



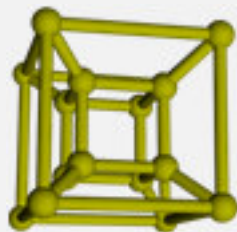
## LoCoMaTech Project Talk 4.1

Innovative tooling techniques for low-cost and low-friction dies

### Coating-Substrate-Simulation

The main goal:  
Investigations in to the mechanical and thermal  
Stability of Coating-Substrate-Systems

**TBZ-PARIV**



Jürgen Leopold

# HFQ™ Forming die

## What seems to be the trouble?

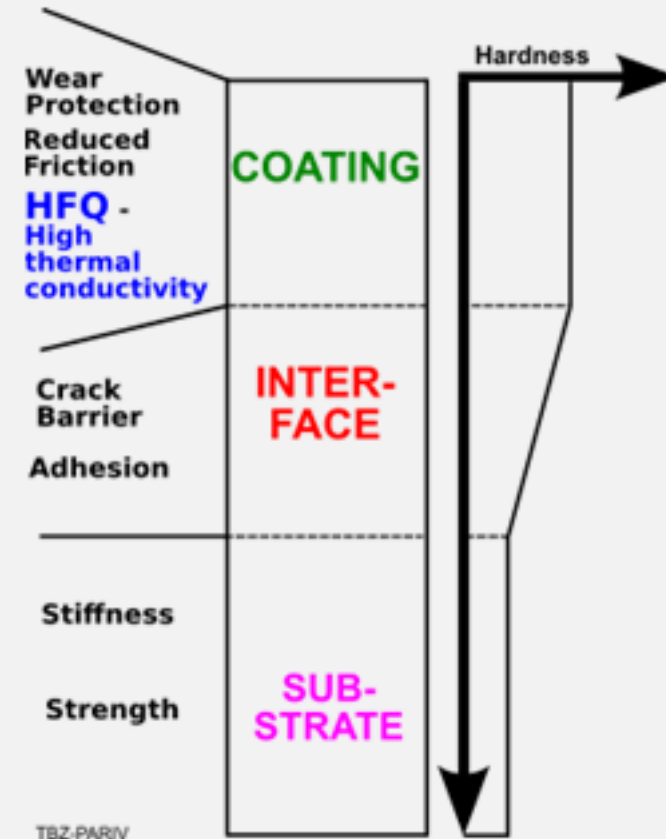
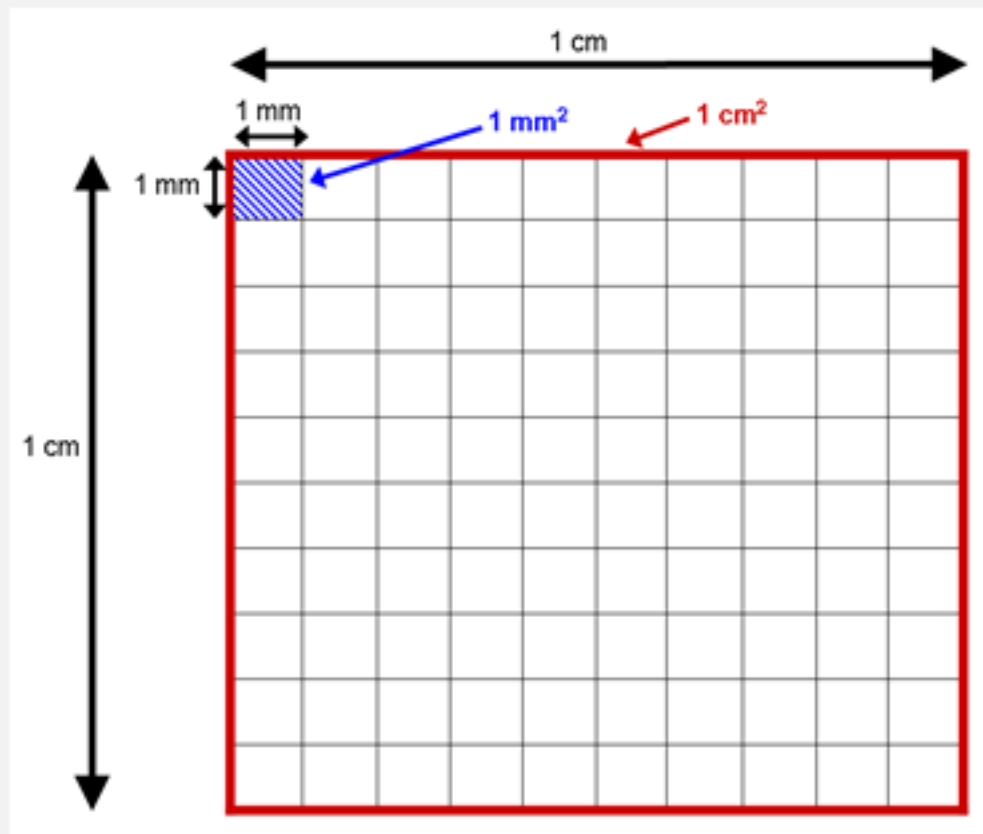


