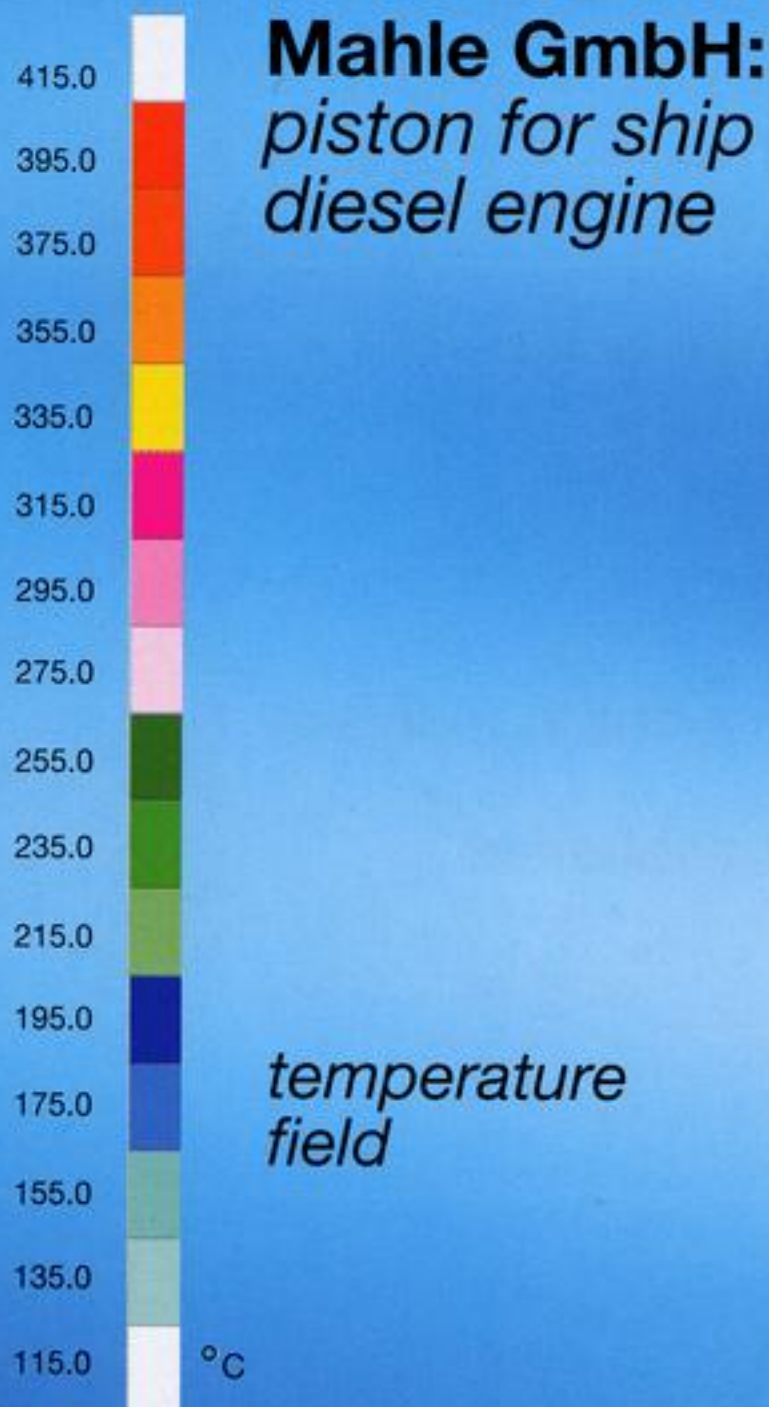
