

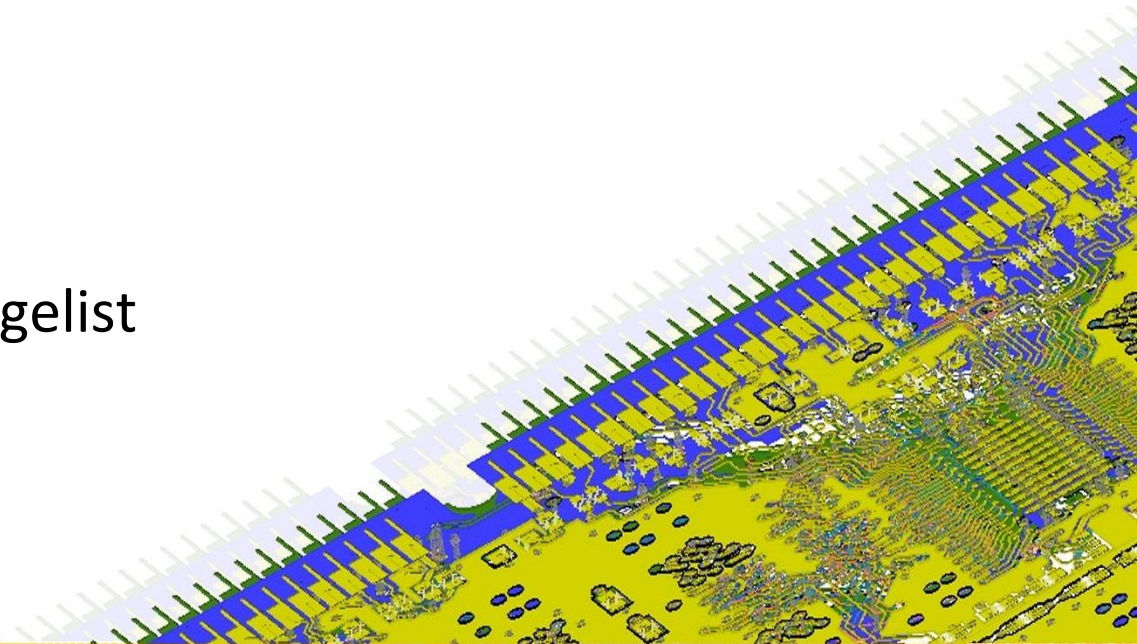
The ANSYS logo is displayed in a black rectangular box. The word "ANSYS" is written in a bold, sans-serif font. The letters "AN" are white, and "SYS" is gold. A registered trademark symbol (®) is located at the top right of the word.

Good Ideas to Great Designs

Pierre Thieffry

Senior Technical Evangelist

ANSYS France



“There’s a tremendous amount of craftsmanship in between a good idea and a great product. The idea changes and grows, and you find there are tremendous tradeoffs you have to make.”

Steve Jobs

“There’s a tremendous amount of Simulation and Optimization between a good idea and a great product.”