Source: FIAT

# HFQ™ Forming die

## What seems to be the trouble?

CRF B-Pillar Tool: **1450mm x 900mm x 565mm** > Coating: **2-3 μm**

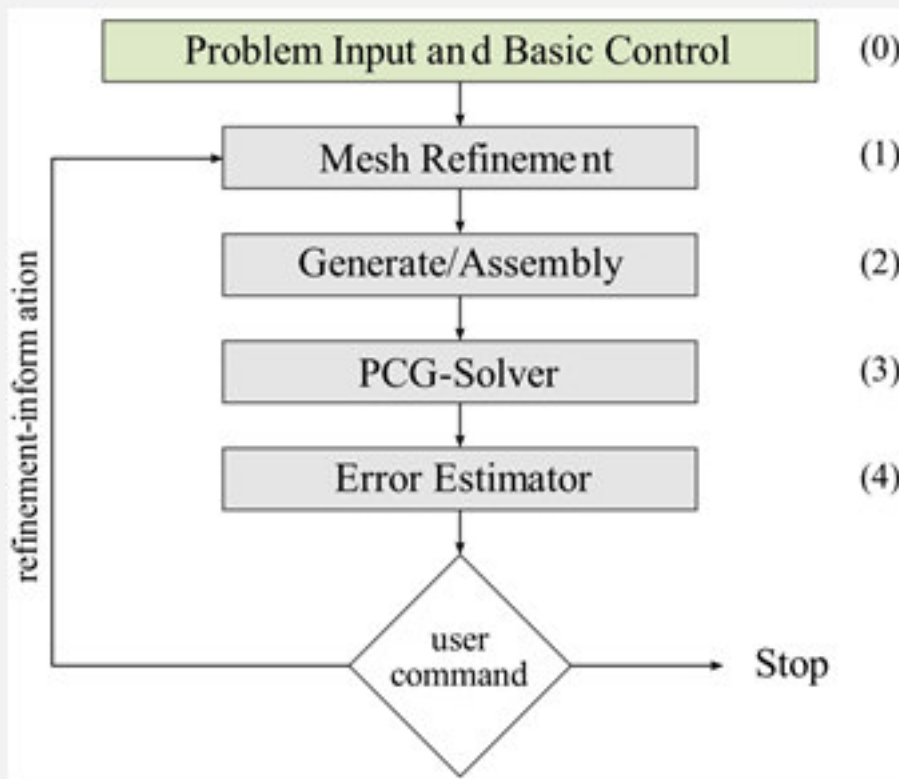


# HFQ™ Forming die

## The answer to the problem



Advanced Adaptive Finite Element Code (**AAFEM**)



### Step 1 – Mesh Refinement

Each element are subdivided into 2 or 4 smaller elements.

### Step 2 – Generate/Assembly

The stiffness-matrix and right hand side for approximating the p.d.e. on the actual mesh will be generated.

### Step 3 – PCG Solver

### Step 4 – Error Estimator

This is the most important step for the basic control of the adaptive meshing. A special tool has been developed to increase the efficiency of the finite element density.

# HFQ™ Forming die Numerical “testbed”

