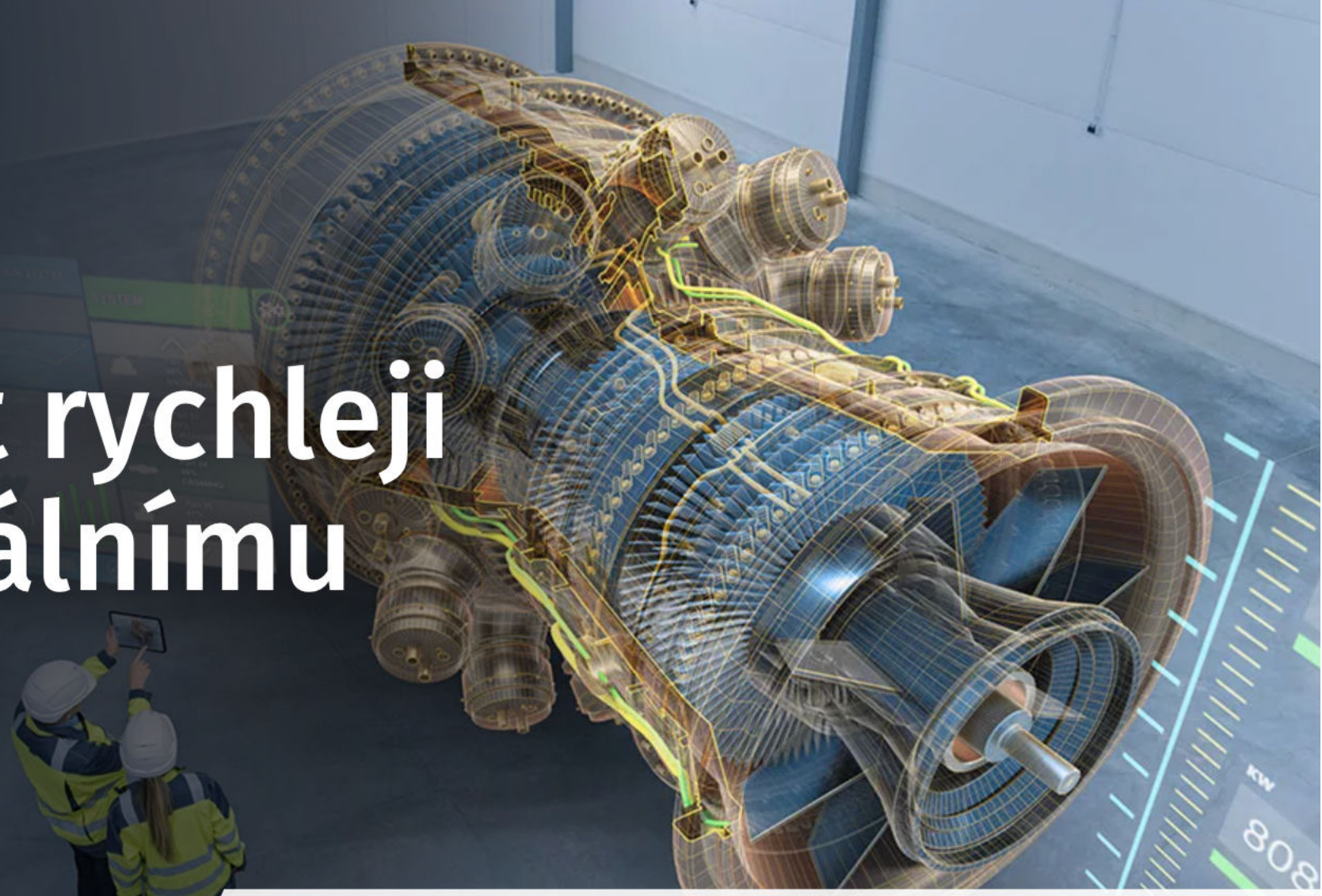
Webinář

Jak vyvíjet rychleji díky virtuálnímu prototypu



Inovujte rychleji

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Agenda webináře Jak vyvíjet rychleji díky virtuálnímu prototypu

- Představení společnosti
- Co je co – vysvětlíme základy
- Principy & postupy
- Příklady & aplikace
- **Bonus:** Hra s rozšířenou realitou ve Vašem mobilu
- Diskuze

Ing. Miloslav Popovič
Technický ředitel

BcA. Petra Kuchtová
Marketingová specialistka

ask@svsfem.cz

Představení společnosti

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Ansys / SELECT CHANNEL PARTNER

SVS FEM = Ansys software pro Česko a Slovensko

Ansys / SELECT CHANNEL PARTNER

- **Dodáváme** Ansys
- **Školíme** Ansys
- Poskytujeme **technickou podporu**
- Dodáváme **výkonný hardware** pro Ansys výpočty
- Provádíme **výpočty a měření**
- Spolupracujeme **na projektech** zákazníka
- **Vyvíjíme** vlastní nadstavby Ansys

Kdo jsme?

Již více než 30 let se věnujeme numerickým simulacím

SVS FEM s.r.o., Trnkova 3104/117 c, Brno

Jsme součástí:

CADFEM

CADFEM Group, celosvětově největšího partnera společnosti Ansys Inc.

AOBP

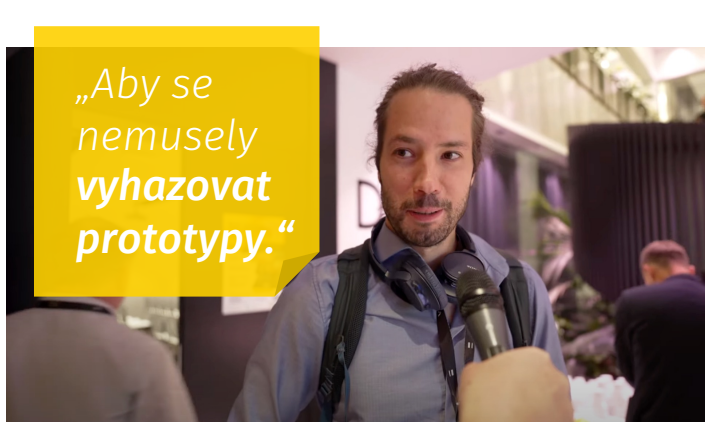
AOBP, Asociace obranného a bezpečnostního průmyslu ČR

TechNetAlliance

Mezinárodní organizace TechNet Alliance sdružující přední pracoviště v oblasti numerických simulací

V jakých průmyslových oborech se virtuální prototypy využívají?

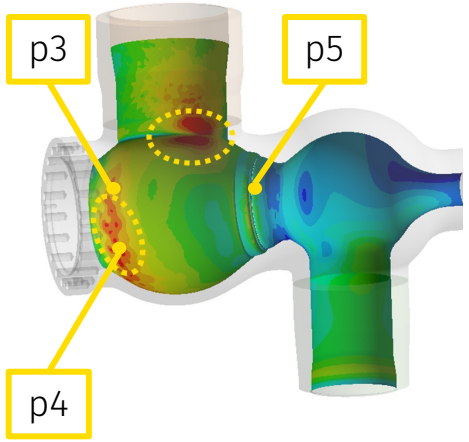
Proč dělat virtuální protypy? Ptali jsme se uživatelů Ansys



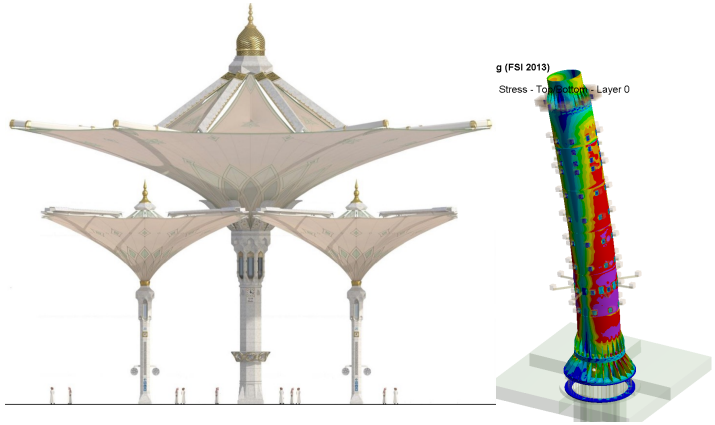
Celé video z Ansys konference na https://youtu.be/ZFgHG0lT0Qk

Kdy a proč použít virtuální prototyp?

- ✓ **Více informací** z libovolného místa virtuálního prototypu



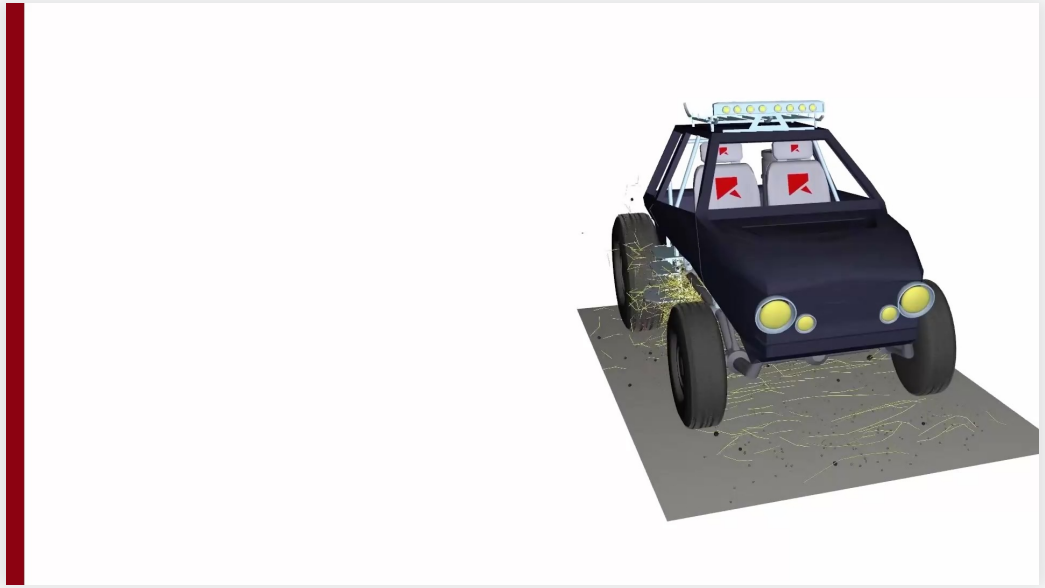
- ✓ **Nákladná výroba** reálného prototypu

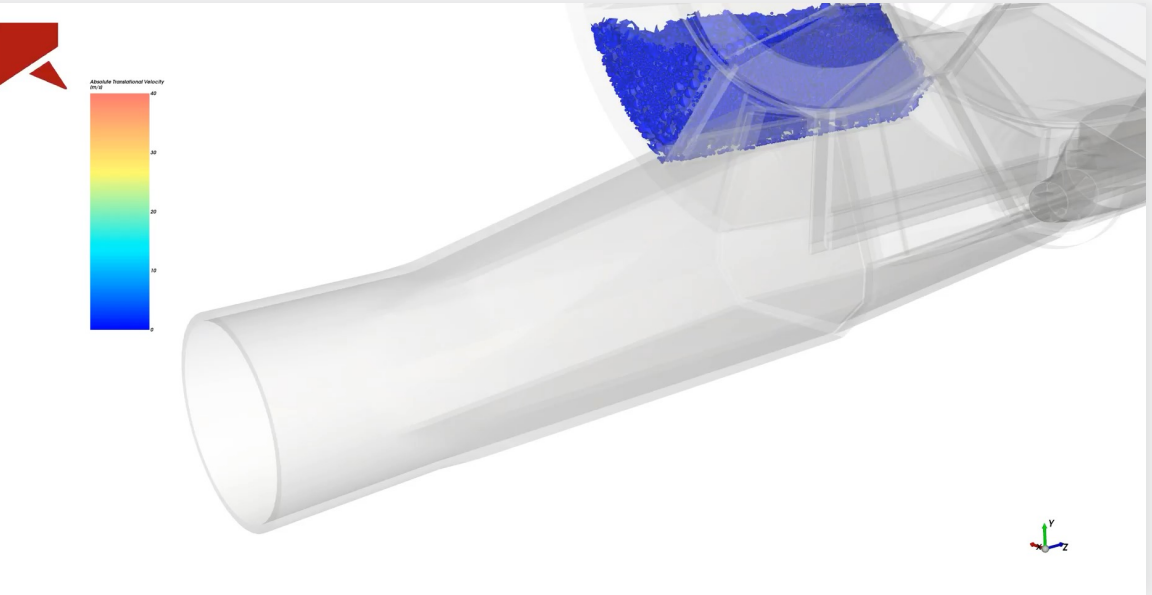


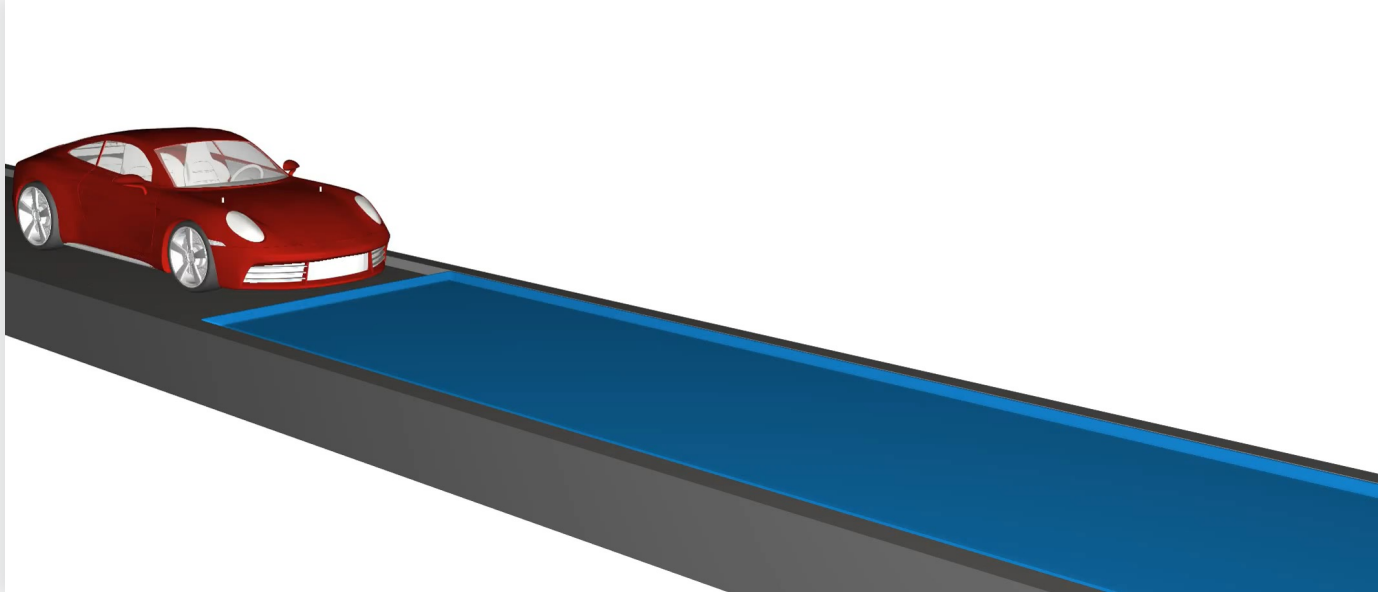
- ✓ **Velké riziko** při zkoušení reálného prototypu

- ✓ **Velké množství** zkoušených **variant**
- ✓ Není možno se podívat, **co se děje uvnitř**
- ✓ A podobně …

Nejistoty, náročnost, okrajové podmínky,...