Good Ideas → Great Designs



Good Ideas → Great Designs



Electric

400 km range

0 – 100 km/h in 3.3 s

5-Star crash rating

17" HD touchscreen

Good Ideas → Great Designs



 FIREFLY

Good Ideas → Great Designs

Reusable rocket system

50 % reduction in launch costs

Environmentally friendly

Self-pressurising propellant

Carbon composite structure



 FIREFLY

Good Ideas → Great Designs

SYNAPSE



Good Ideas → Great Designs

Antenna performance increased by factor 5

Reduction in radiated power limits health hazards

Smaller size more suitable for wearing

Strong signal with small package

SYNAPSE



Simulation-Driven Product Development

Simulation-Driven Product Development Process

Concept



Detailed Design



Physical Testing

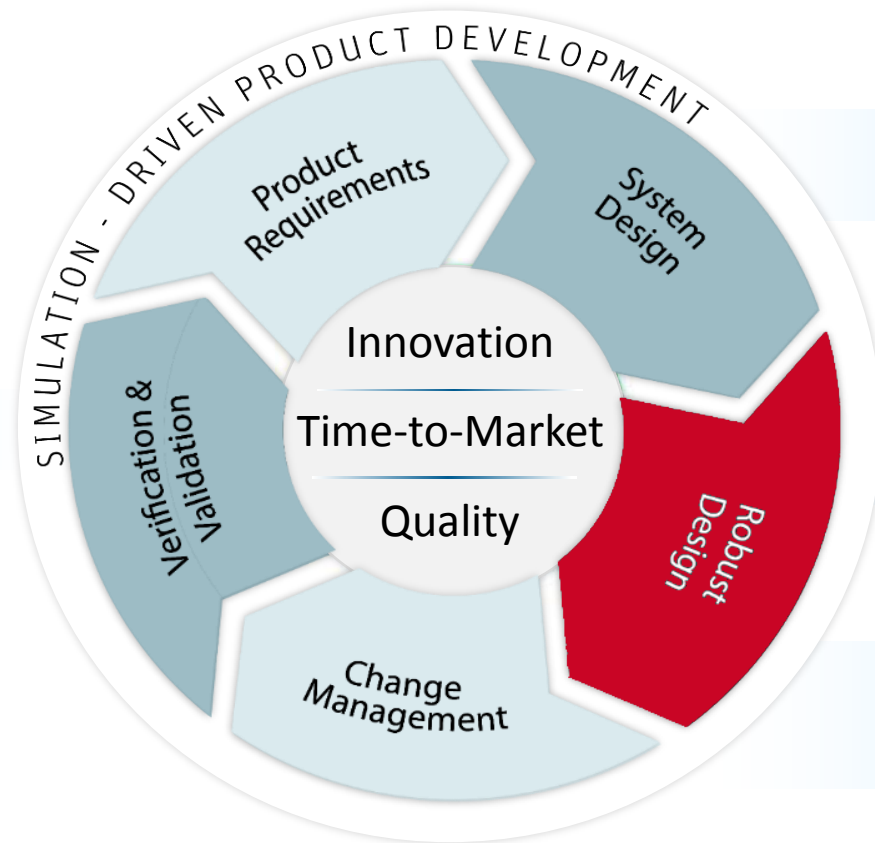


Production

Simulation-Driven Product Development

Simulation-Driven Product Development Process

Concept



Detailed Design



Physical Testing

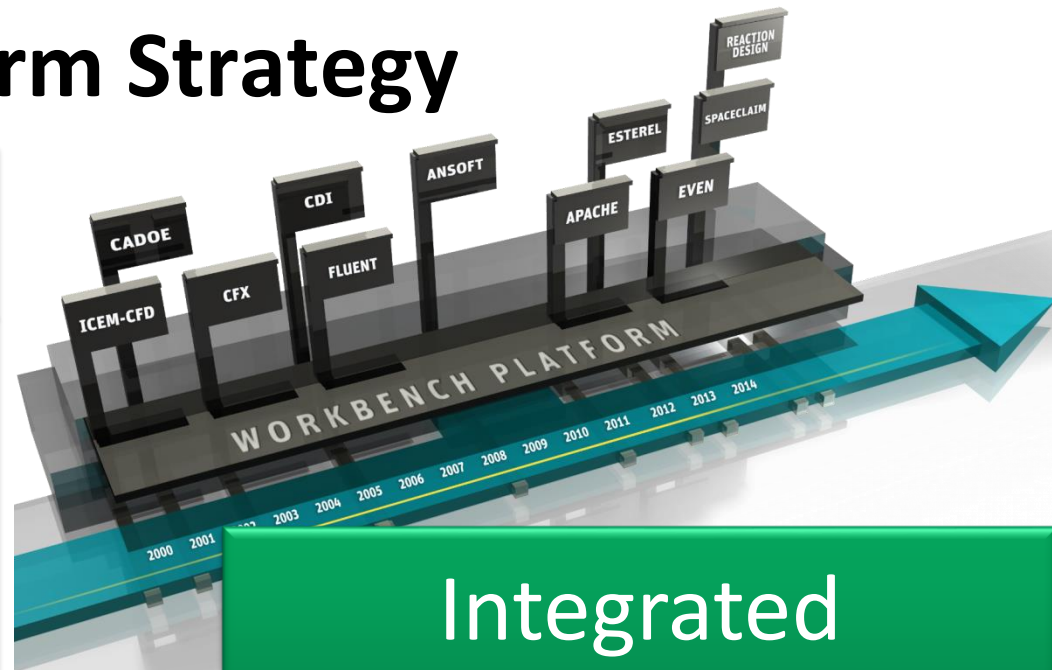


Production

Platform Strategy

Simulation trends

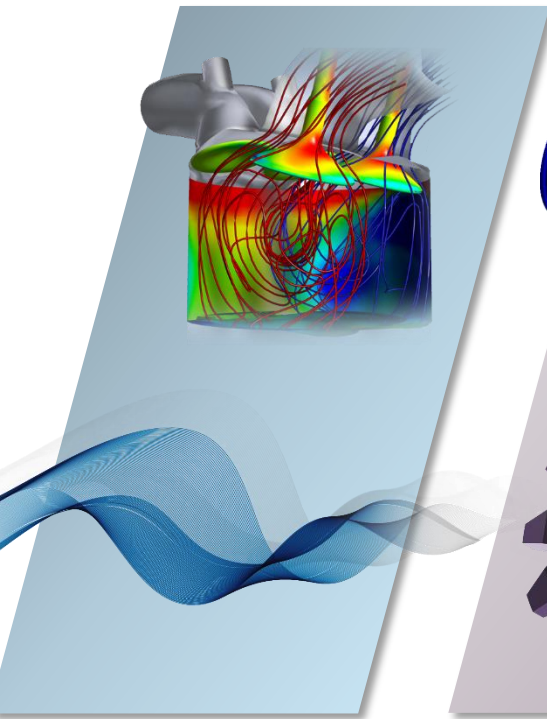
- Multiphysics & multiscale
- Systems engineering
- Earlier use of simulation @ design
- Robust Design



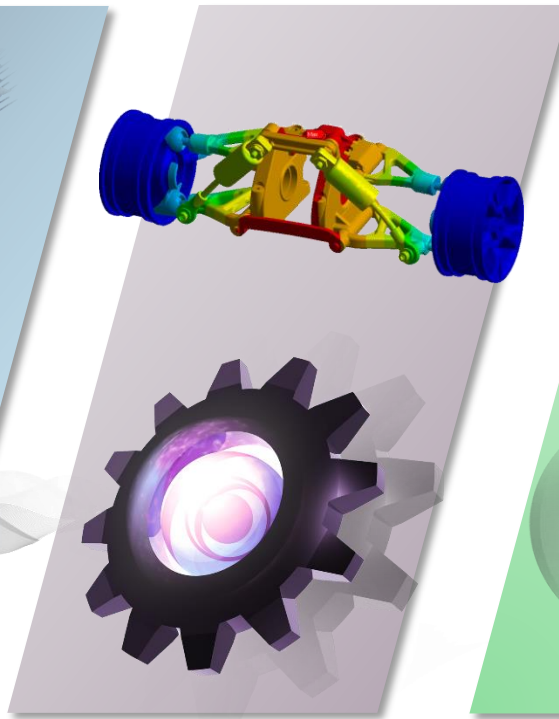
Integrated platform

- Managed data
- Connected tools
- Automated workflows
- Parametric
- Open & extendable
- Interactive & automated (batch)

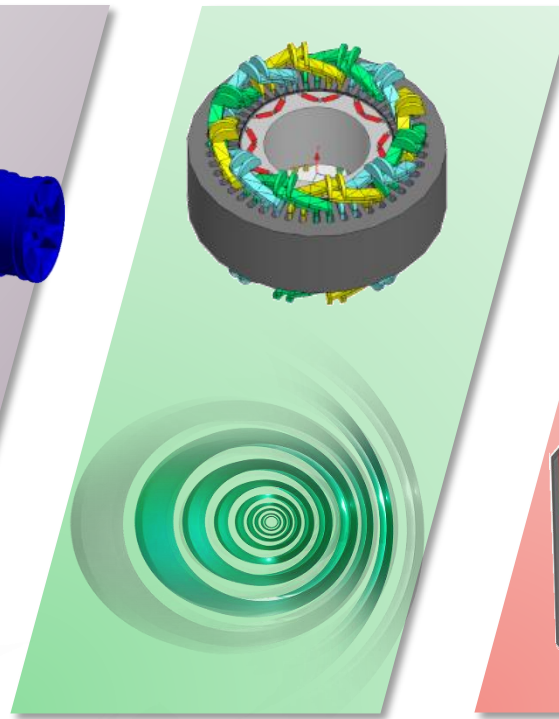
Comprehensive Multiphysics Solutions from ANSYS