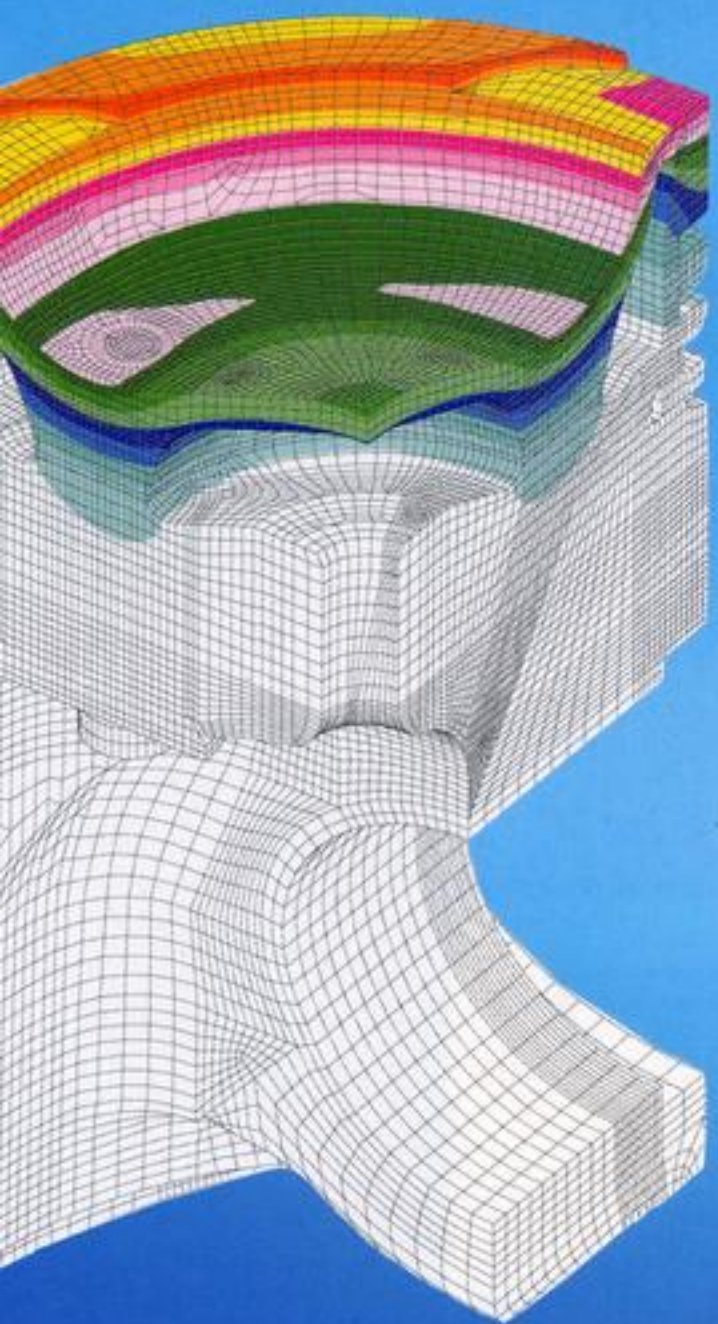