Co je co – základy

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Co je to virtuální prototyp

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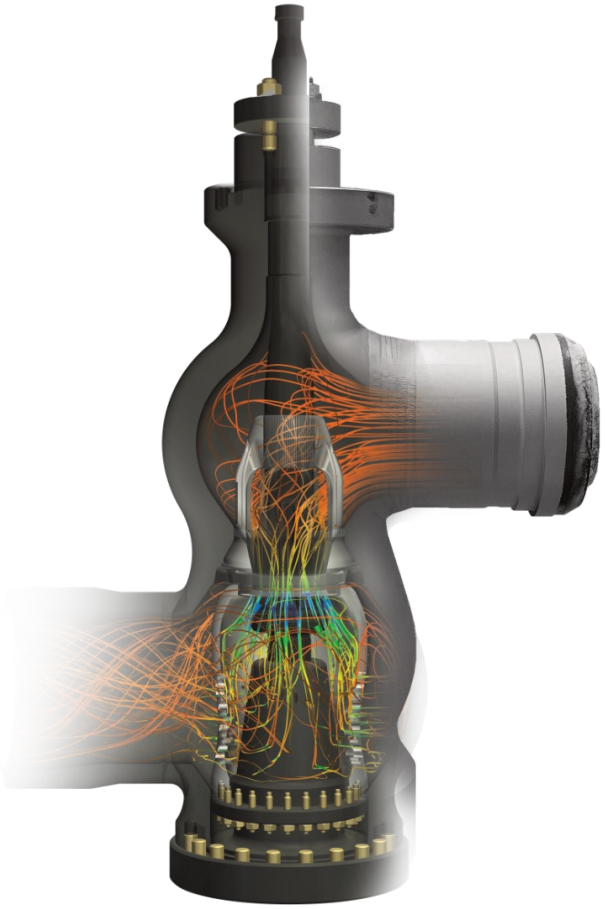
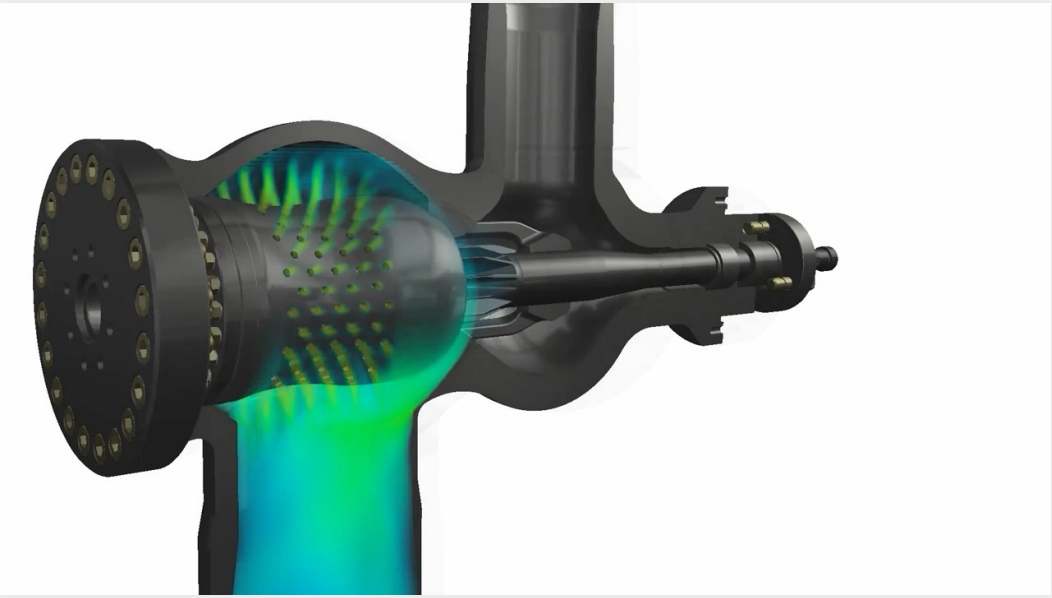
TISÍCE virtuálních testů



- Virtuální prototyp jsme schopni podrobit **tisícům virtuálních testů.**

- Díky tomu můžeme:
  - ✓ **simulovat různé podmínky provozu**
  - ✓ **a odhalit kritická místa.**

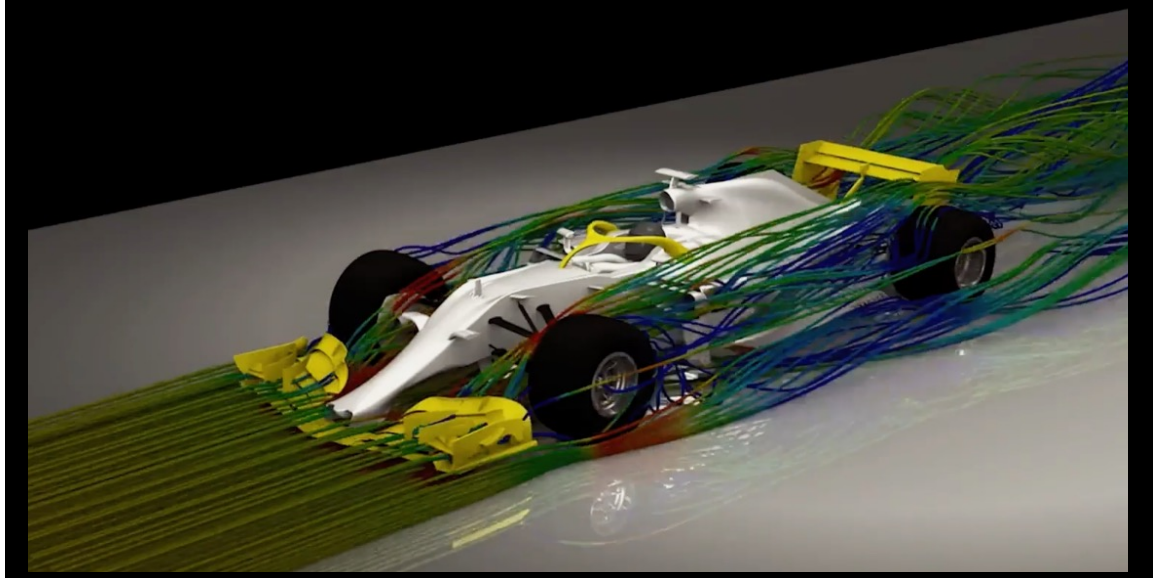


POJMY – reálné simulace x virtuální simulace

Simulace = napodobení
skutečné věci nebo procesu

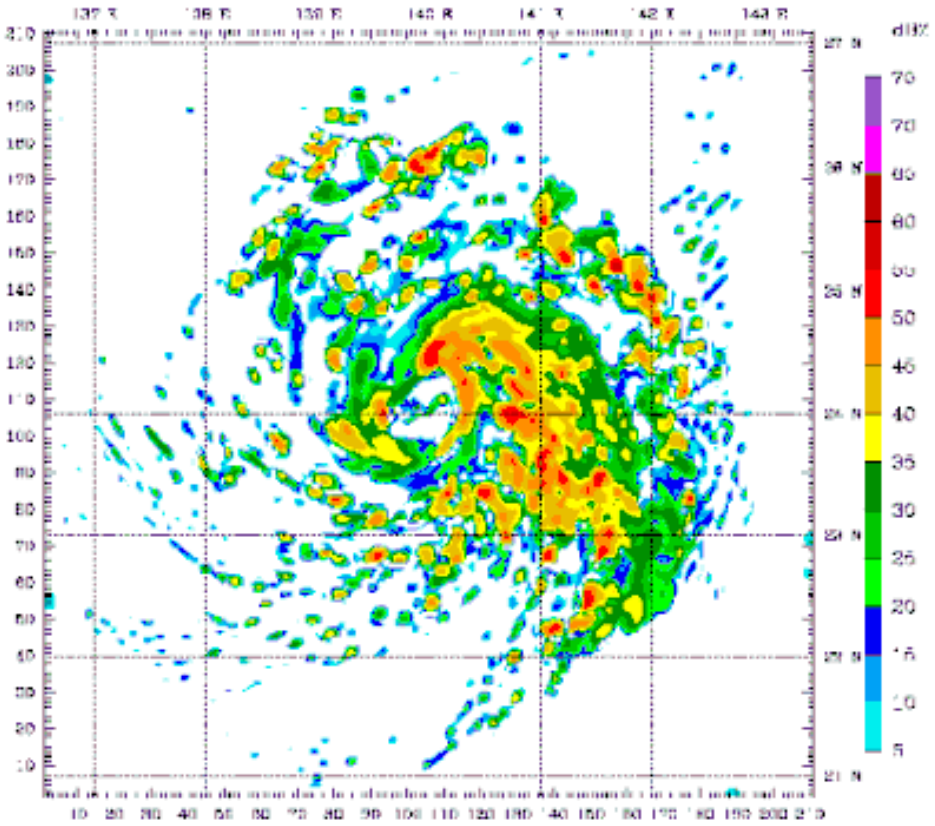
X

Virtuální testování
budoucího výrobku nebo procesu
Numerické, analytické, …

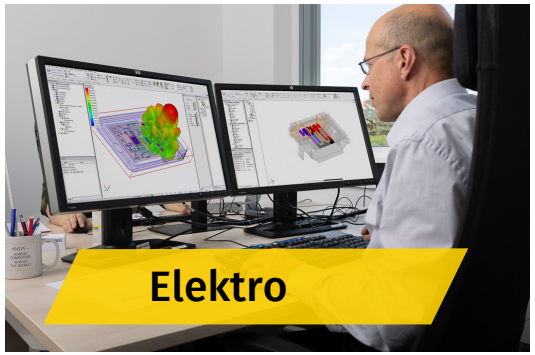


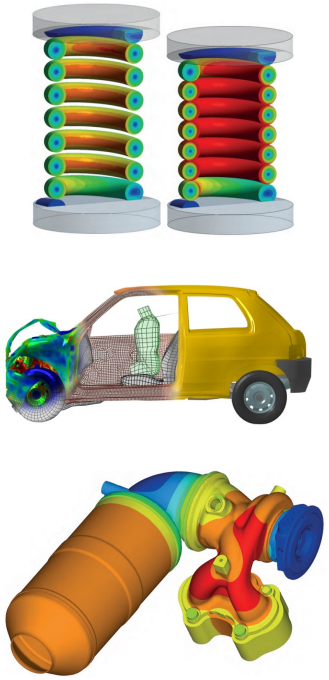
Princip numerických simulací

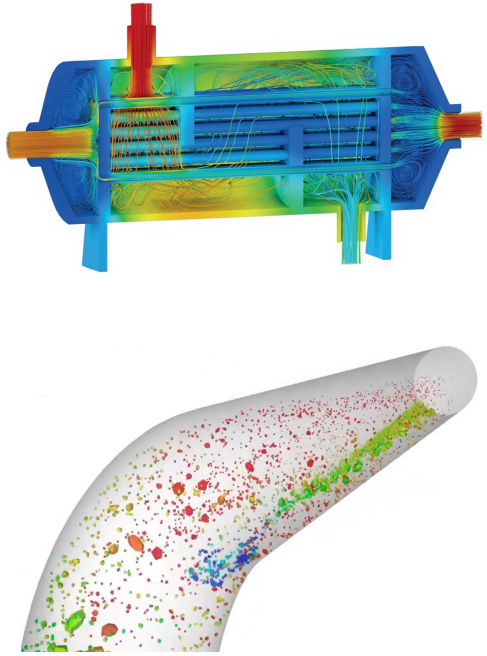
Proces používání matematických modelů a algoritmů k imitaci chování reálného systému nebo procesu pomocí počítačového programu