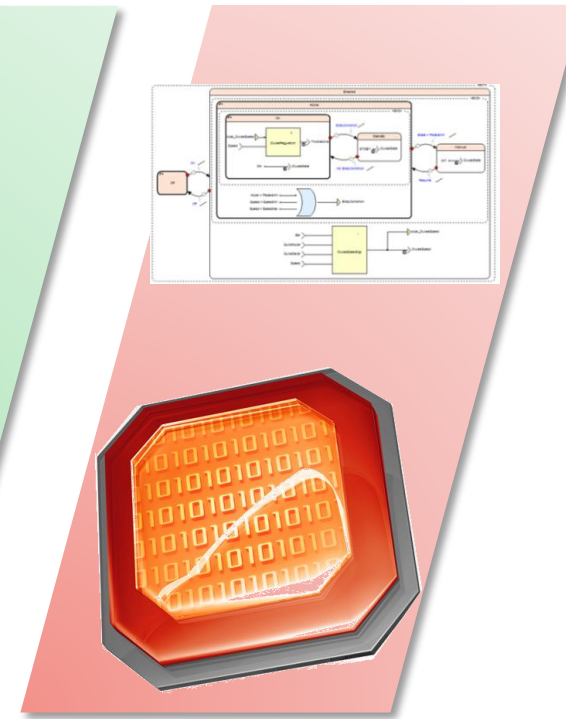
Fluids



Structures



Electronics



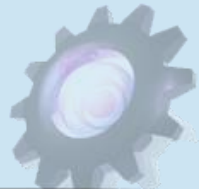
Software

Fluid-Structure-Interaction

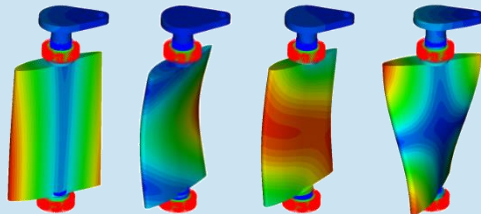
Physics

Results

Insight



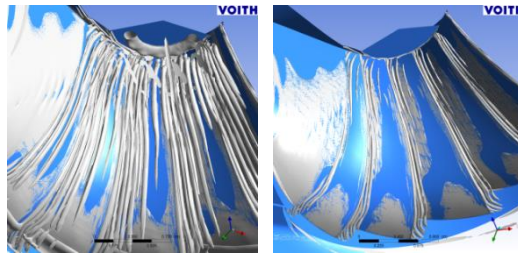
Structures Only



Natural frequencies don't agree with measured frequencies



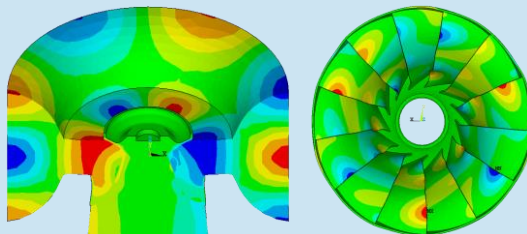
Fluids Only



Predicts vortex shedding, but doesn't explain upstream vibration