# PERMAS

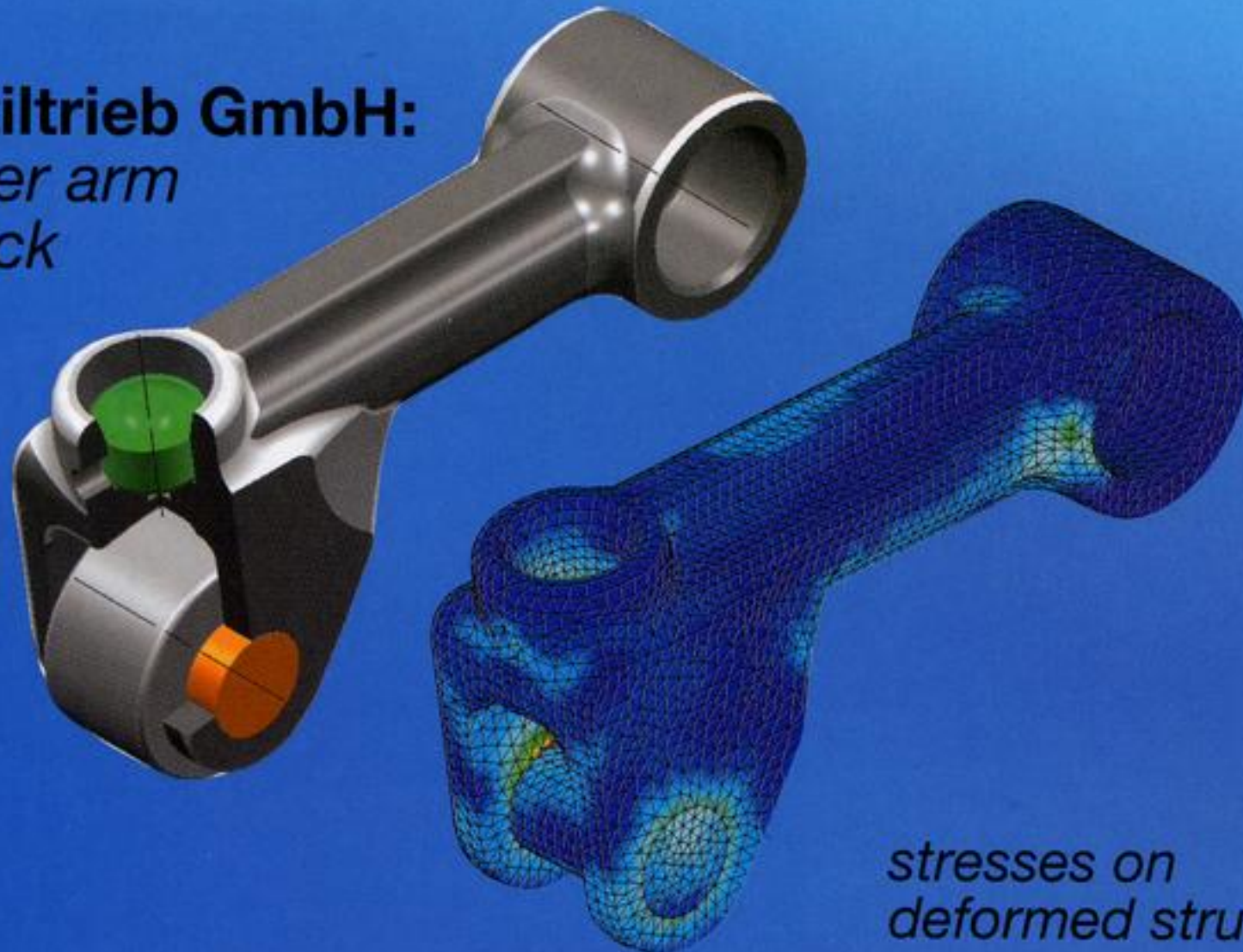
## Analysis of Engines and Engine Components

*PERMAS provides  
very efficient analysis of  
complex volume models:*

- *extremely fast contact analysis*
- *convenient modelling*
  - *non-linear material*
  - *parallel computing*