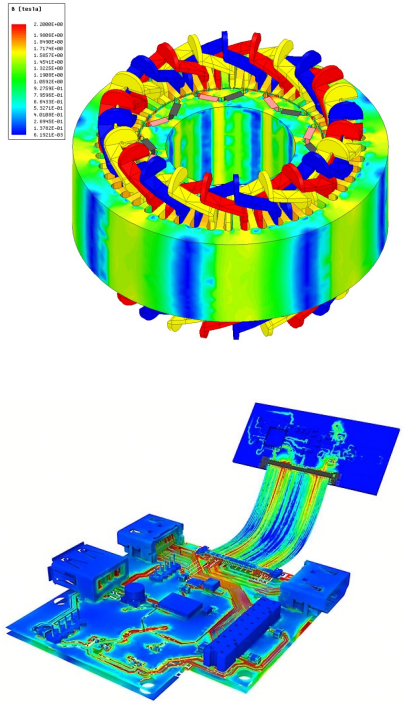


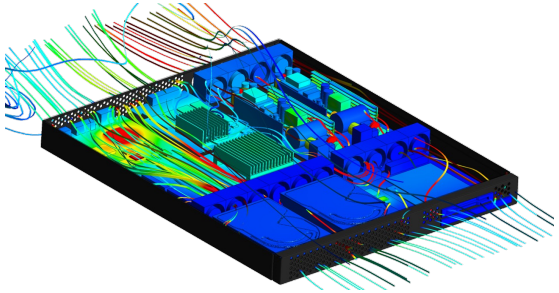
Hlavní oblasti numerických simulací











Principy & postupy

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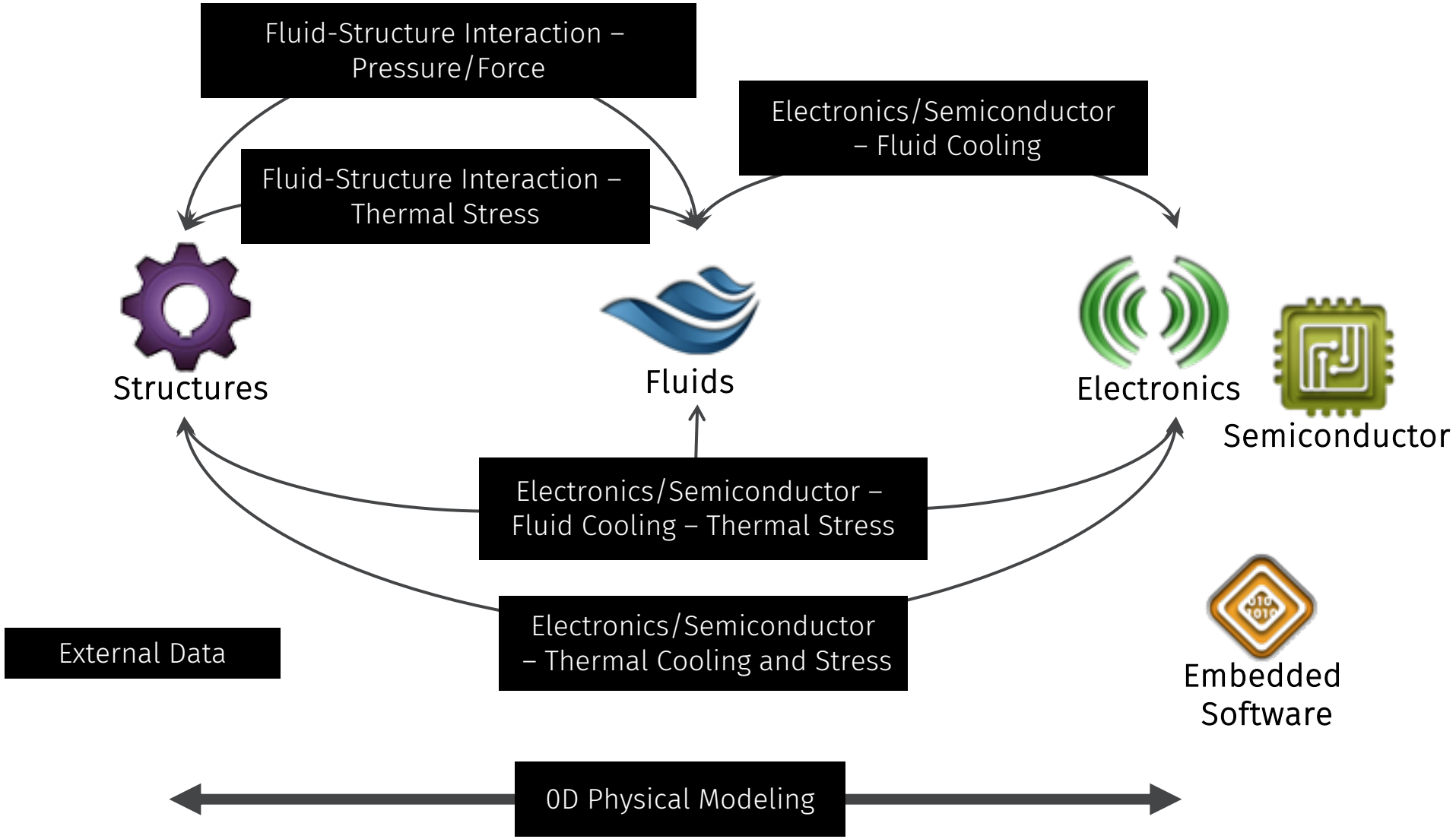
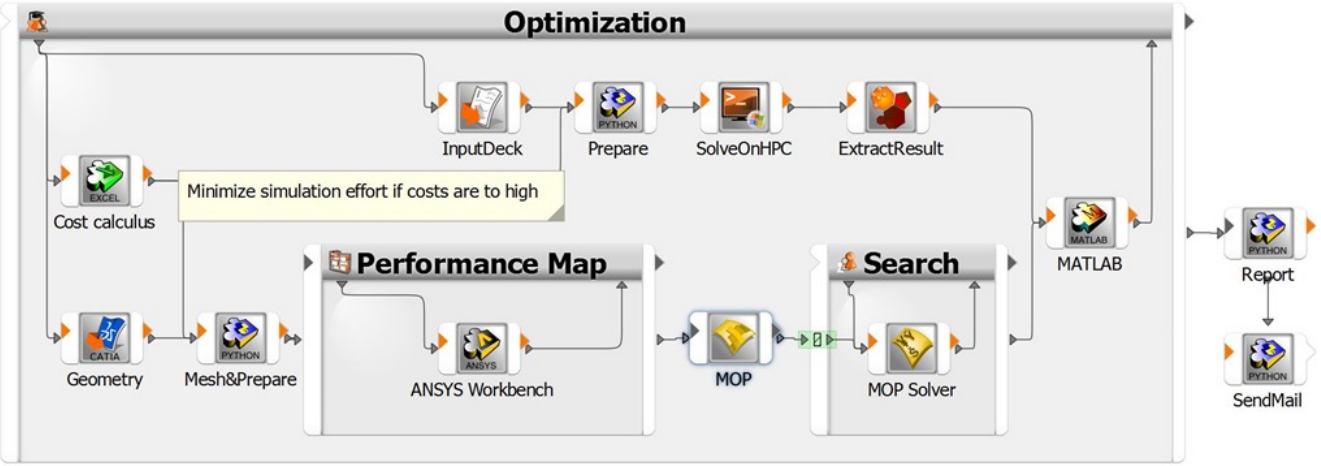
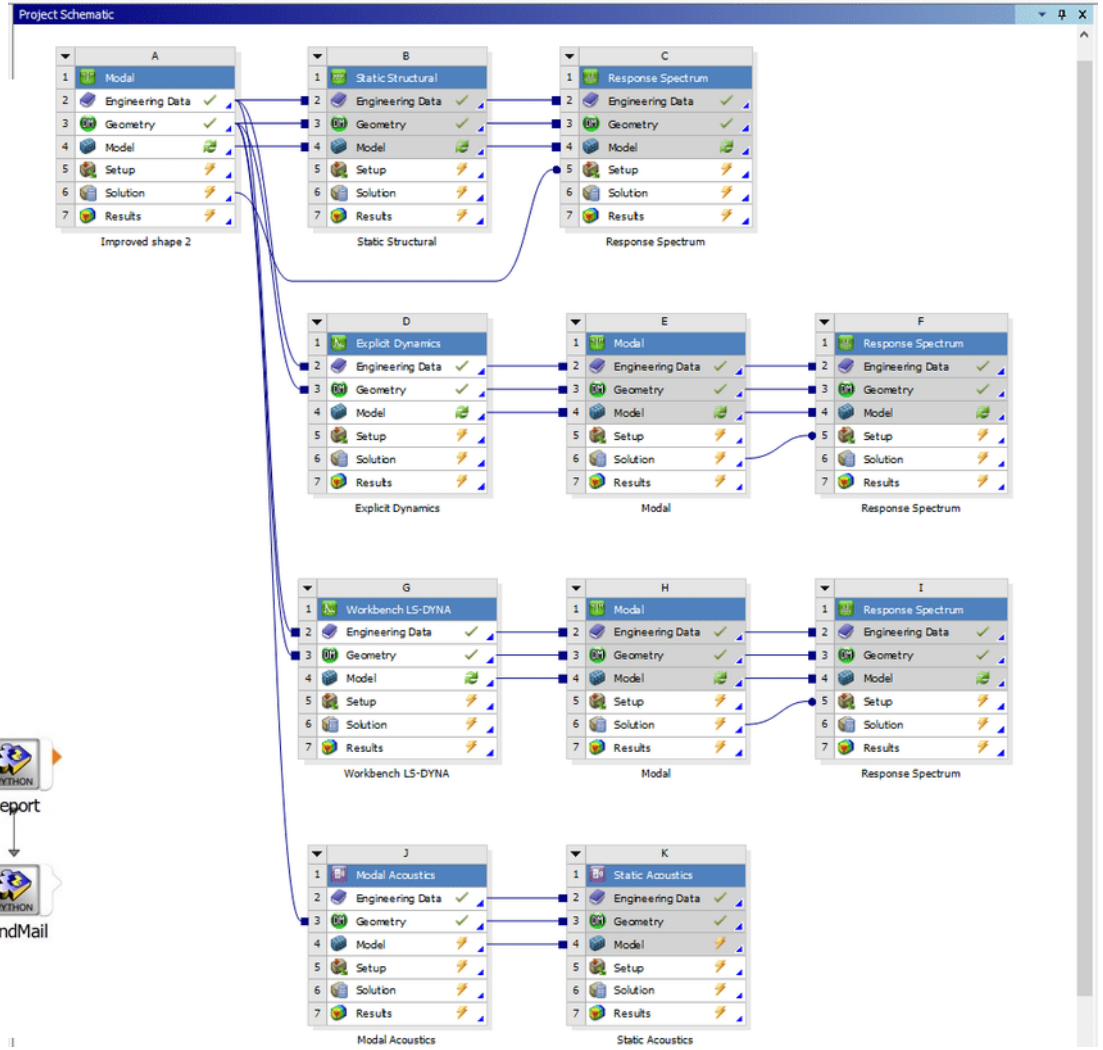
Virtuální prototyp



Virtuální prototyp

- CAD model
- MKP model
- Experimentální data
- Normy





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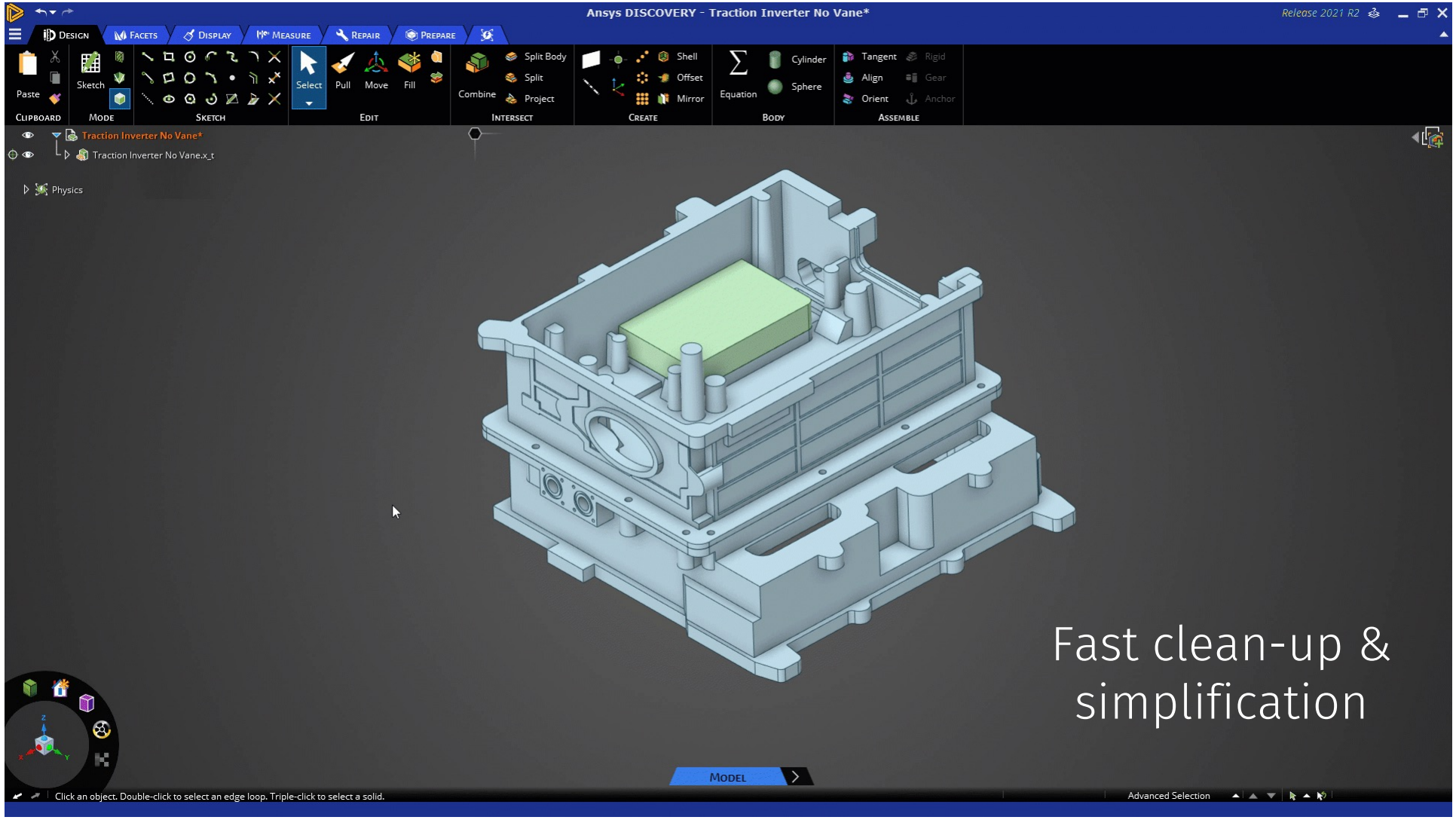
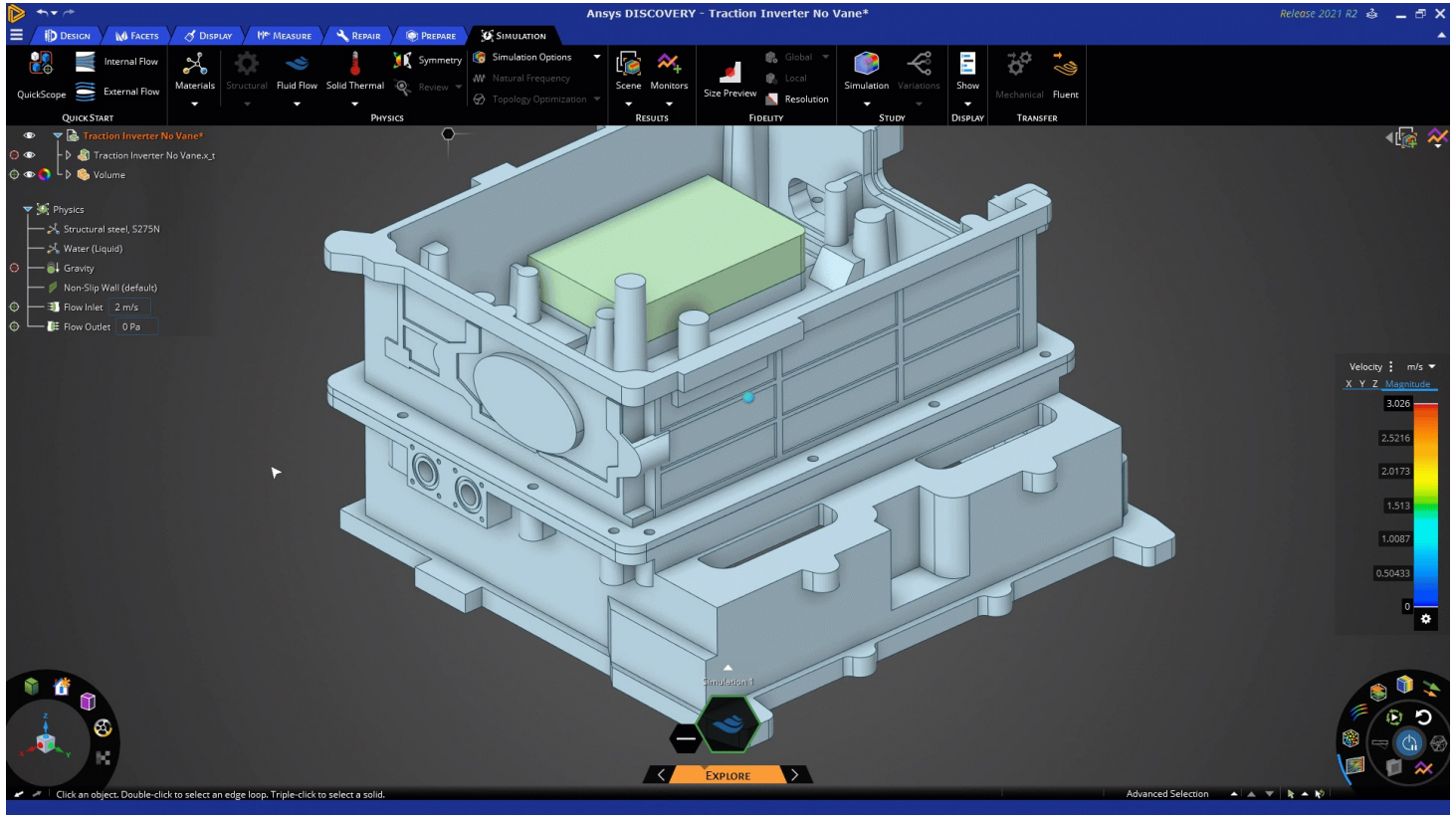
Ansys Discovery – Modeler mode

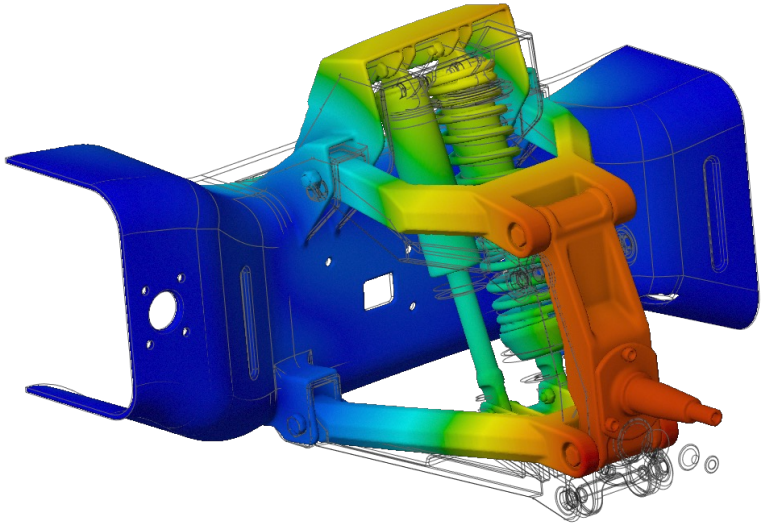


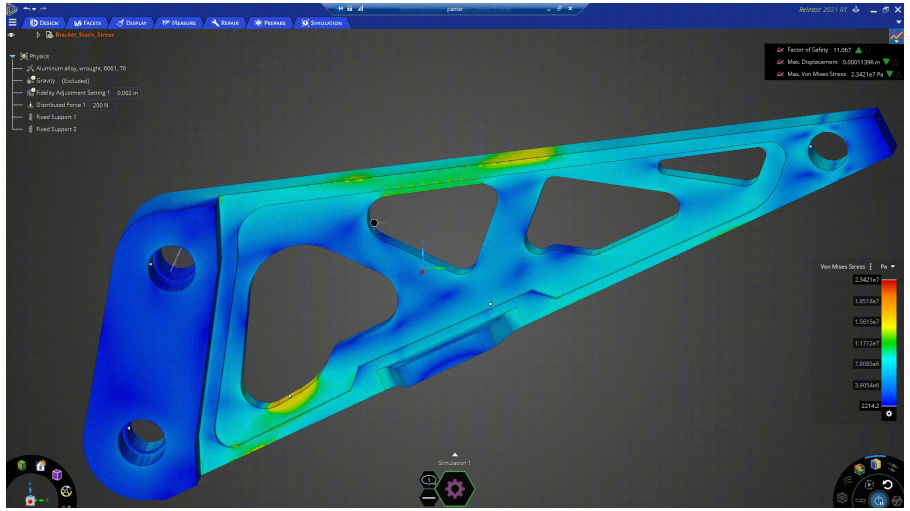
Fast clean-up & simplification

Ansys Discovery – Explore mode

- Jednoduché simulace během několika sekund
- GPU technologie







Příklady & aplikace

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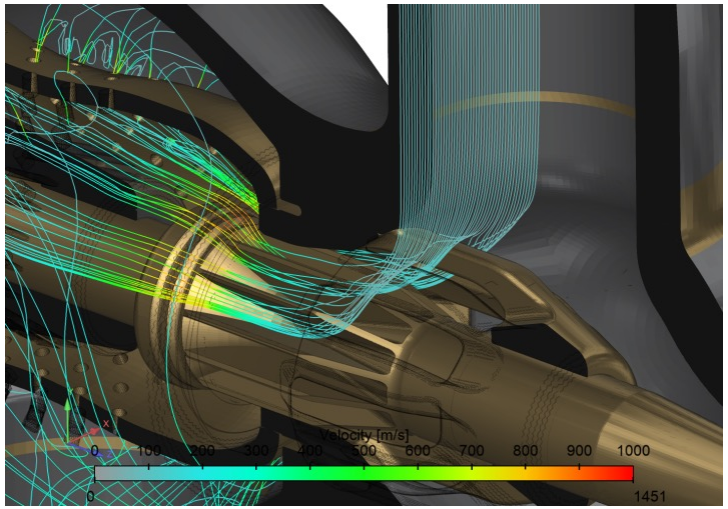
Simulation of Fluid Structure Interaction - CFD

