Powering Innovation That Drives Human Advancement

Applications and Demonstration of SimAI, ML platform for simulation

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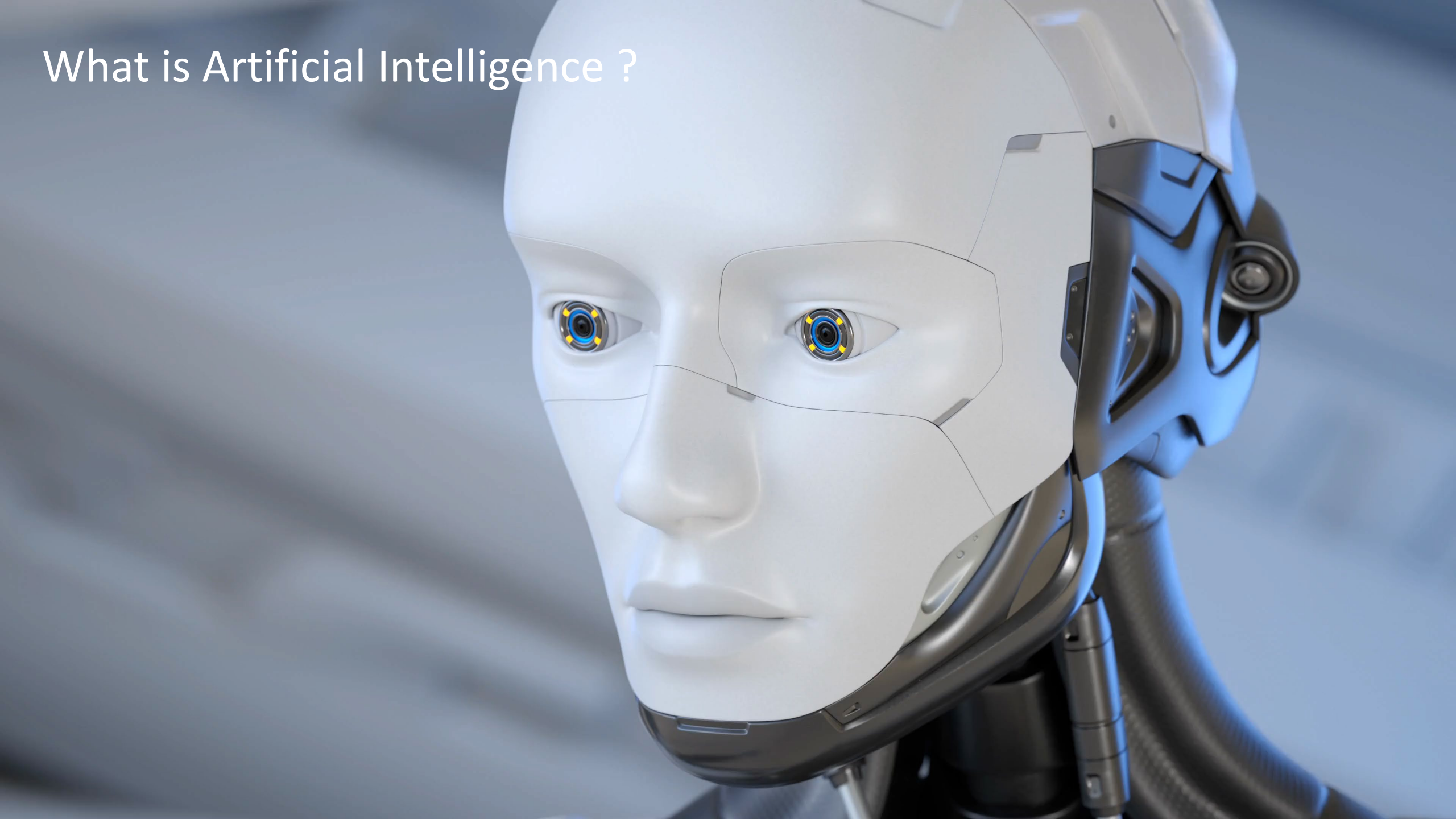
What is Artificial Intelligence ?



