

# ACRA

## Cabine Crashworthiness Prediction



Petr Štěřba, Evektor

# Evektor

- Founded in 1991
- Design activities from 1992
- Fully private owned company



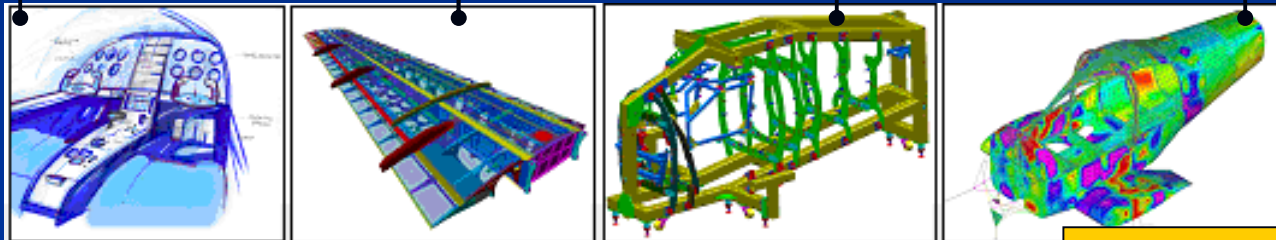
# Scope of Projects

Design studio

Design of components

Design of jigs, fixtures

Stress analysis

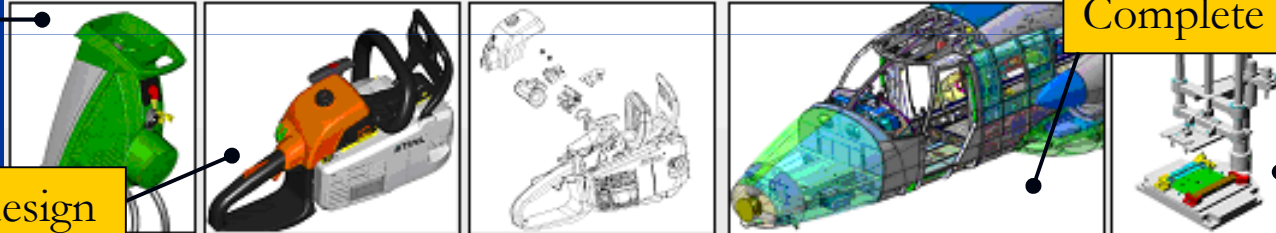


Plastic parts

Complete development

Preliminary design of mechanisms

Prototype tooling



FE-analysis including crashes

Interiors design

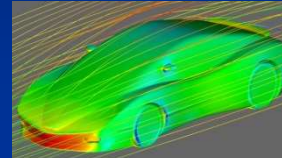
Stamping tools

# Scope of Automotive Projects

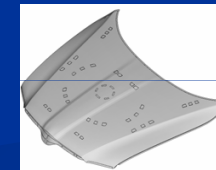
Front Crash



CFD analysis



Static Stiffness



Insurance Crash



Ansa / Meta

Animator  
A3

EnSight

PAM-CRASH

MSC- NASTRAN

Optimization  
analyses

Medina

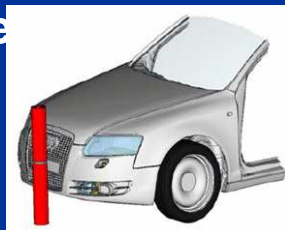
FLUENT

Patran



HyperMesh

Pedestrian  
Safe



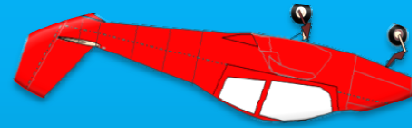
Global Dynamic  
Stiffness



# ACRA Scheme



Methodology of  
pilot/passenger seat  
dynamic analyses



Improve survivability  
of occupants by  
turnover



Material Research

Analyses – Test Correlation

Automotive Industry Know-how

# Regulations and standards

## EASA / FAR regulation for seat design and proof

- § 23.561 Emergency landing static condition
- § 23.562 Emergency landing dynamic condition
- § 23.785 Seats
- AC 23-19 and AC 23.562-1 Dynamic testing

FAA is not accepting compliance by analysis alone currently due to „limited experience“.