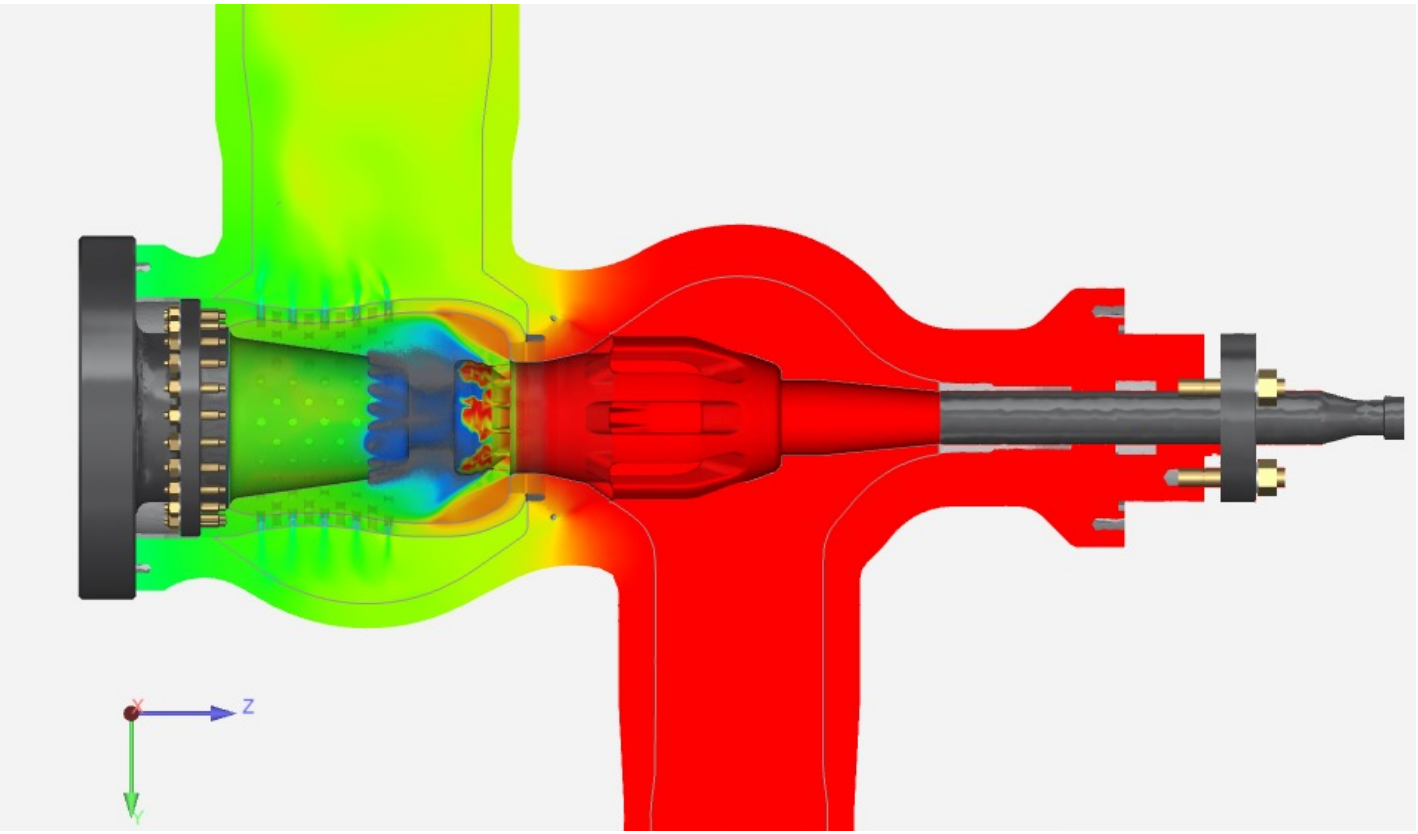
IMI Critical Engineering

- Steam conditioning bypass valve with water injection.
- Two-phase CFD simulation of water injected into steam.
- Temperature field identification for thermal and fatigue analysis.

Customer Benefits:

- Thermal conditions identified during startup/shutdown period inside valve
- Provided inputs for fatigue analysis





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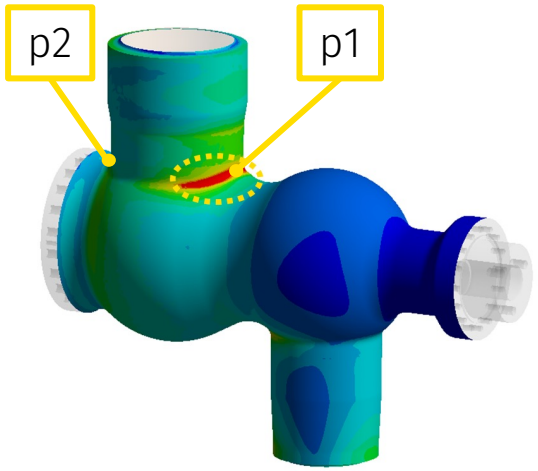
Simulation of Fluid Structure Interaction - Fatigue

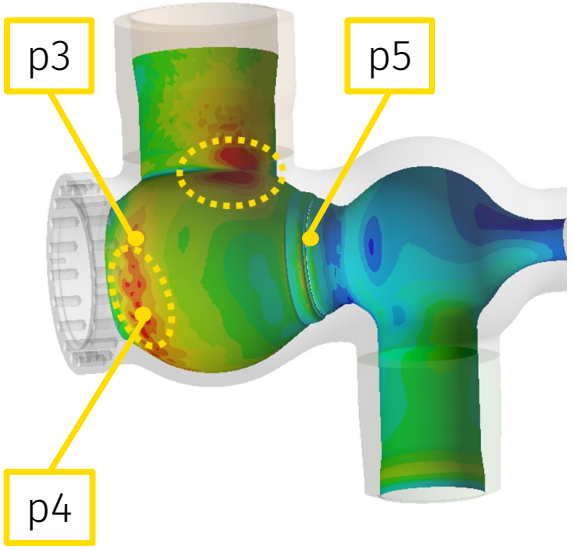
IMI Critical Engineering

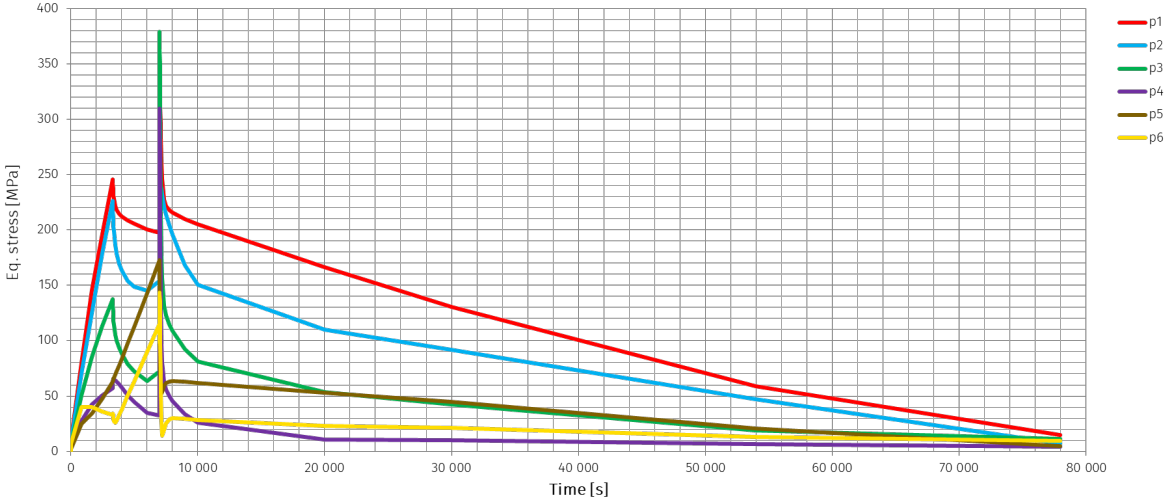
- FEM Simulation of thermal stress and stresses from other external sources.
- Evaluation of fatigue during predefined cycle based on FSI analysis including water injection.

Customer Benefits:

- Identified minimum cycles to failure
- Critical regions located







1. Nejkritičtější místo při daném zatížení vydrží téměř

7000

cyklů

2. Provoz při každodenním odstavování elektrárny bude

16

roků

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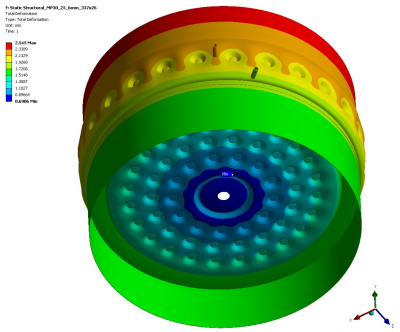
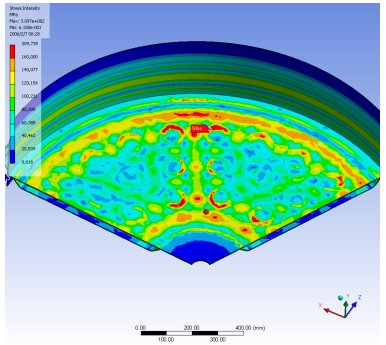
Jak snížit náklady na výrobu o 20 %?

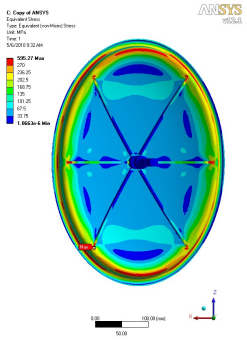
- Nádoba musí splnit **podmínky statické pevnosti** (zatížení vnitřním přetlakem, teplotní zatížení, ...).
- Nádoba musí splnit **podmínky cyklické pevnosti**, což znamená, že její životnost musí být vyšší, než je požadovaný počet pracovních cyklů.
- Nádoba musí vyhovět **podmínkám stability**, což znamená, že během provozu nesmí dojít k boulení stěn.

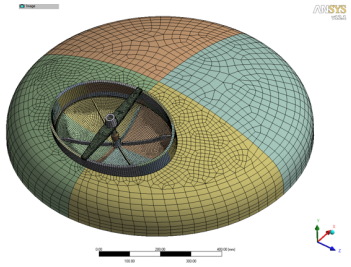
Výsledky:

- optimalizace počtu prolisů na duplikátorech,
- snížení energetické náročnosti výroby.









Výsledky optimalizace:

Snížení váhy varny podle počtu varných nádob o:

200–500 kg

Tloušťka plechu snížena o:

15–20 %

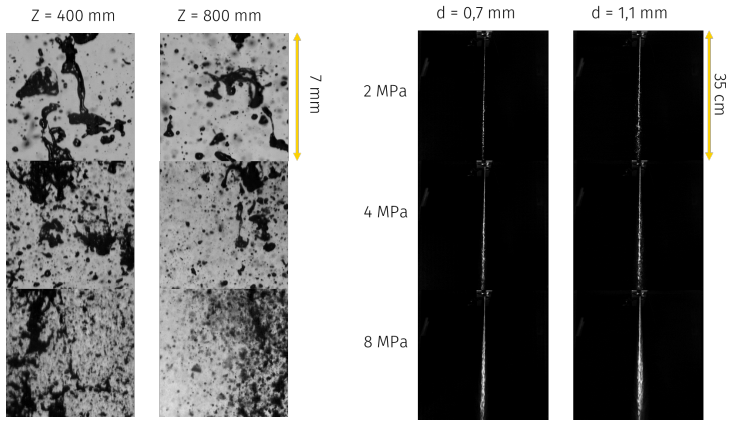
Water Injection and Evaporation in Flue Gas Stream

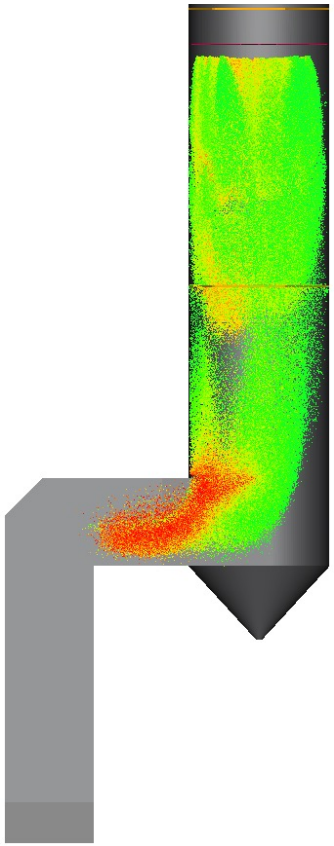
SKUPINA ČEZ

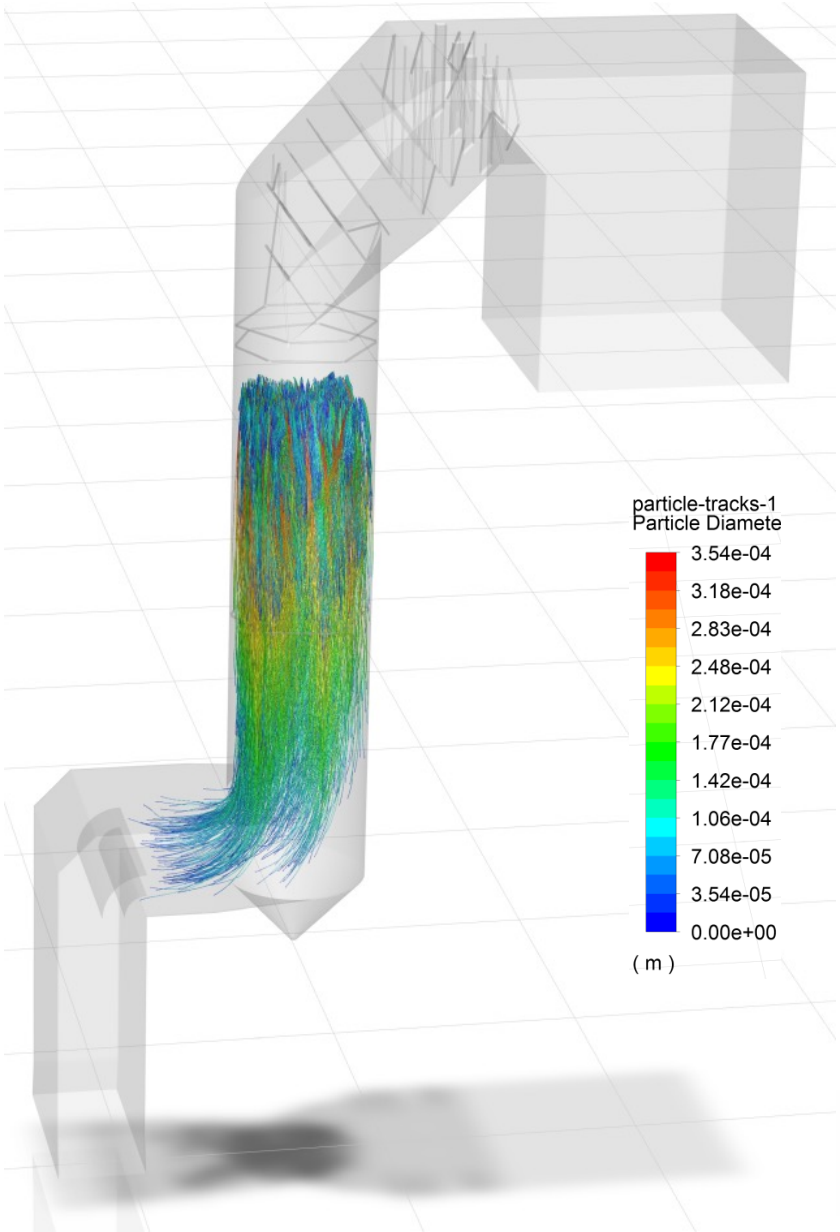
- Complete design of spraying system – nozzles and its locations in the flue gas ductwork.
- Measurement of droplet size and velocity with experimental equipment (BUT).
- Simulation based on measured spray characteristics.

