Brazil

(activities to support the co-operation between industry and universities)

Activity in Material data

As we coordinated a project in Germany to get a „best-practice“ guide to measure yield-stress-strain curves and as such material data is needed for proper simulation and as we knew that a university in Brazil got adequate equipment supported by the German DFG we offered specimens to perform tests and to find out about the results to be able to propose a good source for such data to Brazilian customers.
The activity was welcomed. After fife years there was still no results and then the specimens got lost.
We offered to send new specimens……..



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Activities of CPM in Brazil

(activities to support the co-operation between industry and universities)

Activity to support universities in education

As there are a lot of cold forging companies in Santa Catarina we contacted the university in Florianopolis to offers support to build up special courses in cold forging……..no interest
We did a similar step in Campinas…….no interest

We offered support to the Senai in Brusque with success.
A seminar took place in 2005. But for financial reasons it was offered one time only.

Now there is a big activity by Senai in Bahia and we offered our support again.
We got positive answers but not yet any precise planning till now.

Activities of CPM in Brazil
(activities to involve Brazilian industry and universities into International Organizations)

ICFG The International Cold Forging Group (ICFG) is a non-profit organization to support cold forging technology.
Members are leading experts from university and industry from around the world. Membership is by recommendation only.

We contacted industry and universities to motivate them to set up a Brazilian Cold Forging Group and join the activities of the ICFG.

The ICFG was very open for these activities and finally the then time president participated in the SENAFOR in 2007 to support this activity. He even offered to have one of the very next yearly conferences of the ICFG in Brazil to integrate the Brazilians quickly.





Activities of CPM in Brazil (activities to involve Brazilian industry and universities into International Organizations)

ICFG During the SENAFOR 2007 the Brazilian Cold Forging Group was initiated and some people from university and industry were named to organize the next steps. The BCFG should have been formally established soon and their representatives should have attended the next plenary meeting of the ICFG in the following year to present and further discuss a concept for a plenary meeting and a conference in Brazil in the near future.

O professor Button também falou de um projeto de pesquisa com método e resultados sobre "Proposta para Formação de um Grupo Brasileiro para Estudo do Forjamento a Frio". O objetivo foi mostrar aos participantes do Senafor, que um grupo de pesquisadores no Brasil, apoiados pelo Prof. Tekaya na Alemanha, está iniciando as atividades para formar o Grupo Brasileiro de Forjamento a Frio, que será uma seção do International Cold Forging Group, existente há 41 anos.

Revista do Parafuso #12, 2008

These activities never took place and the nominated co-ordinator did not show up on the next ICFG plenary meeting even…

Only one lonely representative of the industry was there.

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Activities of CPM in Brazil

Successful applications of customers

Forward extrusion with
OSEN process



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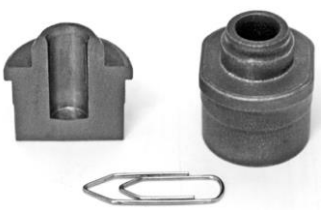
Activities of CPM in Brazil

Successful applications of customers



Complex part
formed
in one operation

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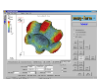
Activities of CPM in Brazil

Successful applications of customers

Forming a shock absorber in an unusual way



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Activities of CPM in Brazil

Successful applications of customers

Producing a CV joint

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Activities of CPM in Brazil

Resume: To enter the Brazilian market with new technology requires

a lot of idealism,

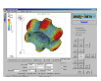
a long standing,

great tolerance,

a lot of creativity and

an open mind for political and cultural differences



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Activities of CPM in Brazil

**Resume: If you have these ingredients and if you are patient enough**

**you can end up with success….**

**and may be able to make a lot of friends in a great country!**


Thank you for your attention