AI is pushing the boundaries of what's possible

Ansys SIMAI

Cloud-native, deep-learning AI, non-parametric

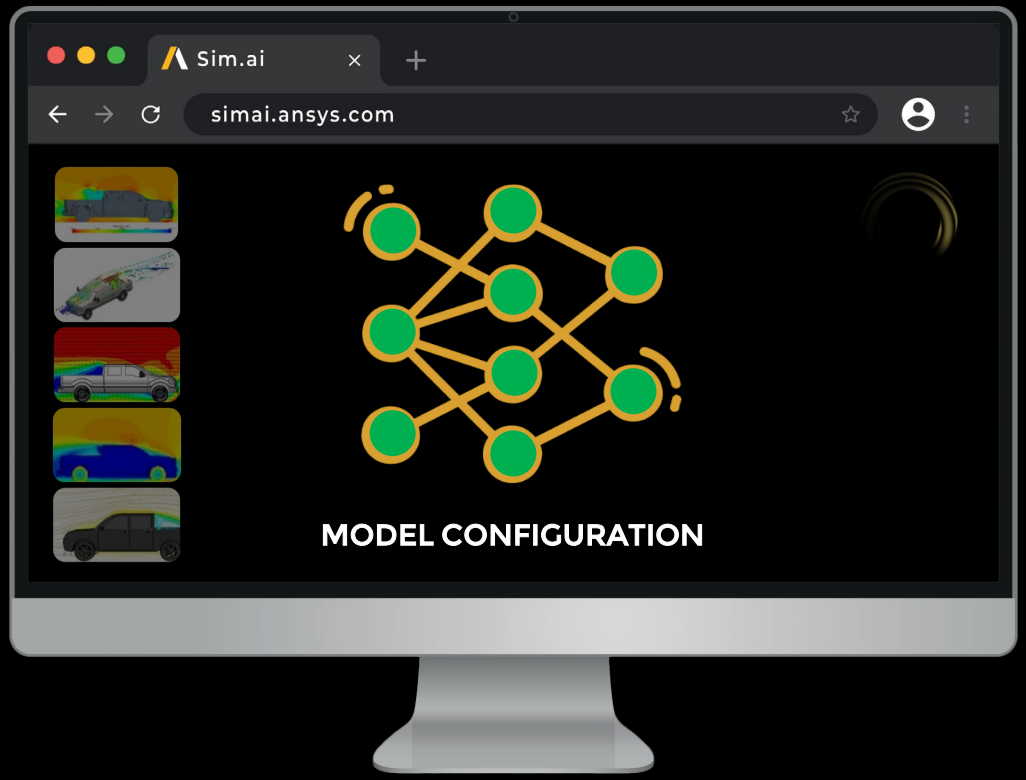
- Train using previously generated simulation results
- Predict in minutes with confidence and test many design alternatives

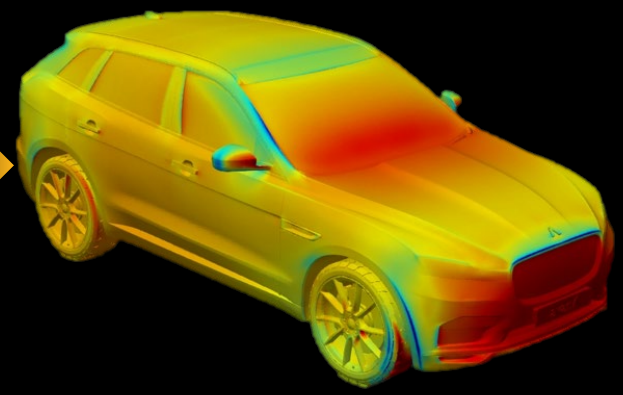
Physics-neutral, broad applications

- Any physics: fluids, structures, electromagnetics, optics
- Any industry: aerospace, automotive, energy, high-tech

How does SimAI work ?