Customer Benefits:

- Optimal design of spraying system
- Optimal nozzle design
- Complete evaporation in specific region







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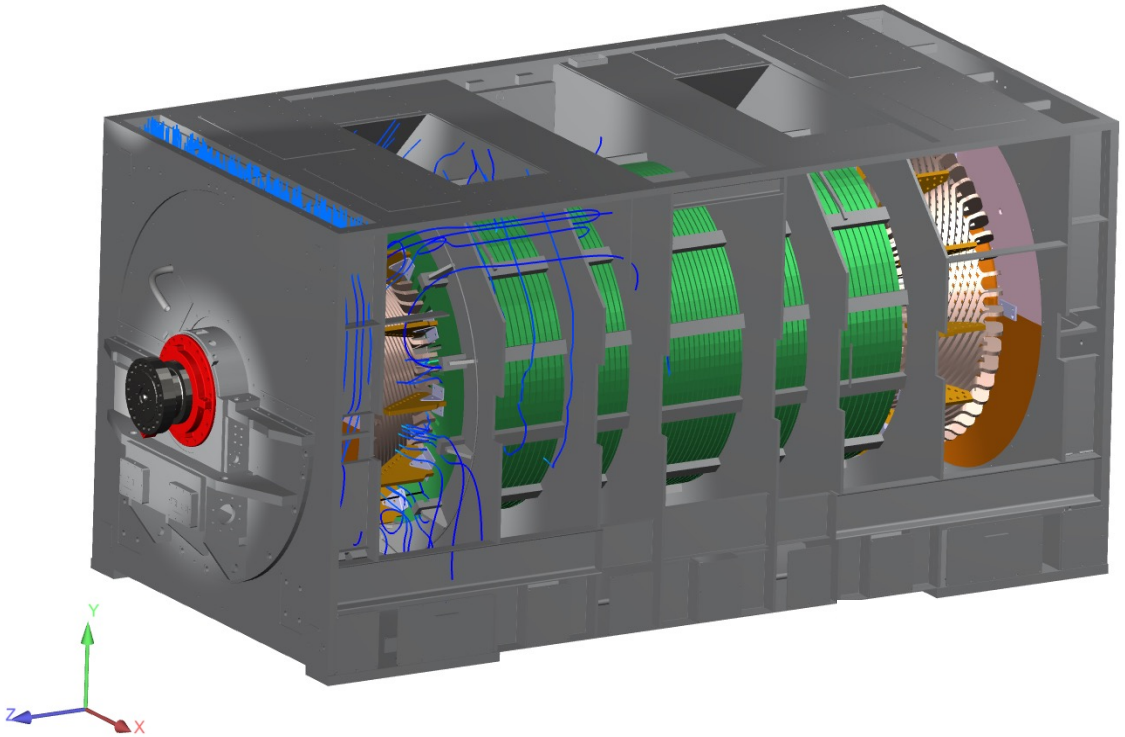
Forced Convection Inside Turbogenerator

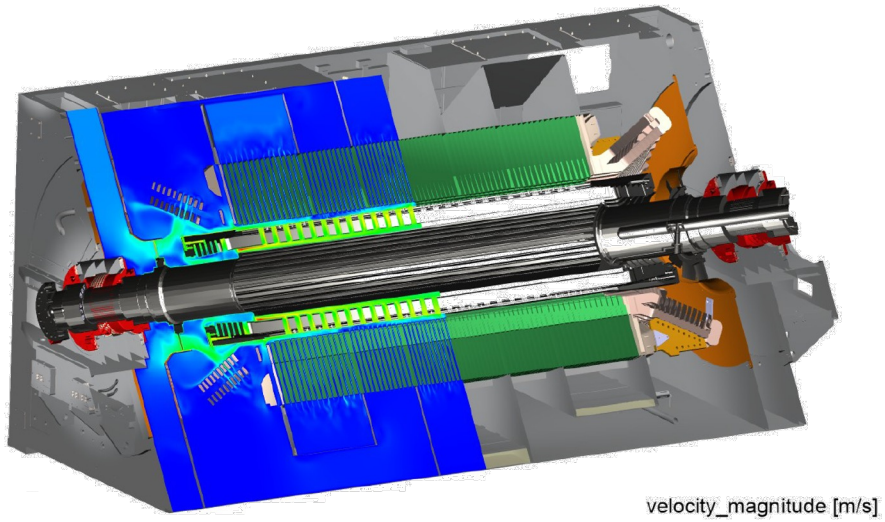
BRUSH
TRUST. WELL EARNED.

- CFD simulation of forced convection inside turbogenerator to identify cooling performance.
- Fan, windings, rotor and stator channels were included in one complex simulation.



Customer Benefits:

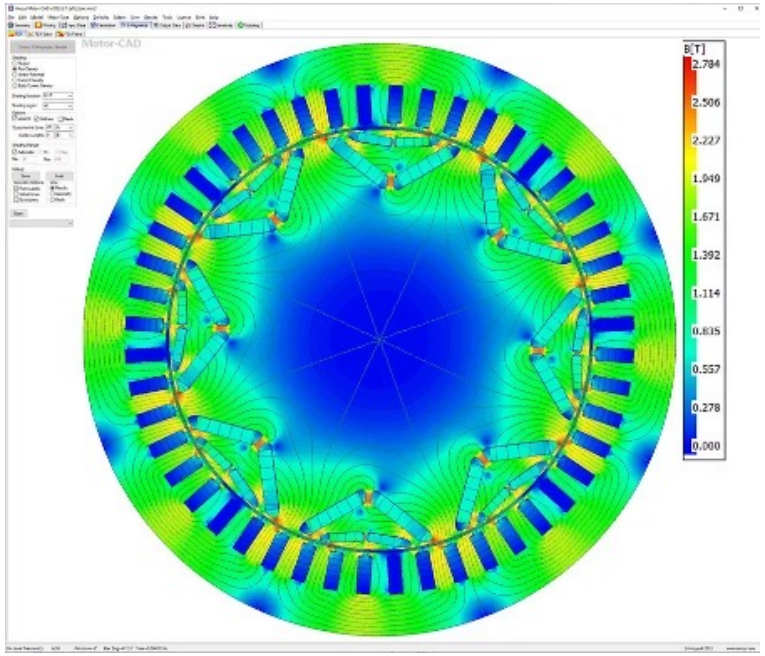
- Undercooled and overcooled regions were identified
- Workflow created for customer's inhouse simulations
- Simulation validation for further turbogenerator designs

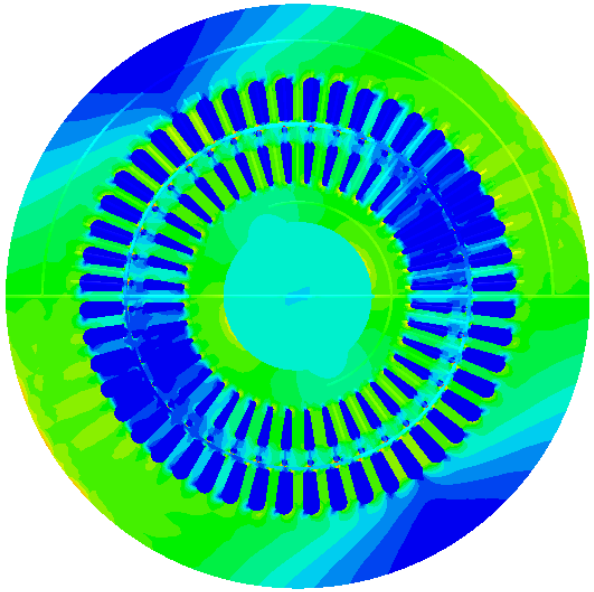


Electric motor

SIEMENS

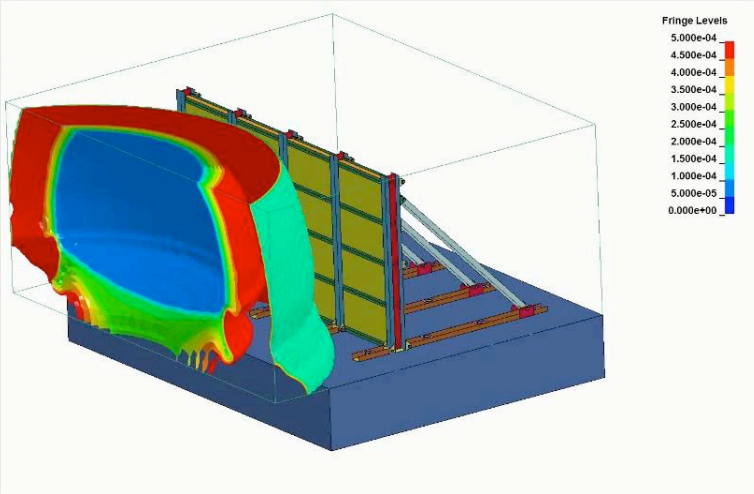
- Simulation of **electromagnetic properties** of a motor in Ansys Maxwell.
- Forces transferred into Ansys Mechanical for **acoustics analysis**.



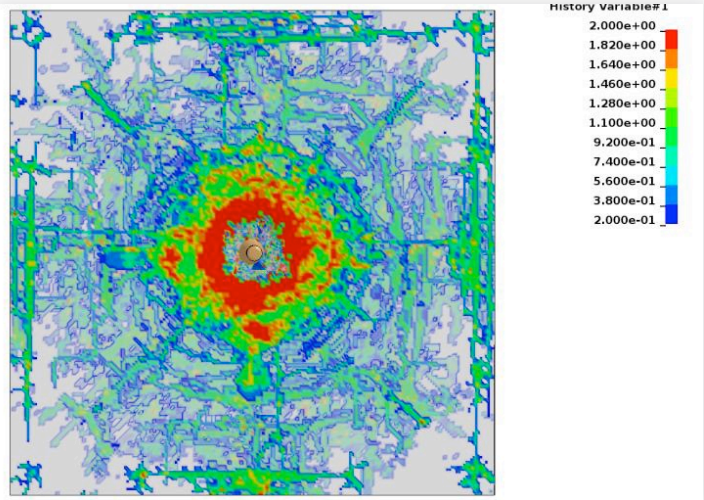


Explicit simulations

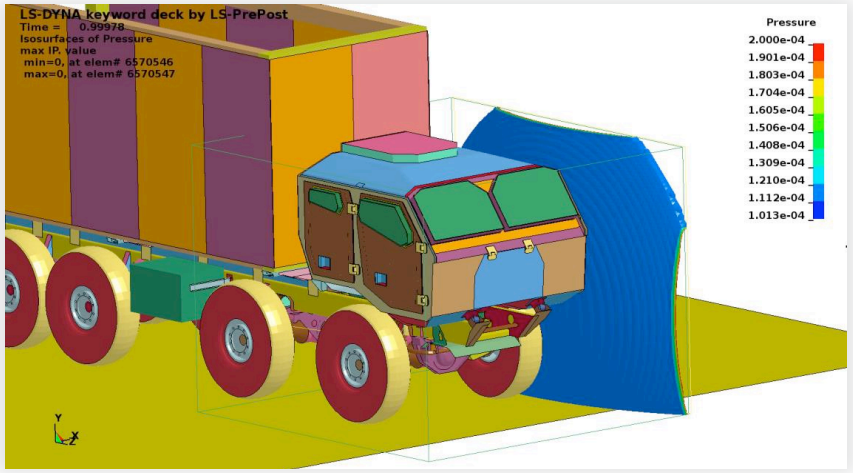
Blast protection wall



Ballistic and blast simulation of glass sandwich

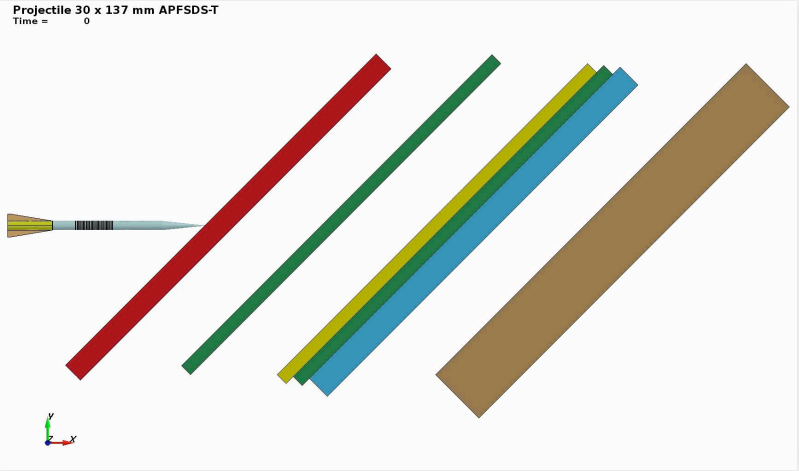


Blast effect on the vehicle



Protection according STANAG

- RHA steel
- Ceramics
- Laminates
- …



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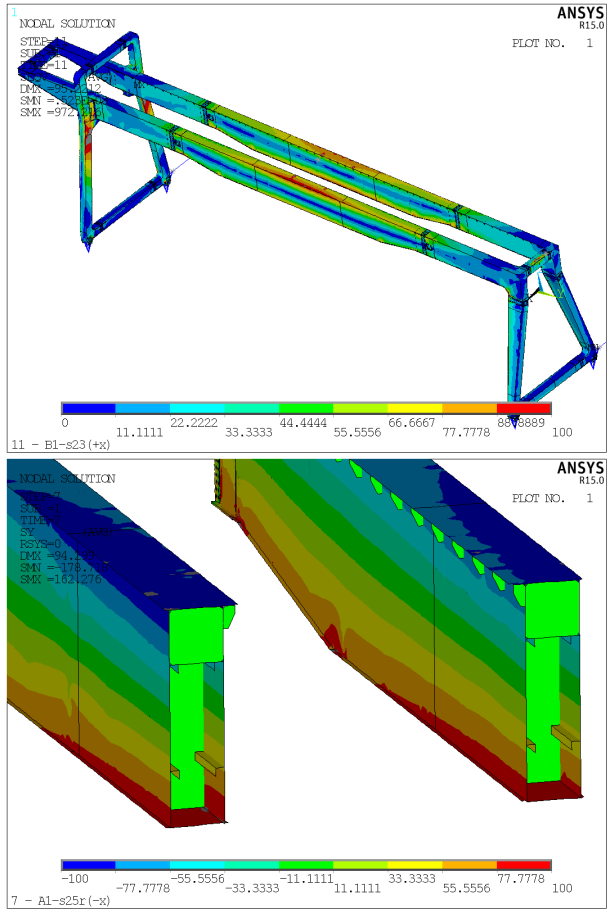
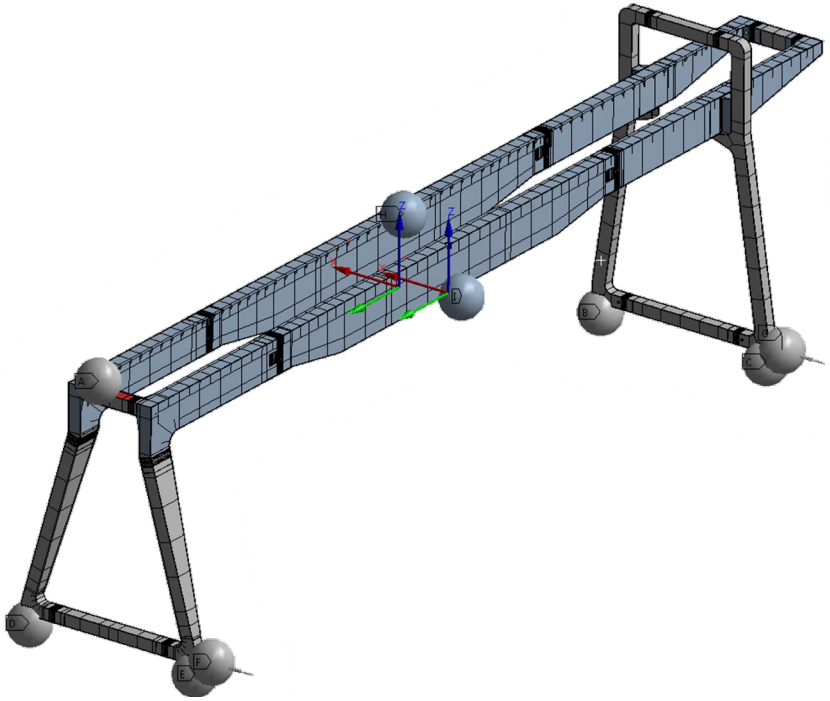
Gantry Crane Mechanical Assessment