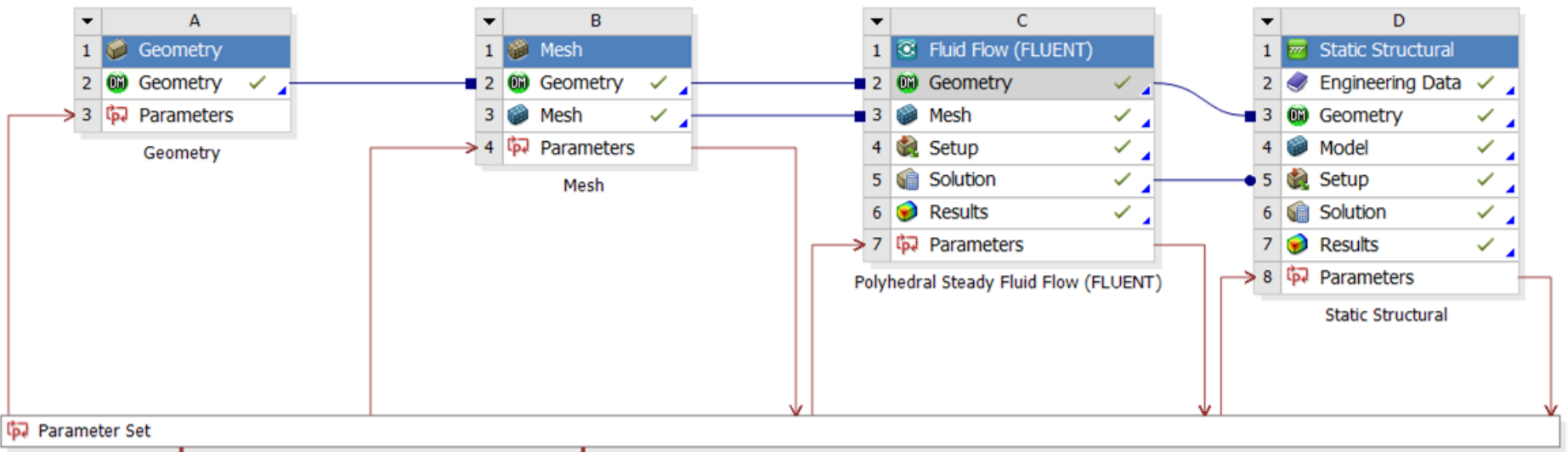


Fluid-Structure Interaction

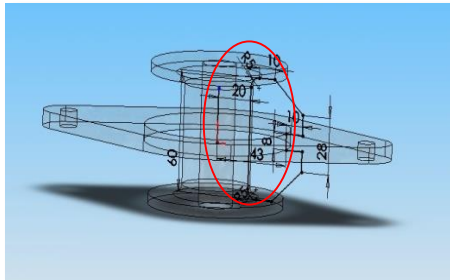
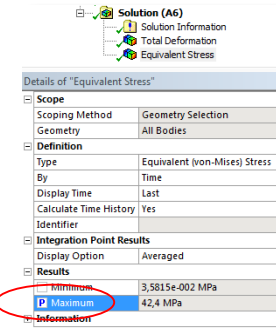
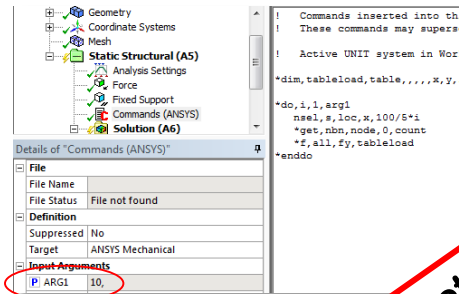
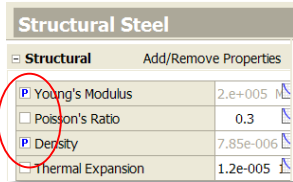


Predicts frequencies & source of excitation

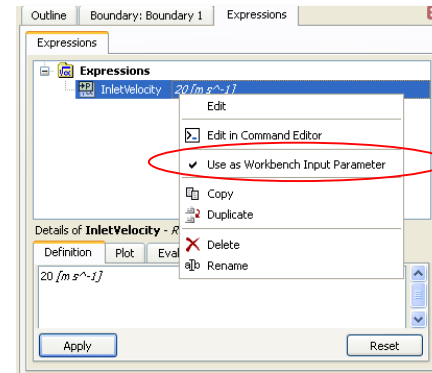
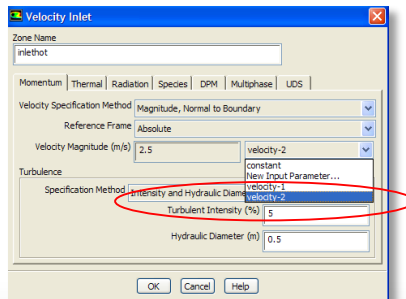
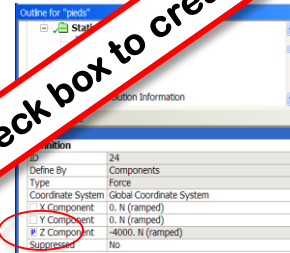
This is how every engineer should perform simulation