New Design





Performance Prediction

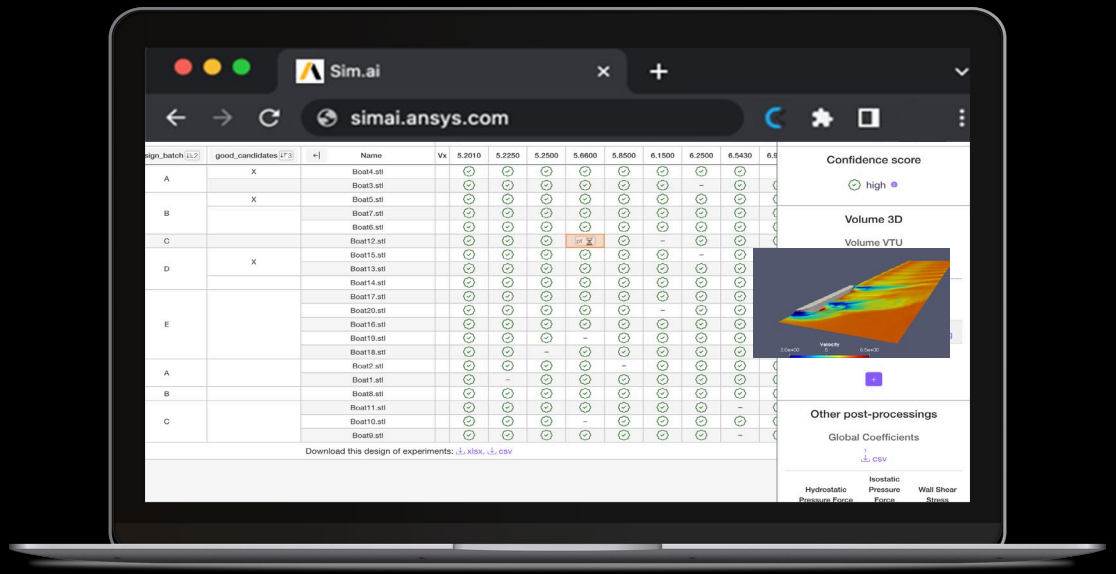
1- UPLOAD *Your Past Data*

2- TRAIN *Your AI Model*

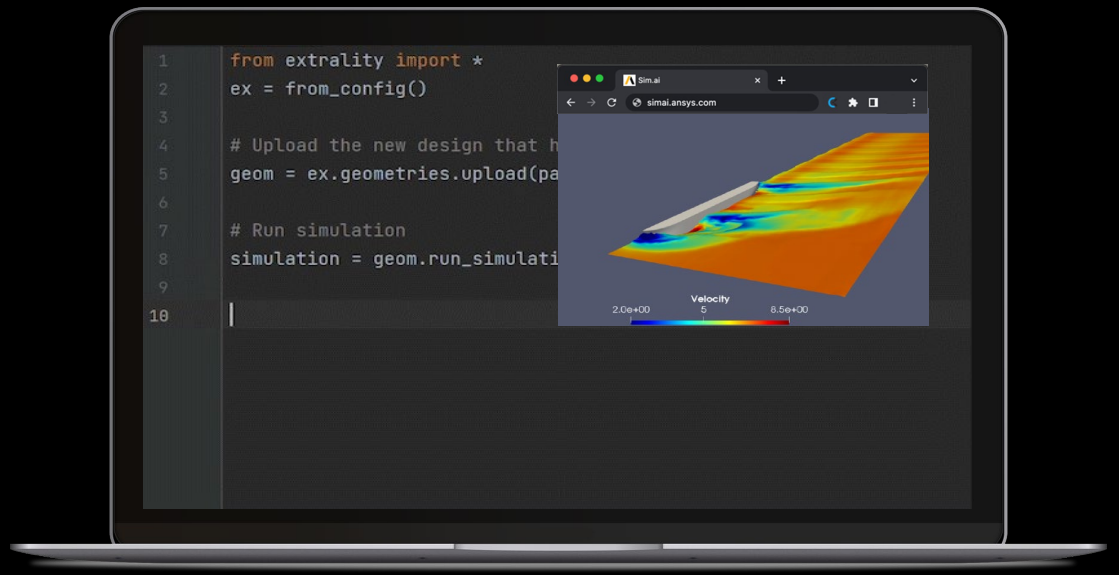
3- PREDICT *In Minutes*

Two ways to access SimAI

WebApp
Simple User Experience



SDK (PySimAI)
Embed in workflows



Ansys SIMAI

Demonstration

Ansys SimAI makes simulation more accessible to a wider audience

Train

Prepare Data → **Train AI Model**

- Existing simulation data
- New simulation data
- Ansys or other solvers

- Data conversion to VTP
- Minutes to upload
- 2 days to train the AI model

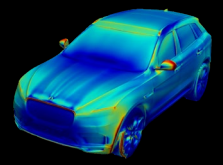
Simulation Expert

Explore

Create Catalog → **Predict Designs**

- A Catalog is a collection of trained AI models

- Interactive Design and Optimization



Simulation Expert | Project Manager | Designer | System Engineer

Validate

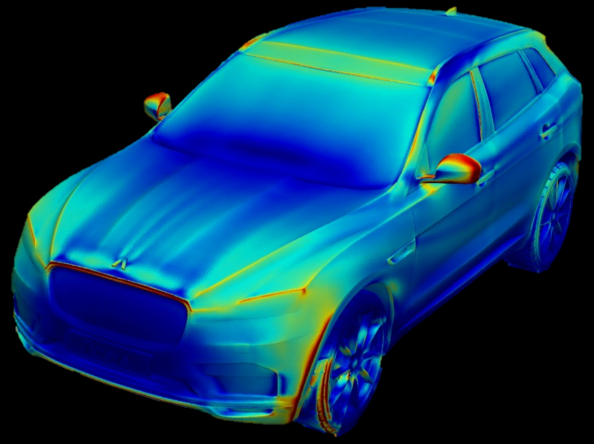
Validate Results

- Validate Selected Best Designs with Full Fidelity Simulation

Simulation Expert

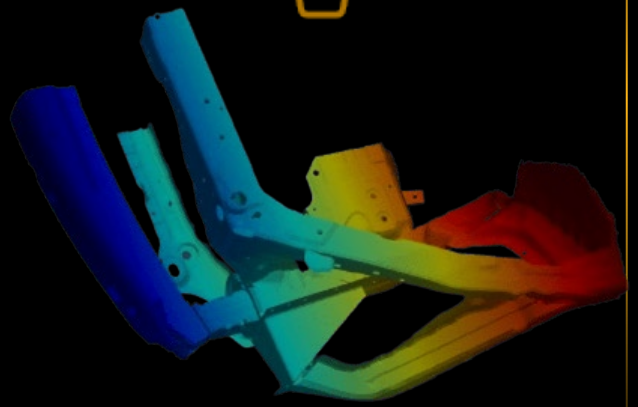
Apply AI to different physics for order of magnitude gains

FLUIDS



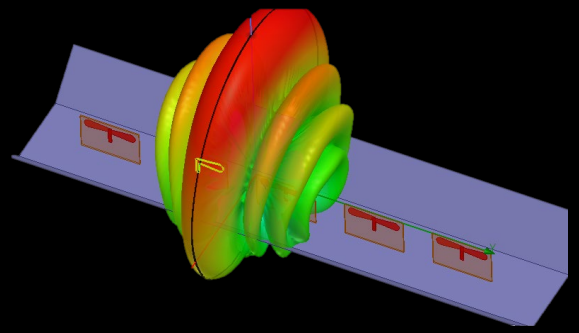