- Assessment of gantry crane retrofit.
- Static analysis of a crane for retrofit purposes



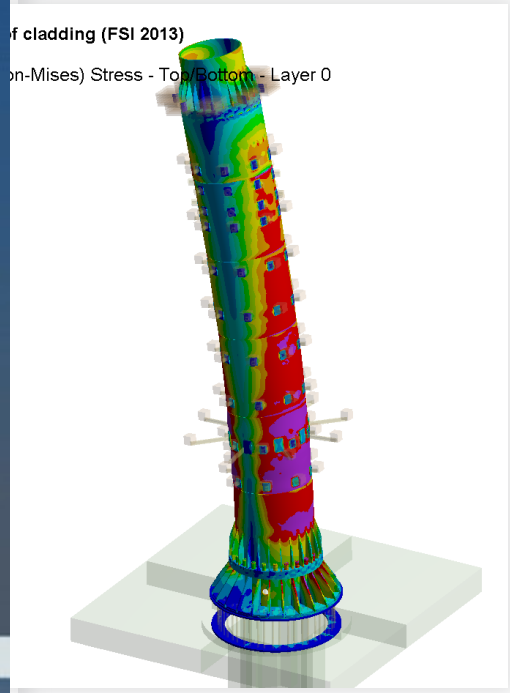


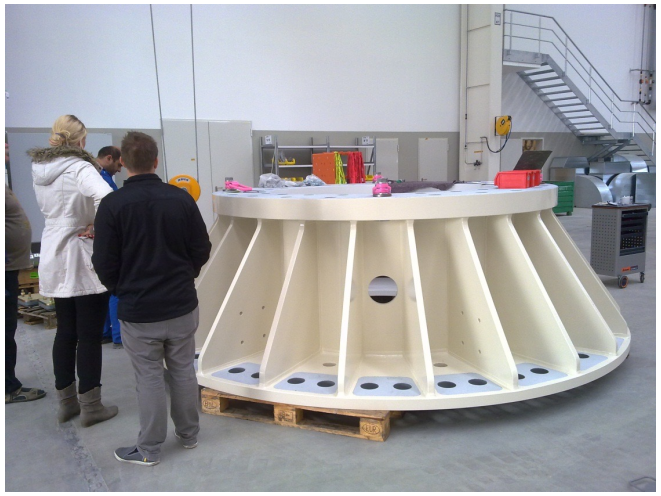
Customer Benefits:

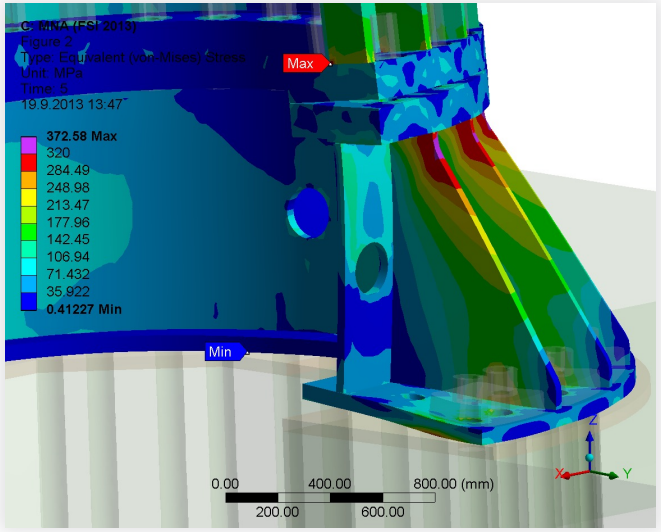
- Assessment according to Eurocode
- Critical locations identified to adjust the design

Parasol U53 – Mecca project

- Stress analysis of large parasol construction.







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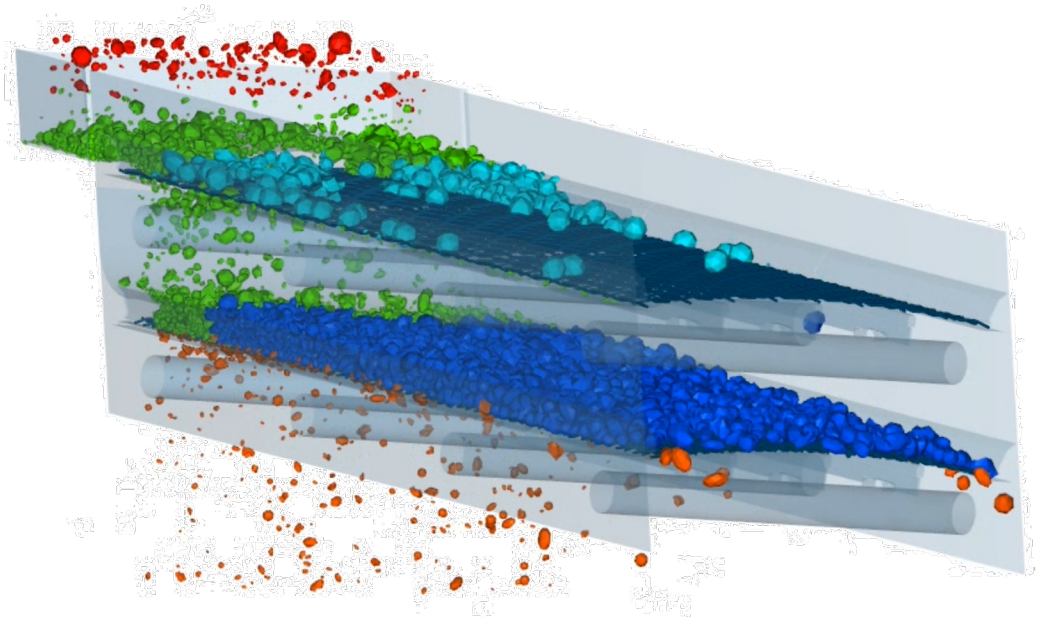
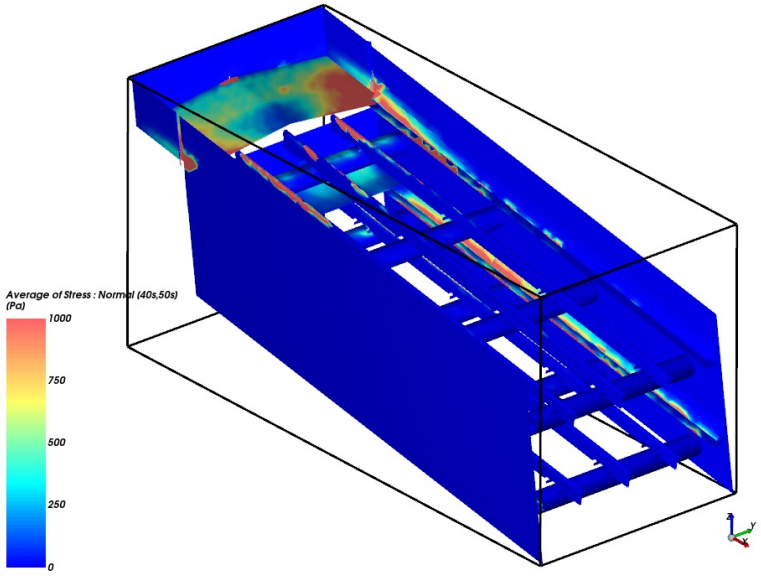
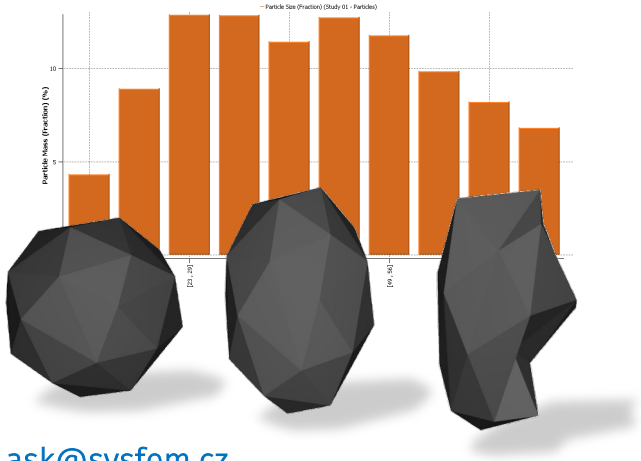
Simulation of Vibrating Screener for Material Sorting

PSP Engineering

- Discrete Element Method (DEM) simulation of vibrating screener.







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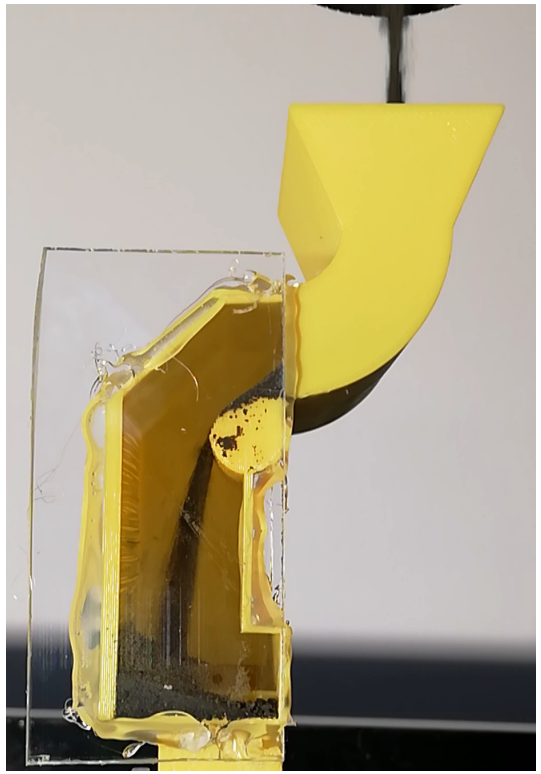
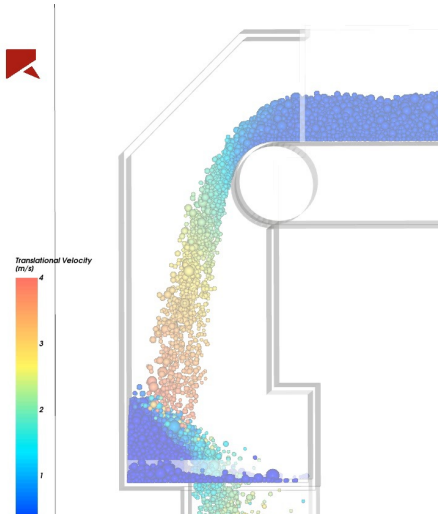
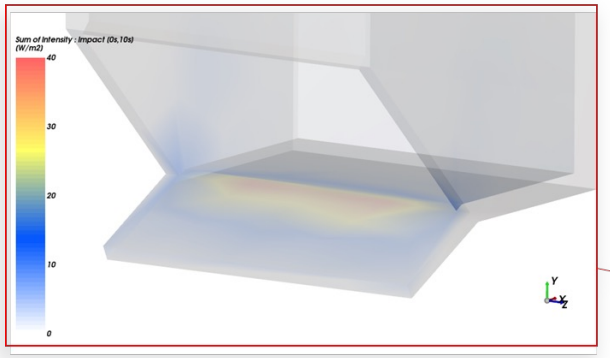
SVS FEM

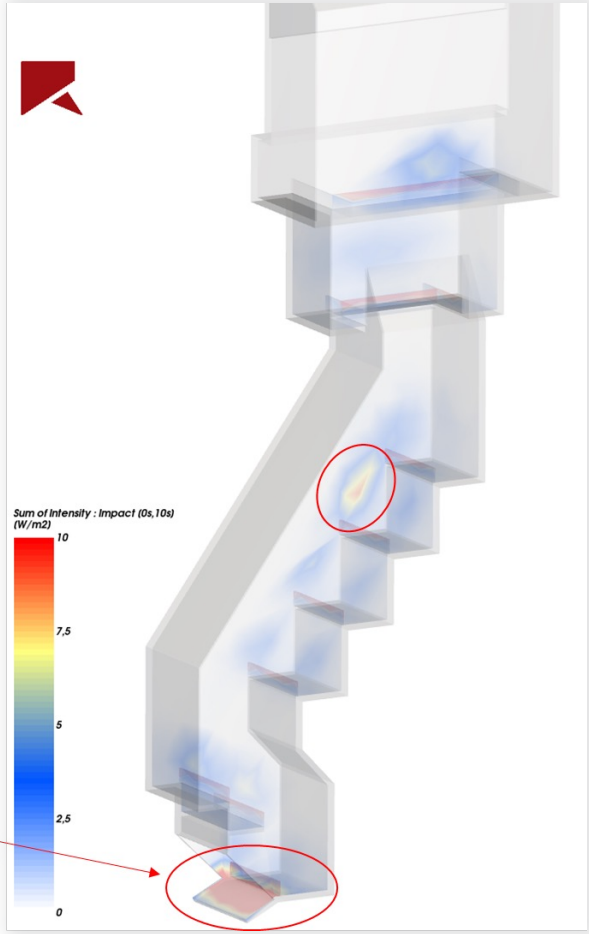
Clinker Transportation in Cement Production Plant

- DEM simulation of bulk material flow and wall erosion.



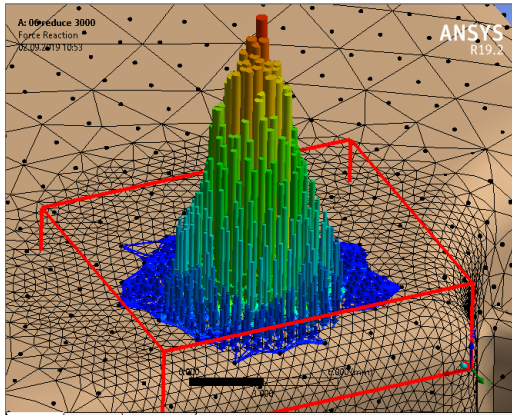


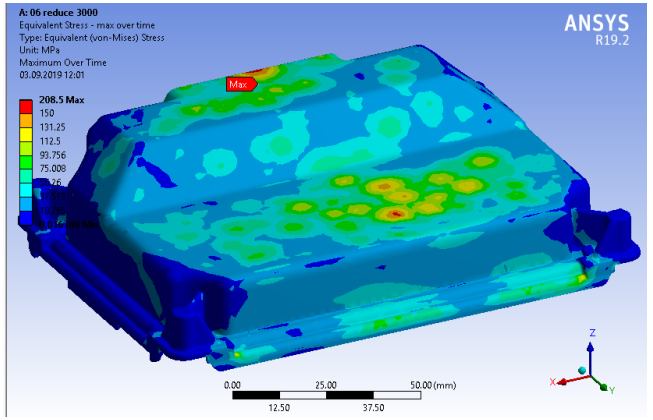




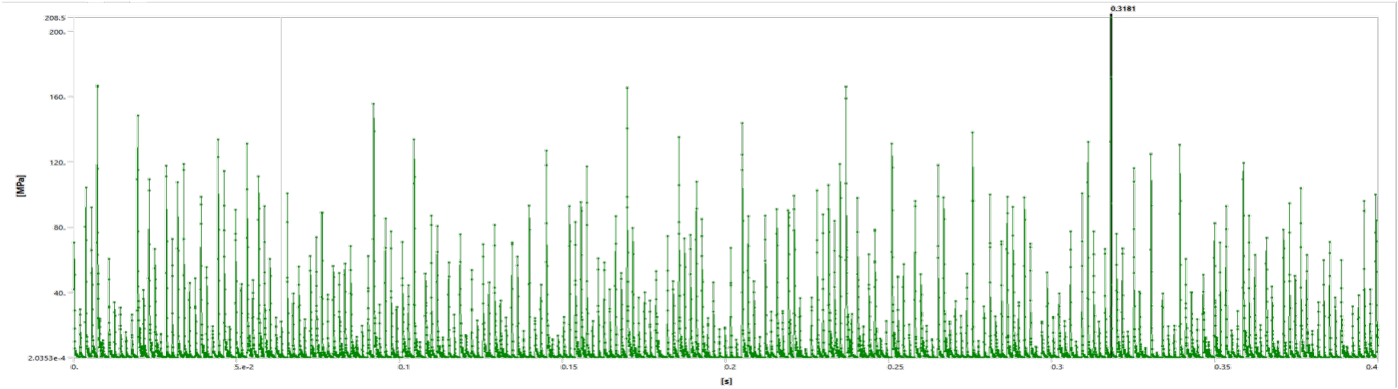
Particle Impacts on a Wall

- DEM and FEM analysis of rock impact on a plastic box.