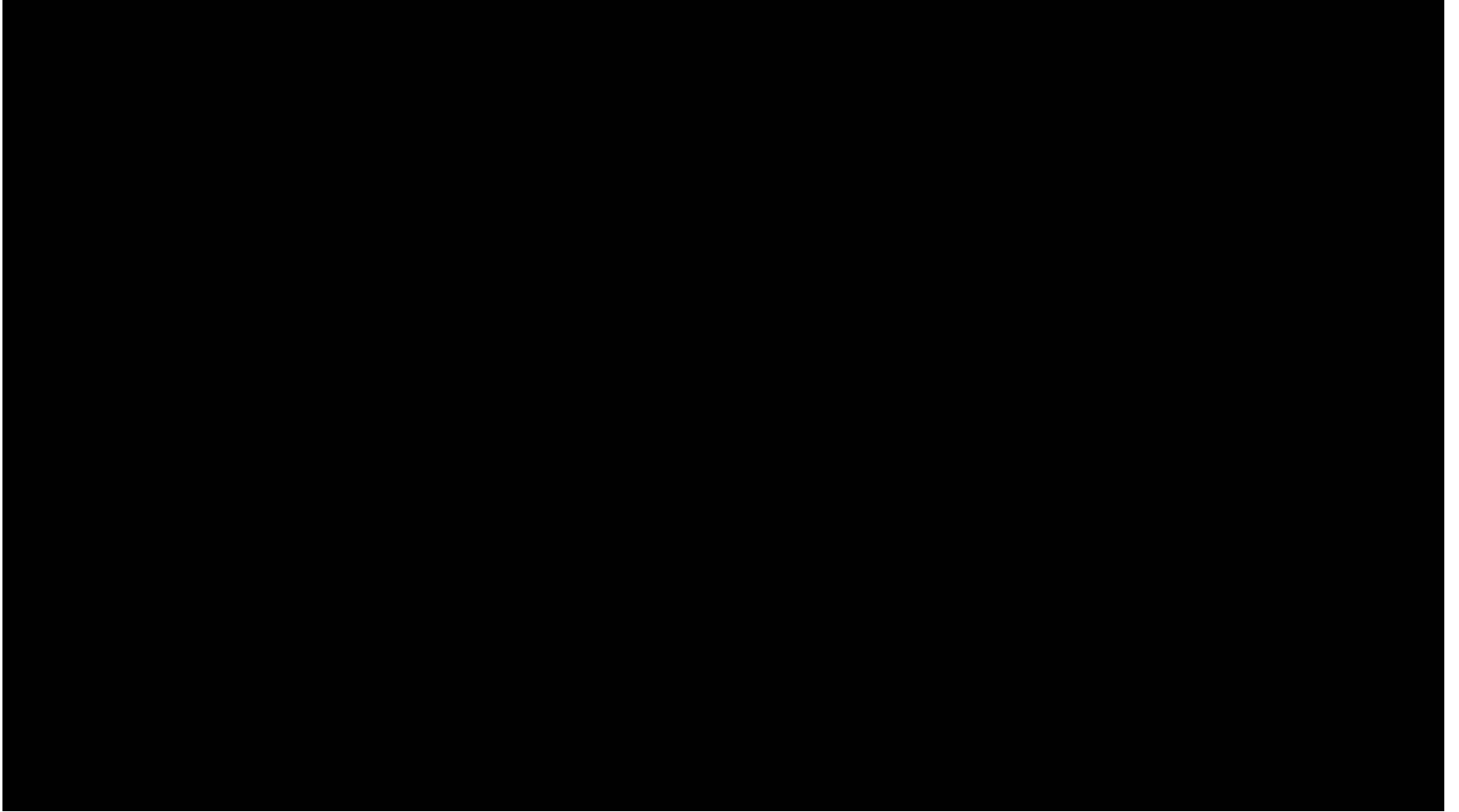
Check the box to create parameters!



Check box to create parameter



ANSYS Integrated Multiphysics - AIM



“What-If” in AIM

The screenshot displays the ANSYS AIM Design Points Dashboard. On the left, a sidebar shows the 'Study' status as 'Up-to-date' and lists various simulation processes and templates. The main area features a 'Design Points Dashboard (Beta)' with a table of design points and a line graph below it.

Design Points Dashboard (Beta)