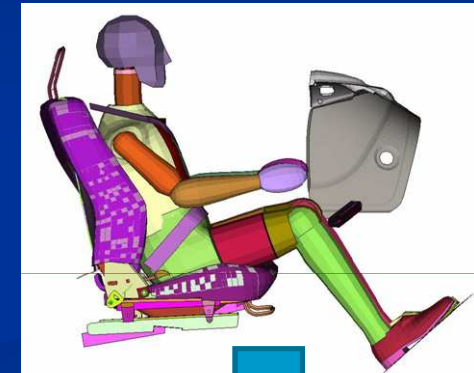
## EASA / FAR regulation for passenger / crew safety by turnover

- § 23.561 Emergency landing condition – Static condition
- AC 23-19 Simplified criteria for aircraft design by aircraft overturn

## Research of methodology of aircraft seat dynamic calculation

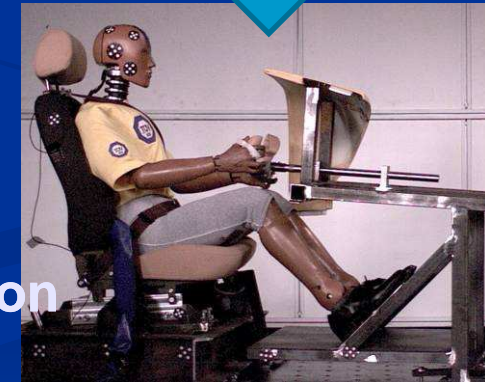
### Goal:

- Solver tests
- Methods of Finite Element Model building
- Comparison of test and simulation



### Output

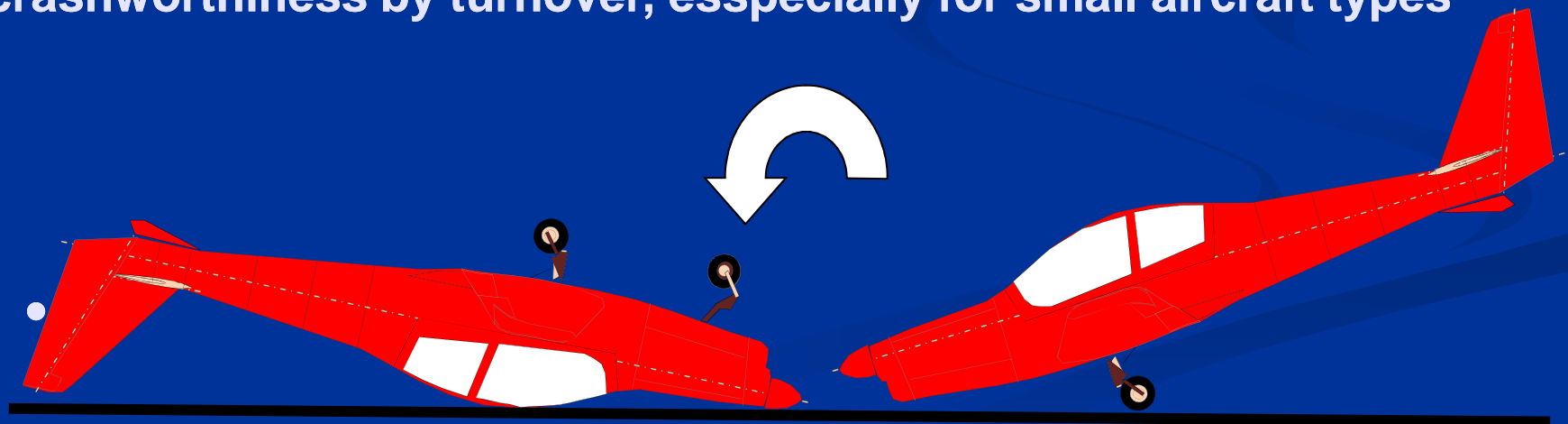
- Methodology of aircraft seat dynamic calculation