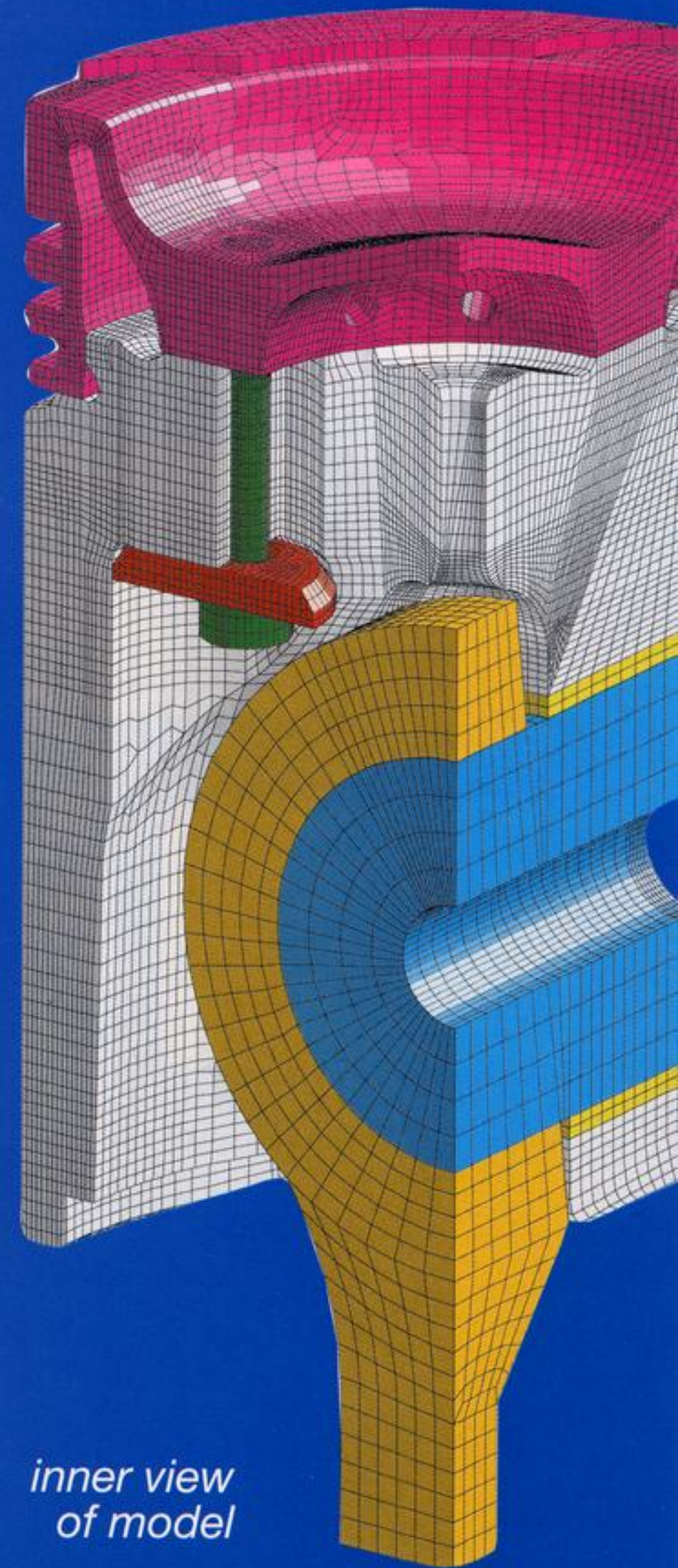


**Mahle Ventiltrieb GmbH:  
roller follower arm  
for large truck  
engines**



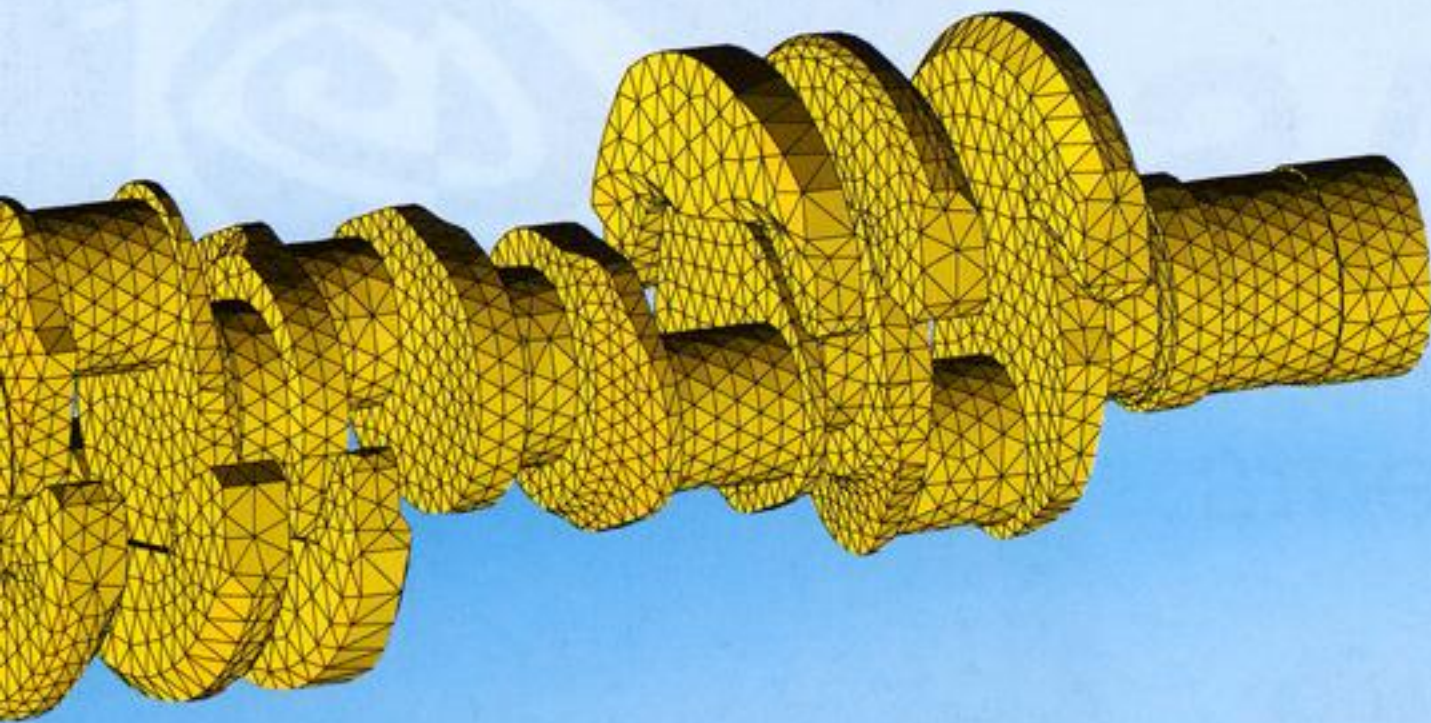
*CAD- and  
FEM-model*

*stresses on  
deformed structure*