Vehicle Aerodynamics
Thermal management
Cooling design

STRUCTURES



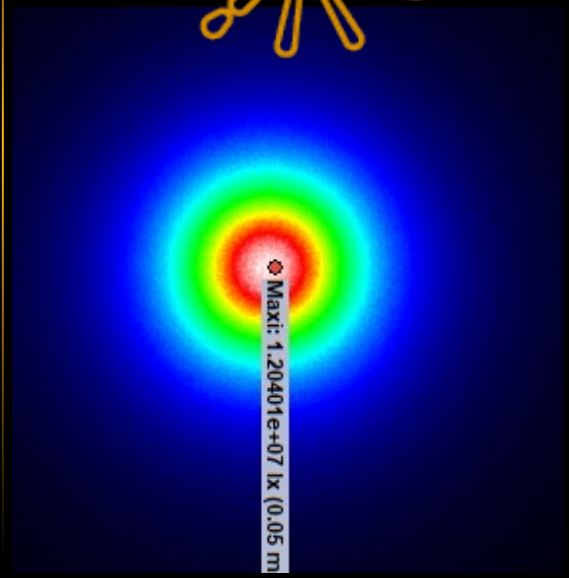
Generative design
Impact performance
Stress + deformation

ELECTRONICS



Antenna design & placement
Magnet placement
PCB EM losses and forces
Electric motor design

OPTICS



Illumination

Leveraging Ansys SimAI to evaluate bumper impact

A virtual optimization approach is needed to get the best performance in safety, durability and NVH.

Technical solution:

- **50 different crash models with varying part thicknesses were evaluated to generate a surrogate AI model**
- **The AI accurately predicts the bumper deformation and barrier forces as a transient response.**
- **AI prediction on new bumper thickness in less than 1 min.**

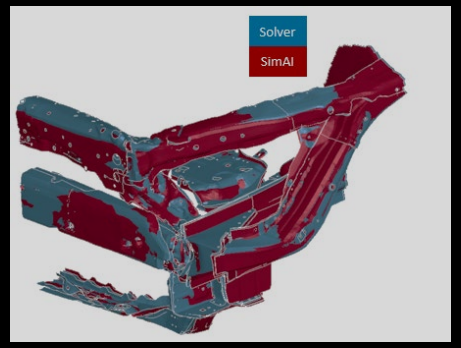
Automate prediction and consistent performance:

~100x faster by leveraging past simulations database

Optimize designs while assessing more variables:

20x more variables optimized compared to traditional simulation methods

Difference



Overall crash predictions have an error of less that 0.5% and barrier force error is within 10%.