## Development of methodology for aircraft turnover dynamic calculation

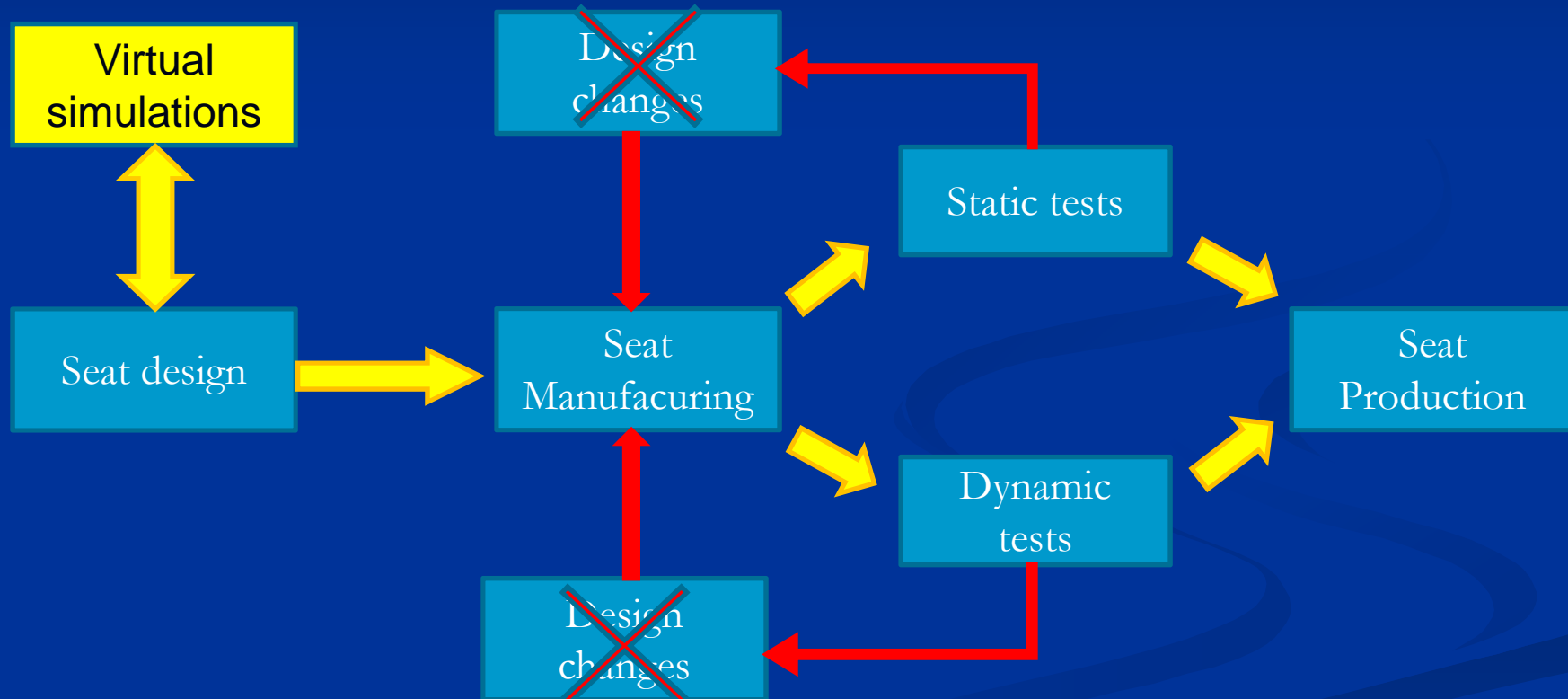
### Goal:

- Simplified criteria for aircraft design will be compared with turnover dynamic simulation
- Increasing passenger / crew safety and improve the structural crashworthiness by turnover, especially for small aircraft types





# Today's and new seat development process

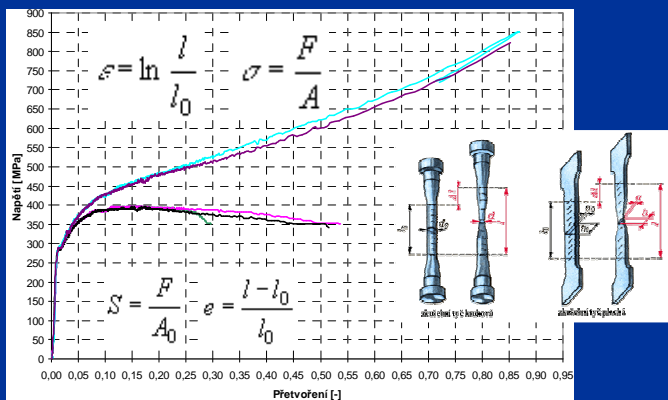


## Research of aircraft material properties

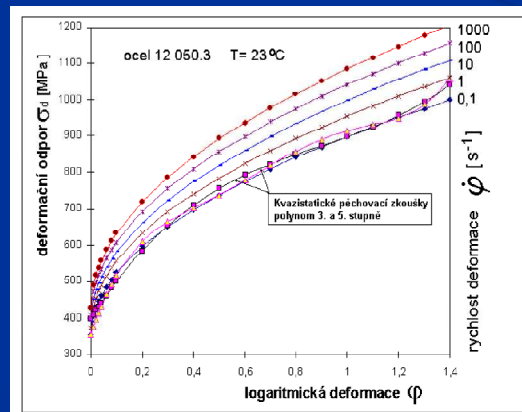
### Goal:

- Database of aircraft materials properties for simulations
  - true stress / true strain
  - strain rate
  - damage

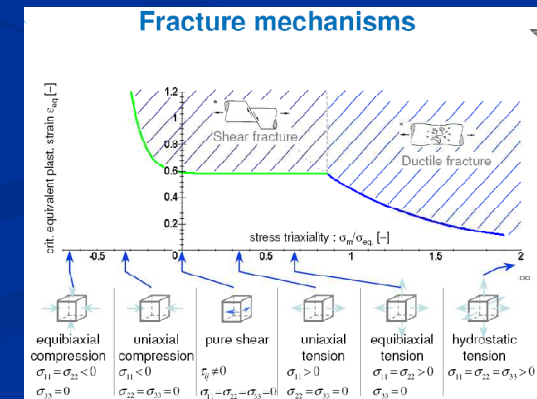
### true stress/strain



### strain rate



### damage



# ACRA Benefits



Passenger/crew safety



Development cost  
Development time

## Welcomed partners:

- Material research lab
  - high speed deformation characteristics
- Final small airplane producer
- Dynamic test lab