Design Points: 5 Up-to-date, 2 Out-of-date, 7 Total

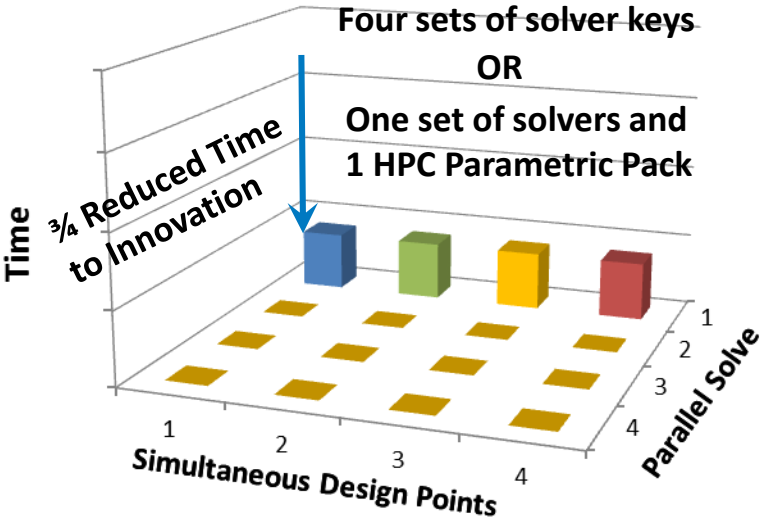
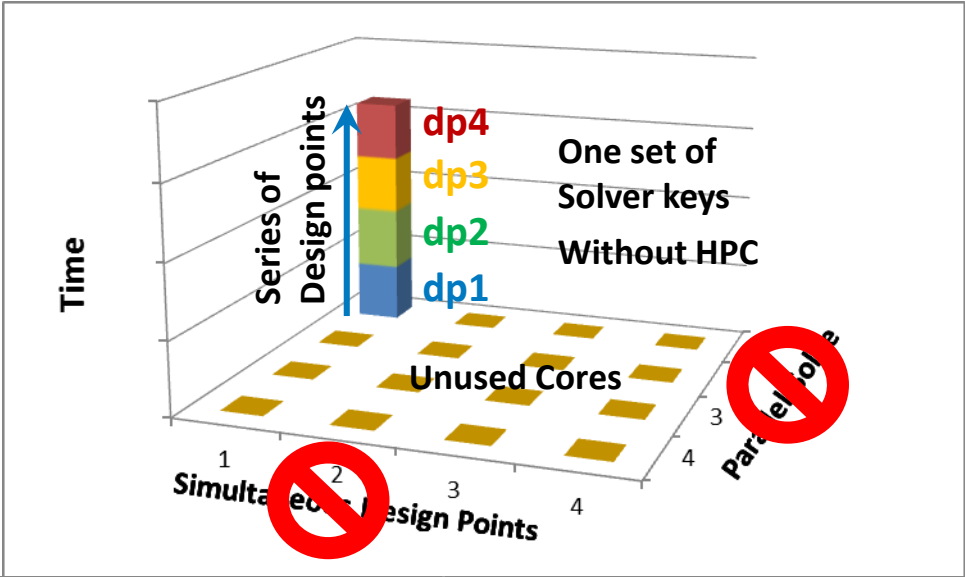
2 item(s) selected. Deselect All

Name	Retained status	P1 - Geometry Import Source 2 DS_width	P3 - Input Parameter	P4 - Pressure 1 Pressure Pa	P2 - Mesh 1 Number of elements
DP 0	Up-to-date	0.05	8	1.2346E+05	80
DP 1	Up-to-date	0.07	12	1.2346E+05	120
DP 2	Up-to-date	0.08	16	1.2346E+05	160
DP 3	Up-to-date	0.09	16	1.2346E+05	160
DP 4	Up-to-date	0.1	16	1.2346E+05	160
DP 5	Out-of-date	0.04		1.2346E+05	
DP 6	Out-of-date	0.06		1.2346E+05	

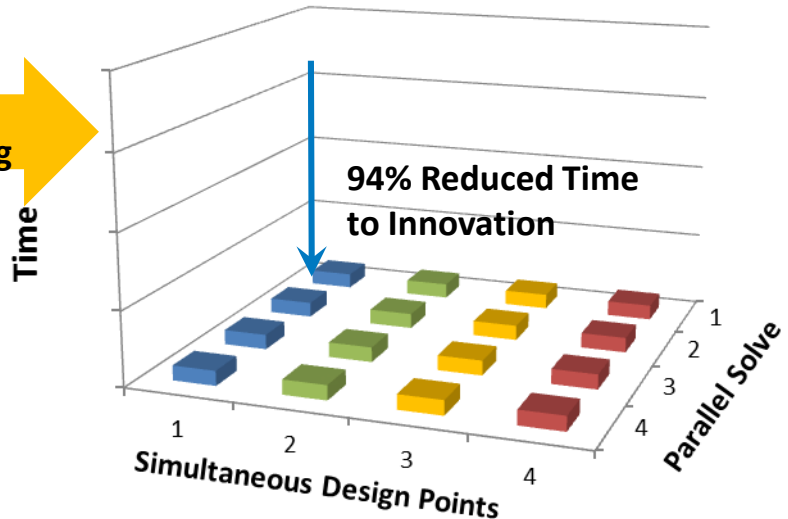
The graph below the table plots the values of parameters P1 through P6 across the design points. The x-axis represents the design points (DP 0 to DP 6), and the y-axis represents the values. The graph shows several curves, with a prominent blue curve that peaks at DP 2 and DP 3. A red curve is also visible, peaking at DP 5. The graph includes a legend for P1, P3, P4, P2, P5, and P6.