Drastically accelerates product development and time-to-market

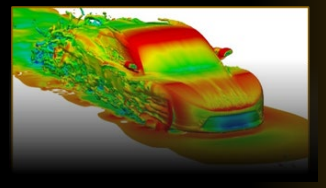
PHYSICAL PROTOTYPE

14 MONTHS

20+ ENGINEERS

1 DESIGN

VIRTUAL PROTOTYPE



1 WEEK

3-4 ENGINEERS

20 DESIGNS

AI ACCELERATED SIMULATION

10 MINUTES

1 ENGINEER

2000 DESIGNS

REDUCES

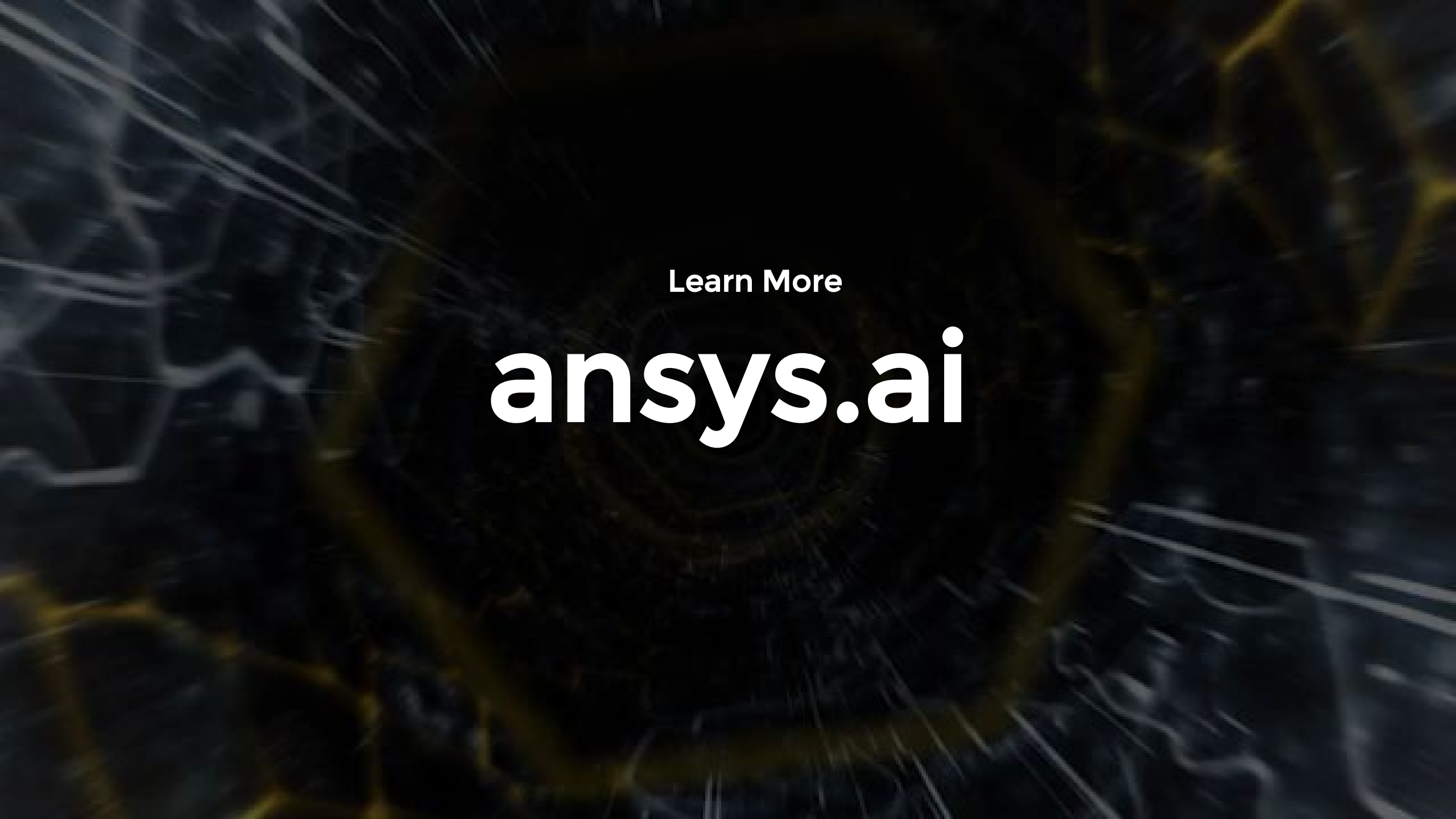
design cycle time, development and testing costs

INCREASES

engineering productivity and scalability and product quality.

IMPROVES

production and operational efficiency.


Learn More
ansys.ai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