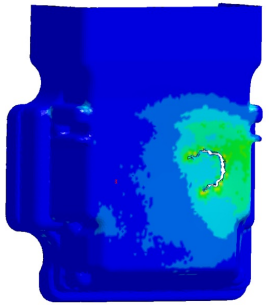




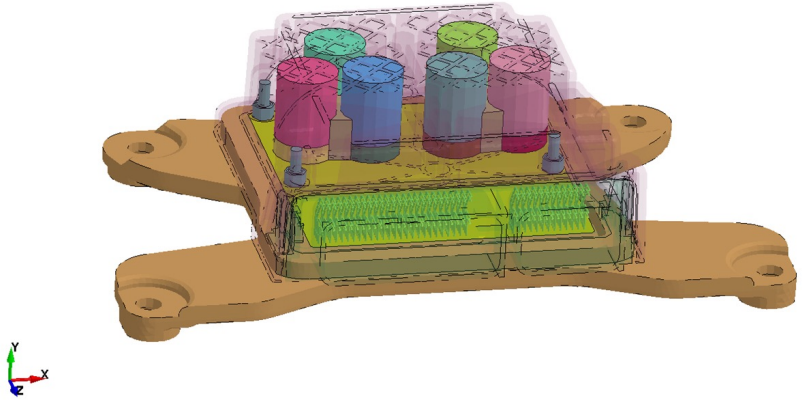
- Customization
- Rocky DEM and Mechanical coupling



- Impact test on a plastic box.



- Subassembly crash simulation



Impact Test of Mobile Noise Barrier

MC\VELOX

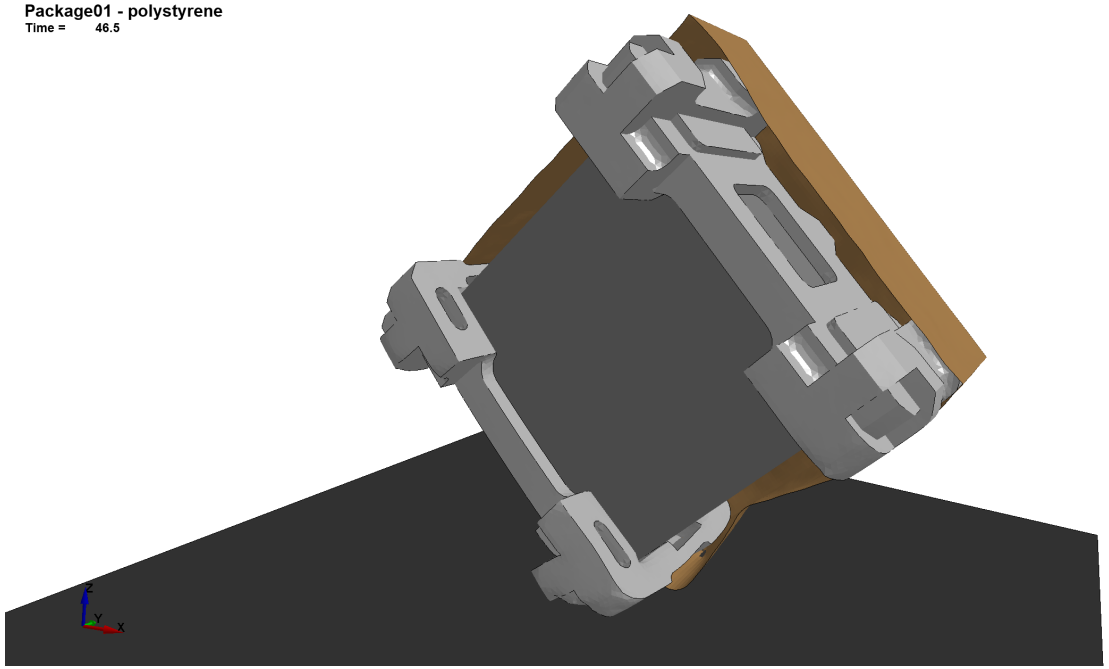
- Inhouse models of three vehicles, simulation validation by experiment.

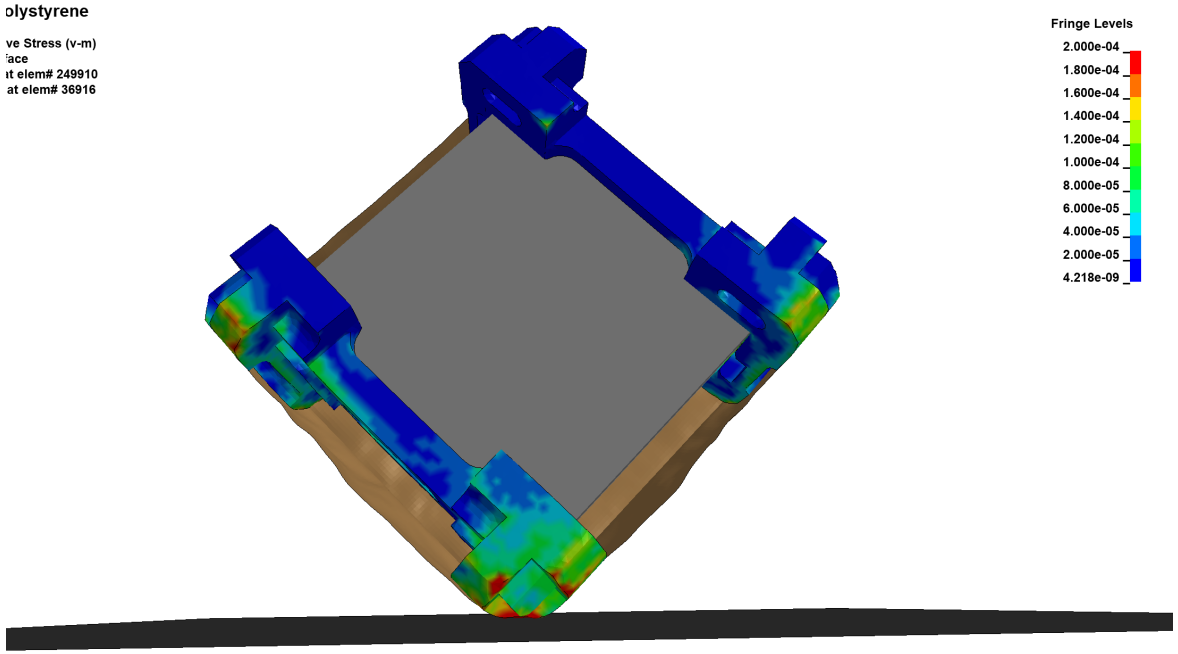
Design of new mobil noise barrier

✓ 3 models of vehicles
- Passenger car 900 kg
- Bus 13 t
- Truck with a trailer 38 t

Drop Test of Package Material

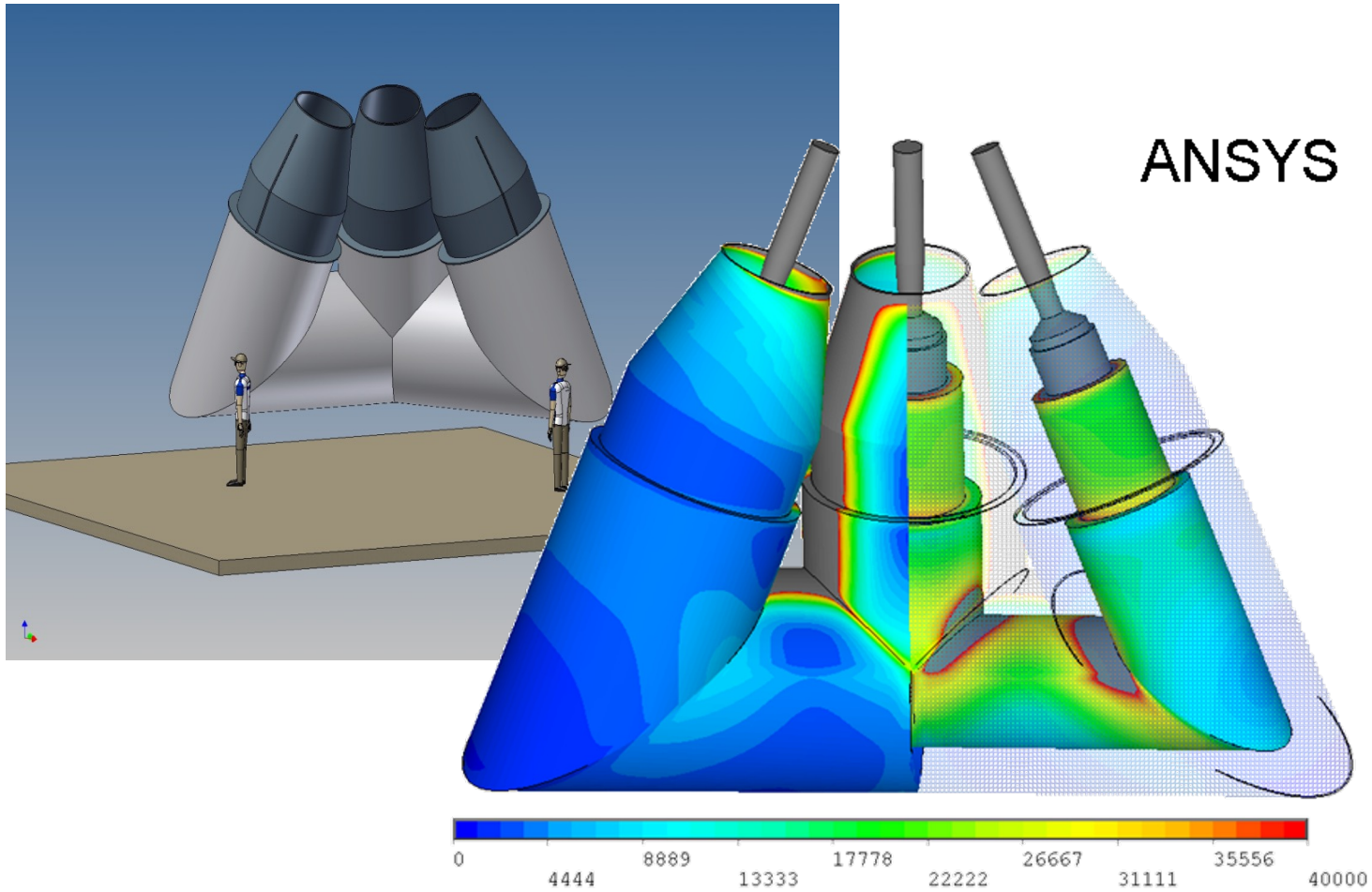
- Damage prediction of packaging material and carried goods.
- Acceleration effect during drop down.

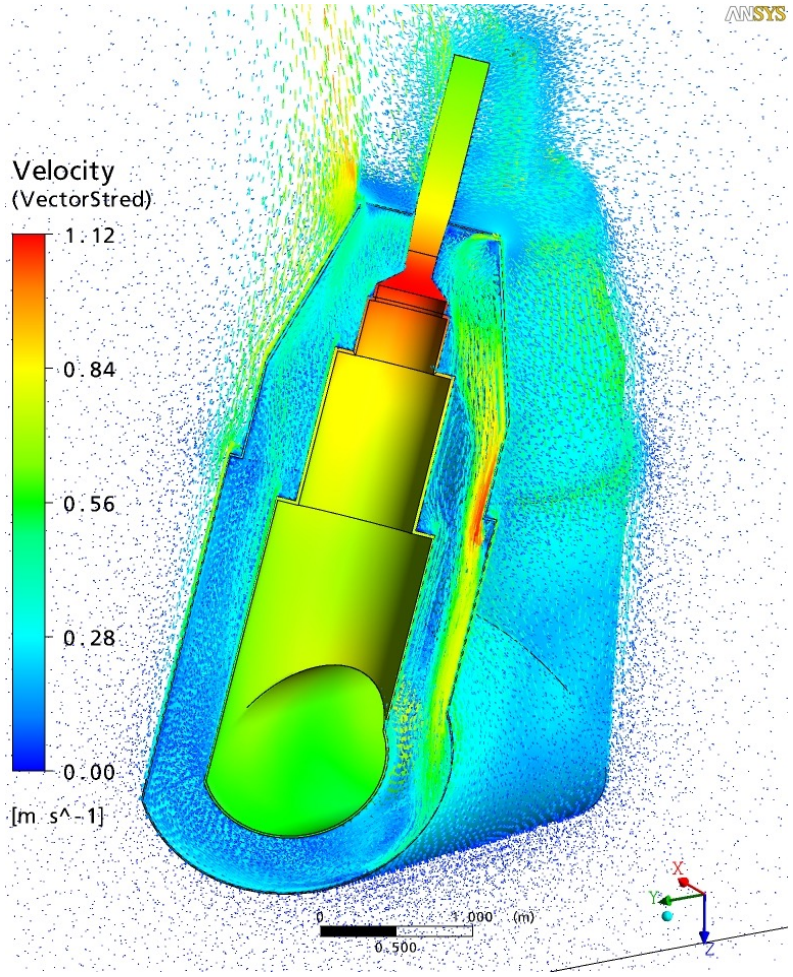




Neutral Point Thermal Testing of Power Plant Generator

- Prediction of maximum surface temperature ahead of certification measurement of neutral point.