HPC to reduce simulation time and improve cost efficiency



+ Parallel Computing



Robust Electric Machine Design through Multiphysics

Robust Electric Machine Design

- WEG needed to develop a new motor with improved energy efficiency, reduced operating noise and increased bearing life.
- The company wanted to streamline its development process to create an optimized design while taking into account all the requirements.

ANSYS in Action

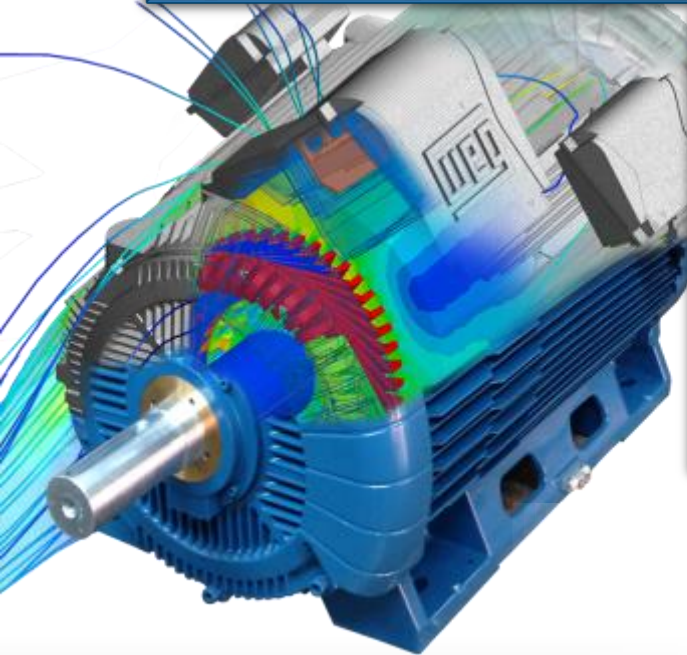
- Use ANSYS CFD, structural and electromagnetic multiphysics simulation to reduce fan losses, minimize aerodynamic and electromagnetic noise, reduce bearing operating temperature and automate the design process.

Key Results

- Multiphysics trade-off studies helped substantially reduce fan losses without sacrificing electromagnetic performance
- Noise reduction and energy efficiency targets were met

Increased number of
CFD simulations from
four per month to 800

Improved bearing life
by 150%



ANSYS multiphysics tools help WEG deliver best-in-class performance for electric motors while substantially reducing the lead time and cost of the development process.

Cassiano A. Cezario, Briam C. Bork, Marcelo Verardi, Research and Technological Innovation Department
José R. Santos, Product Development and Application Department
WEG Equipamentos Elétricos S.A.

ANSYS Simulation Ecosystem

110

- Software partnerships

70

- Hardware partnerships

110

- Academic partnerships



optiSLang inside ANSYS Workbench

optiSLang modules of Sensitivity, Optimization and Robustness evaluation provide easy to use „best practise“ optiSLang functionality

The screenshot displays the ANSYS Workbench interface for a project named 'ten_bar_truss_apdl'. The 'Projektenschema' (Project Schema) shows a hierarchical structure:

- A Mechanical APDL**: Contains Mechanical APDL, Analysis, and Parameter.
- Parametersatz**: A central parameterset that receives input from the Parameter in A and is linked to three analysis systems.
- B Sensitivity**: Contains Sensitivity, DOE, MOP, and Results.
- C Evolutionary Algorithm**: Contains Optimization EA, EA, and Results.
- D Robustness**: Contains Robustness, Sampling, MOP, and Results.

The 'Meldungen' (Messages) table at the bottom shows the following data:

	A	B	C	D
1	Typ	Text	Assoziation	Datum/Uhrzeit



This is how every engineer should perform simulation