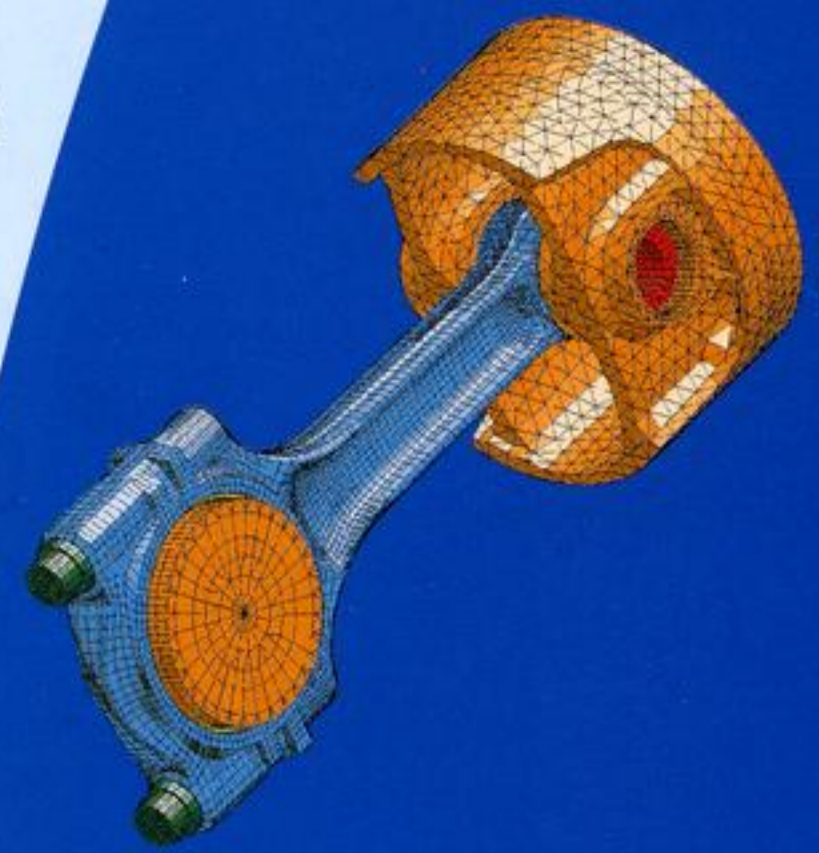


*inner view  
of model*

**Deutz AG**  
crankshaft of V8 engine

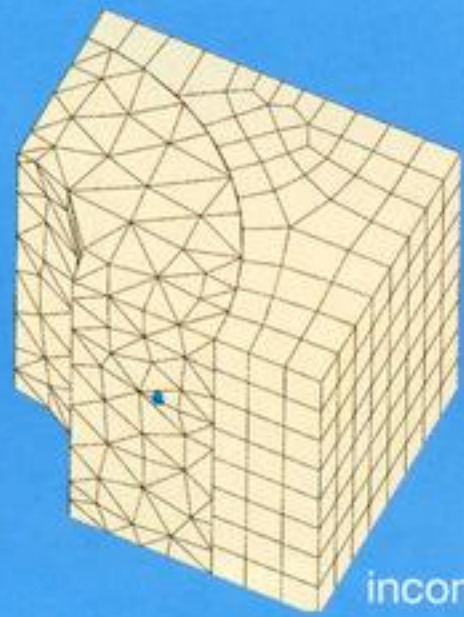


**Porsche AG**  
con-rod of Boxster engine



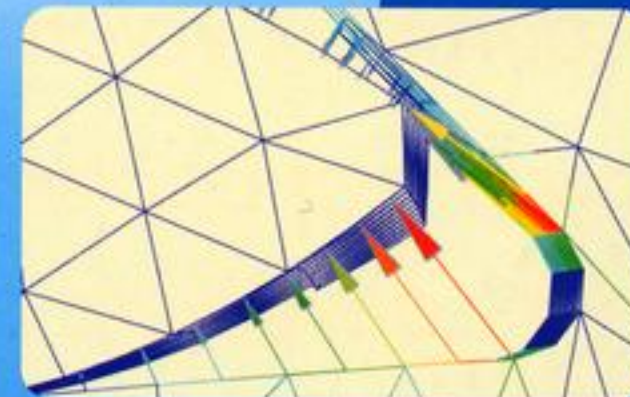
- very large models with many contacts
- incompatible contacts

**extremely fast contact analysis**



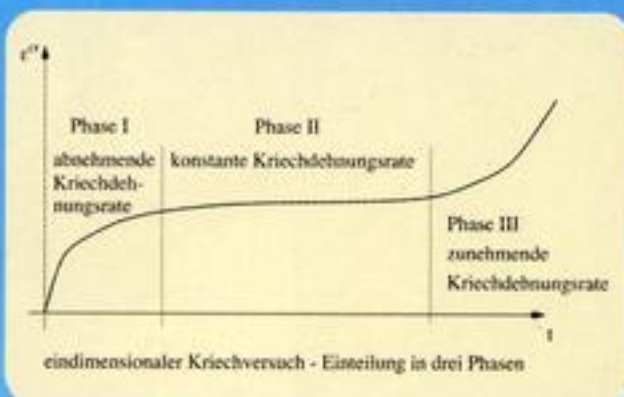
incompatible meshes

- coupling of incompatible meshes
- convenient modeling of ribs, press fits, bolt joints