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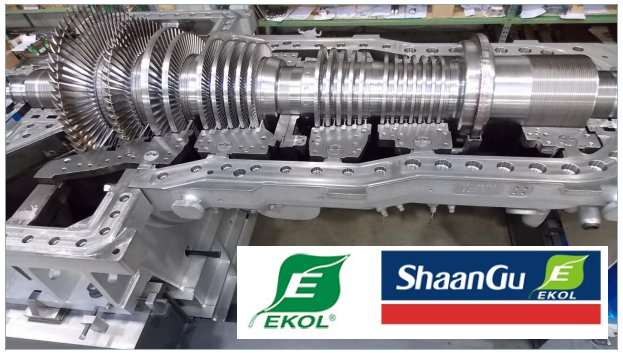

Průmyslové sensory

zdroj: noriujutiklio.lt

SIMATIC NET

zdroj: fiverr.com

OPC UA
network protokol

SVS Digital Twin

FMPy

FMU – ME

Functional Mock-Up Unit – Model Exchanged

dynardo
optiSLang®

Ansys

References

Ministry of Defence & Armed Forces
of the Czech Republic

MINISTRY OF THE INTERIOR
OF THE CZECH REPUBLIC

Czech Republic
Ministry of Transport

MINISTRY OF
INDUSTRY AND TRADE

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EUROPEAN UNION
EUROPEAN DEFENCE FUND

EUROPEAN DEFENCE AGENCY

GAČR
GRANTOVÁ AGENTURA ČESKÉ REPUBLIKY

Joint Research Centre
JRC

Reference

PROVYKO
CEITEC
VVU
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VÚSH
SIEMENS
Danfoss
Garrett ADVANCING MOTION
DOOSAN Doosan Škoda Power
BOSCH Invented for life
Bobcat DOOSAN
SIGMA SIGMA®
AL AUTOMOTIVE LIGHTING
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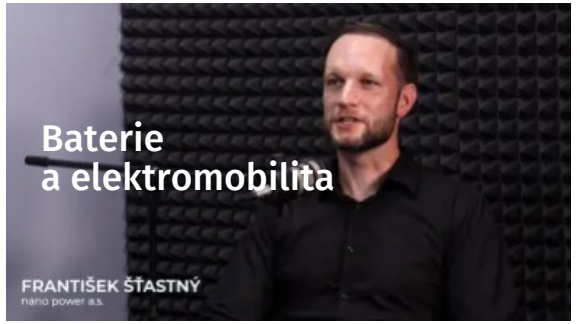

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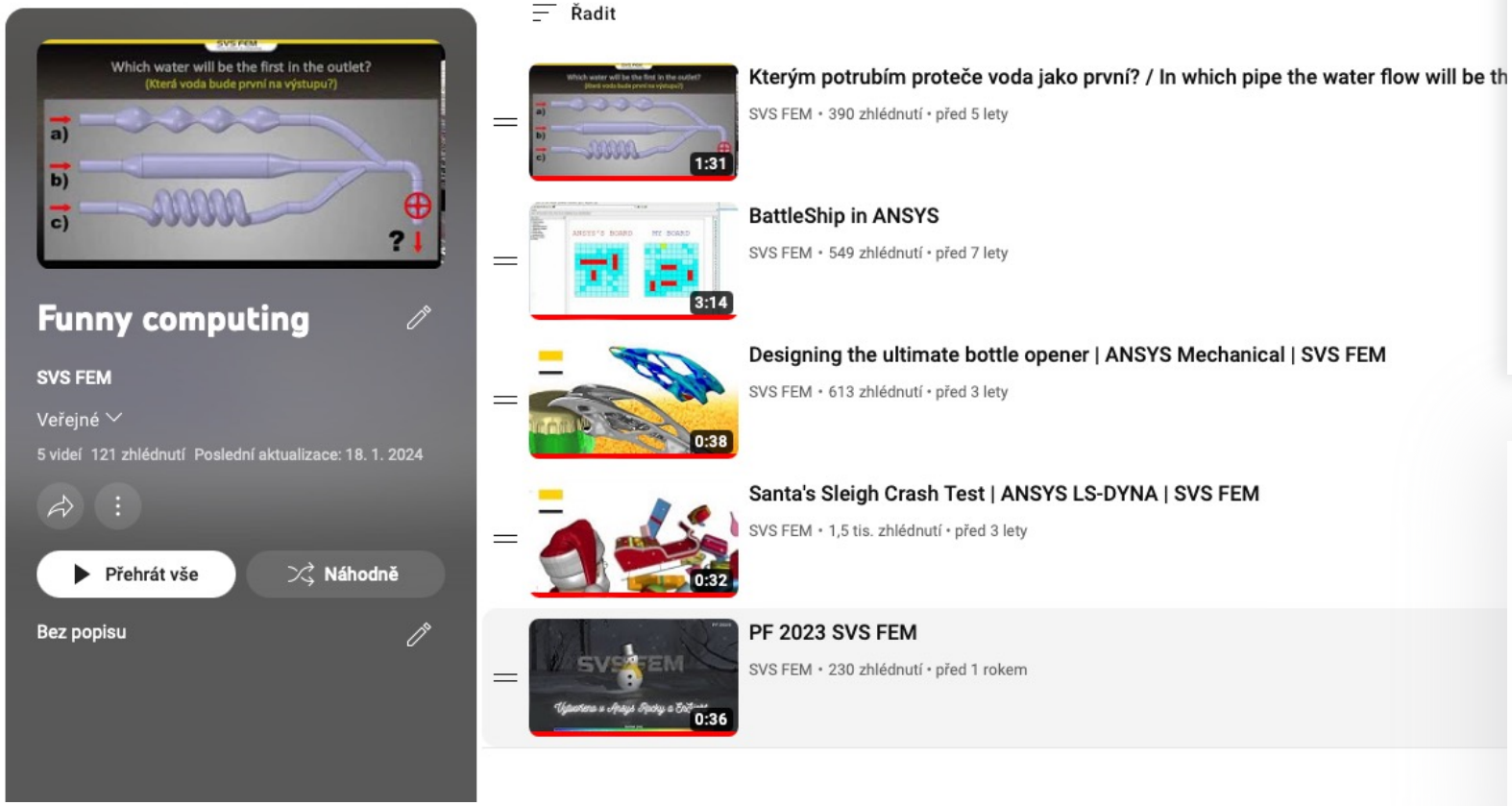
Playlist Funny computing



Playlist na YouTube https://youtube.com/playlist?list=PL-OB49-BMenTpHjBDErn3piP7AfLUsTym&si=TwbRTeX2q1y0UM0K

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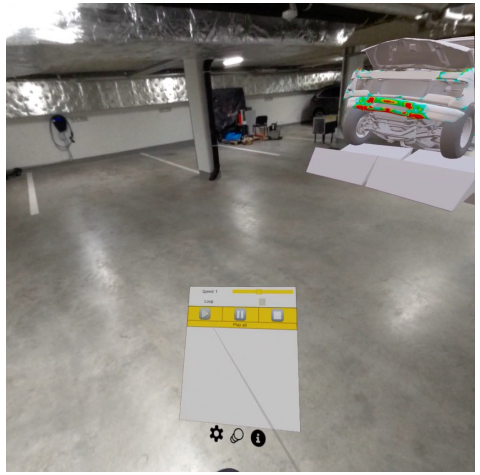
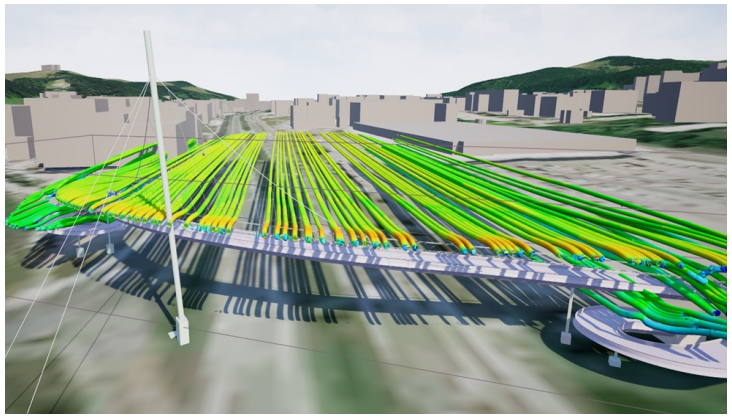
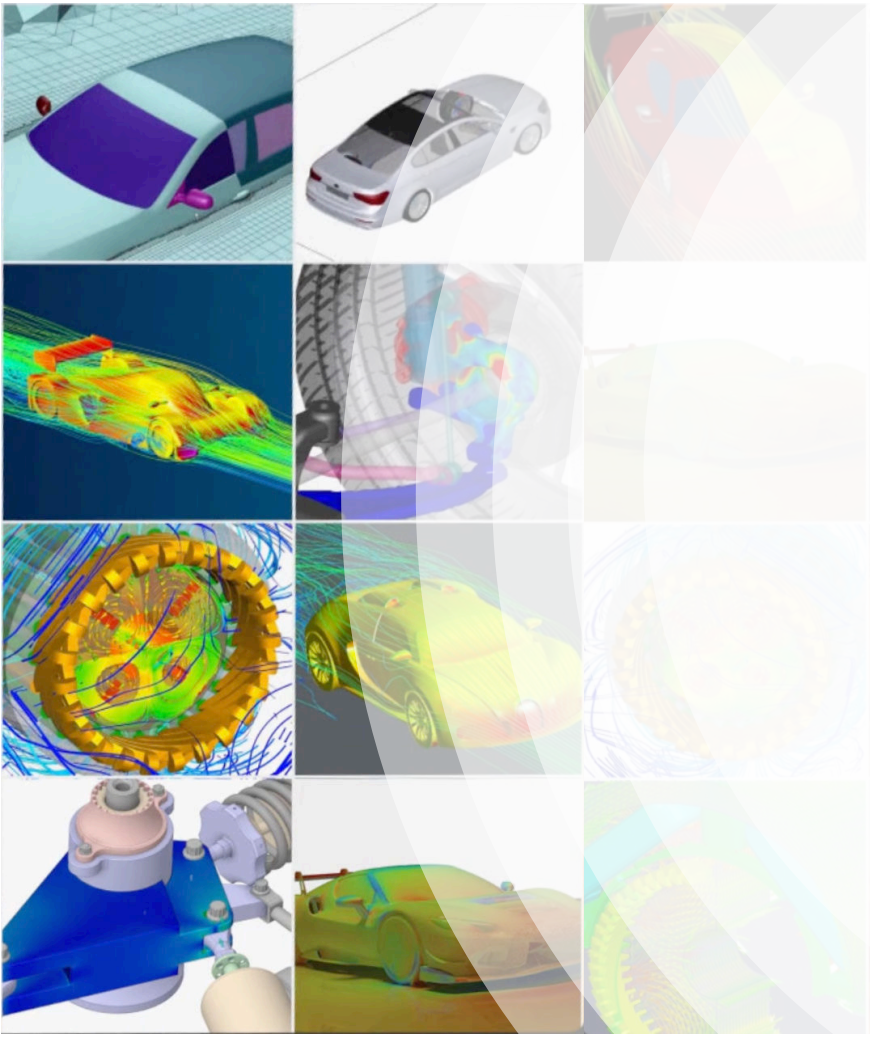
Naskenujte QR kód Vaším mobilním telefonem a umístěte jeden z našich modelů třeba k sobě na stůl.

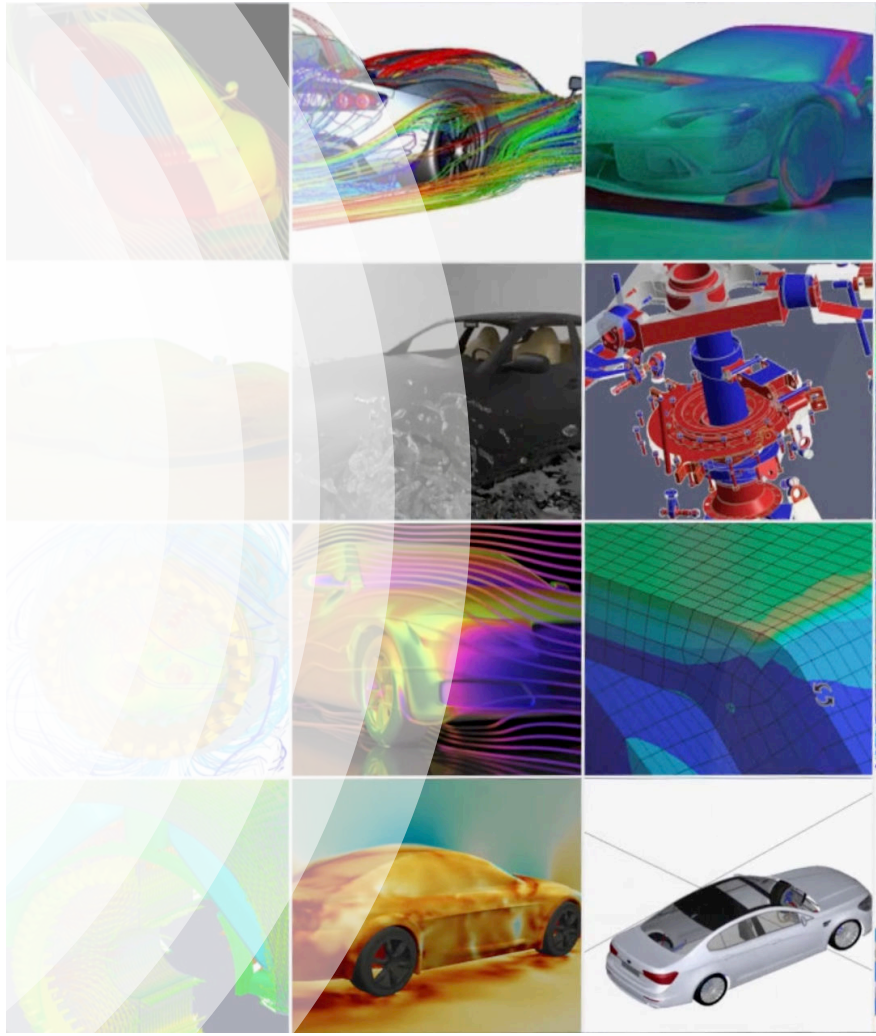
Postup, jak na to, najedete na blogu: https://www.svsfem.cz/rozsirena-realita





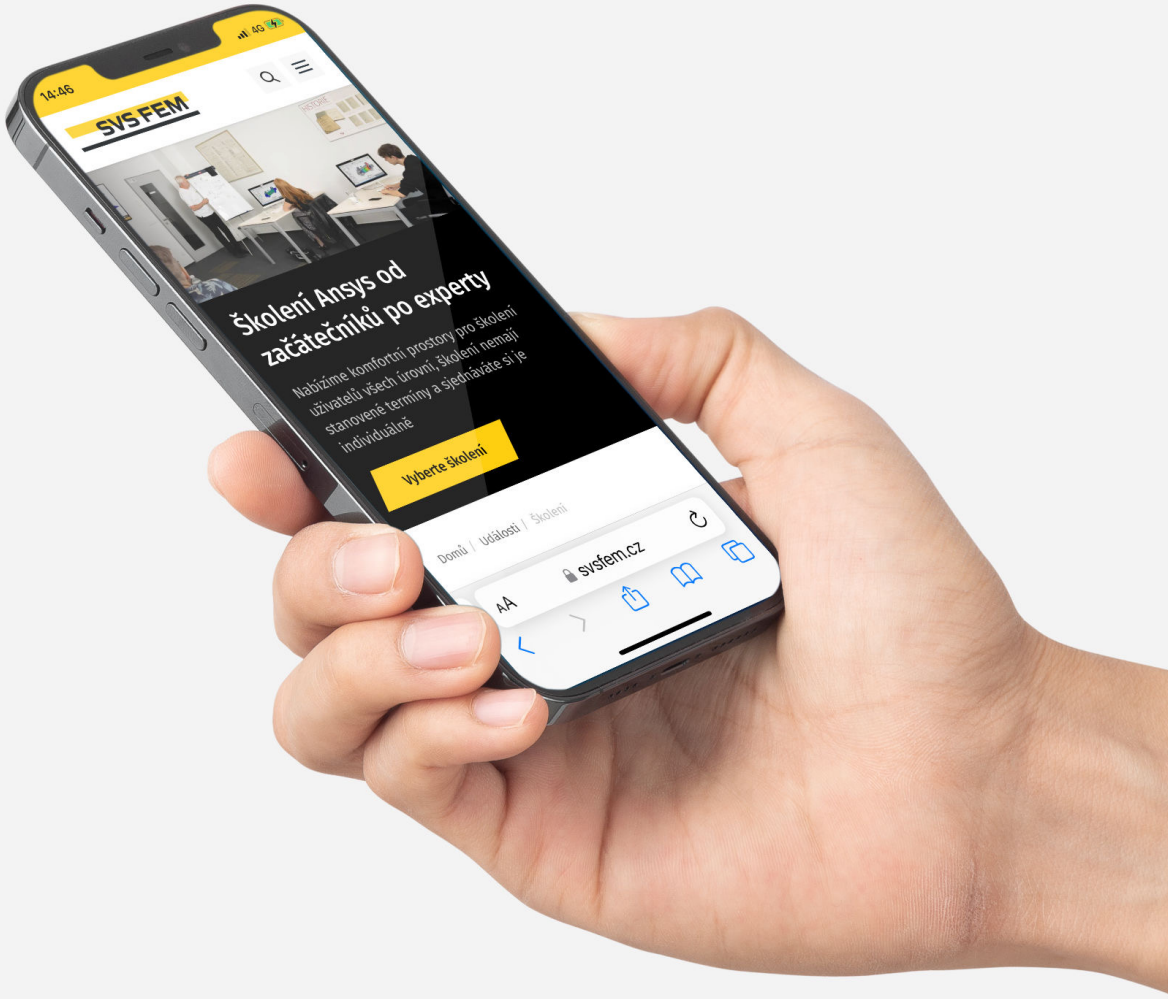


Diskuze



Budeme Váš průvodce ve světě simulací

Sledujte nás na soc. sítích



Díky za pozornost
a zůstaňme ve spojení

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www.svsfem.cz