incompatible contacts

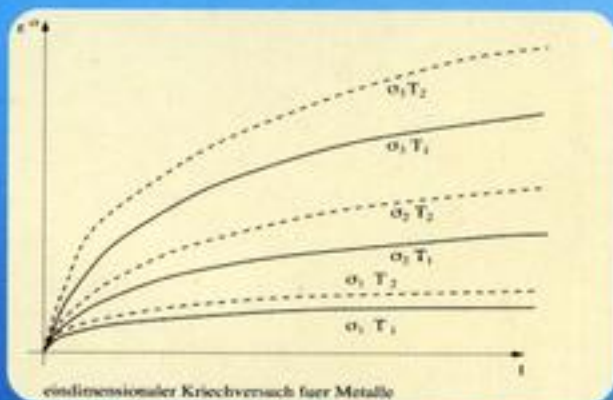
**convenient modelling**



non-linear material laws

- plasticity and creep
- non-linear elasticity

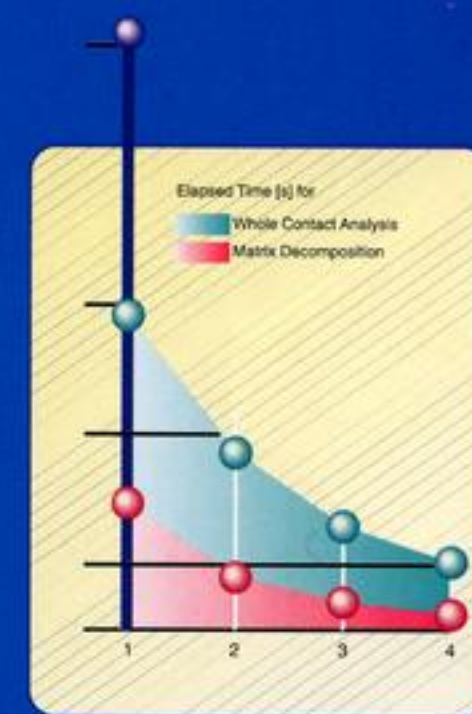
**non-linear material**



temperature-dependent parameters

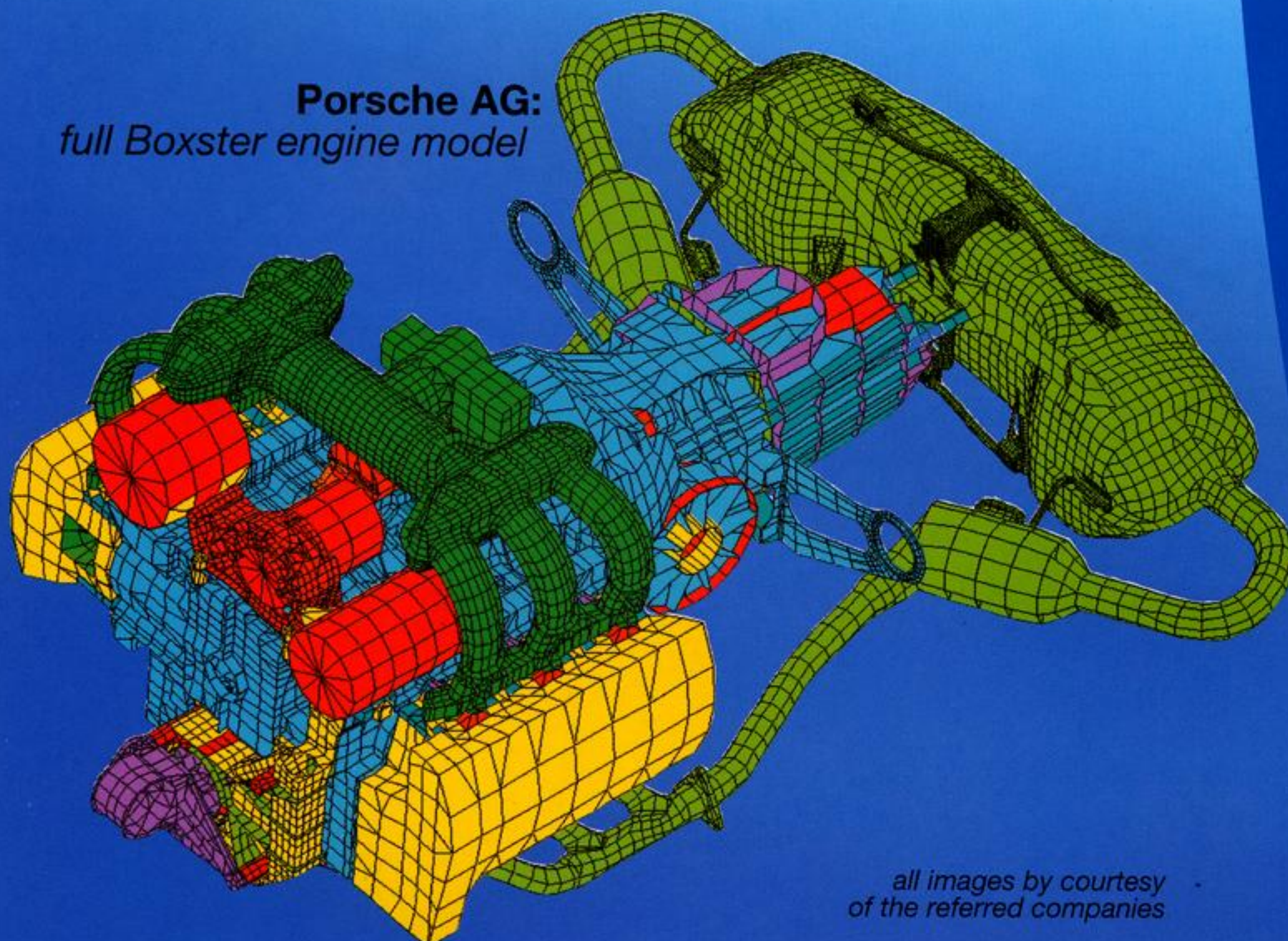
- thermal, static and contact analysis
- modal analysis and acoustics

**parallel computing**



parallelization

**Porsche AG:**  
full Boxster engine model



**for more information  
on PERMAS contact...**

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