



3DEXPERIENCE®

達梭系統SIMULIA結構分析軟體 於Oracle HPC 雲端運算的應用

2021/10/28

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士盟科技股份有限公司

SiMUTECH 士盟科技股份有限公司

CAE工程顧問
Consultant

客製化專案
Customization

產品最佳化
Optimization

教育訓練
Training

服務項目



軟體銷售

>20年工程軟體銷售經驗
>200個客戶單位
業務分布於台灣及大陸



教育訓練

持續不斷地頻繁開課與即時的技術支援



顧問服務

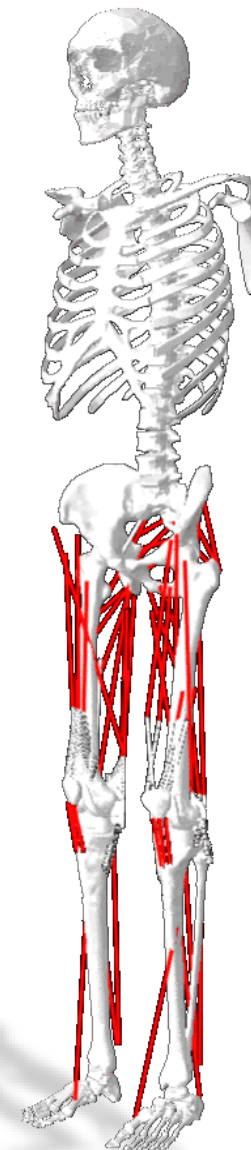
每年
>100件的顧問服務與分析
驗證案



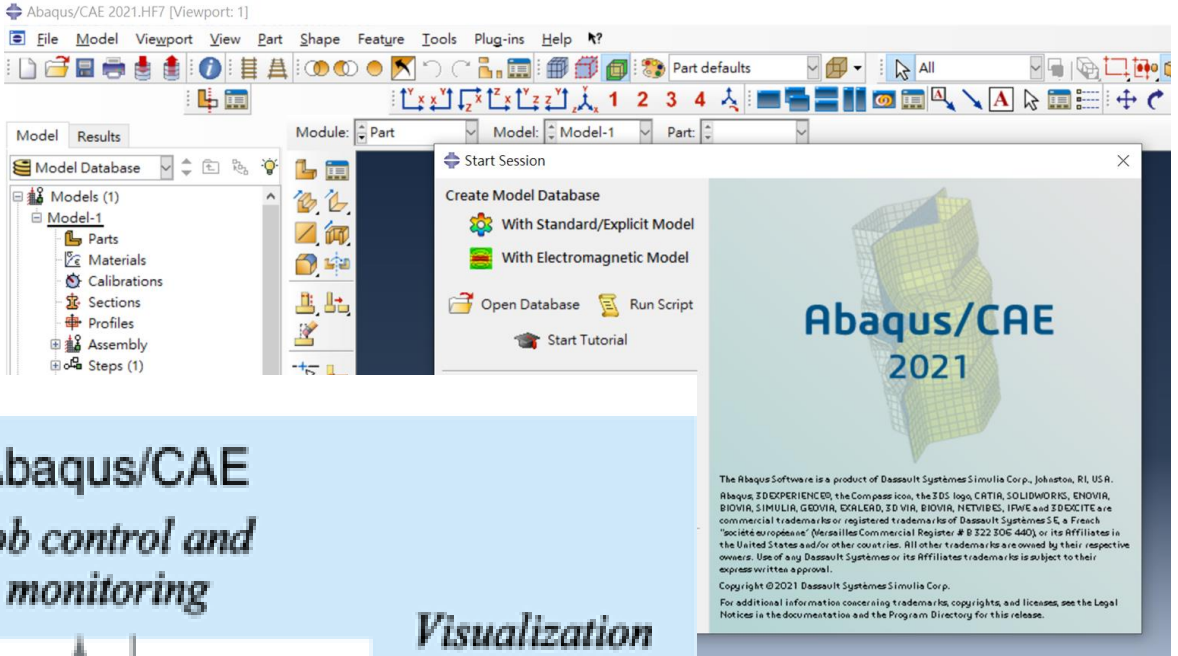
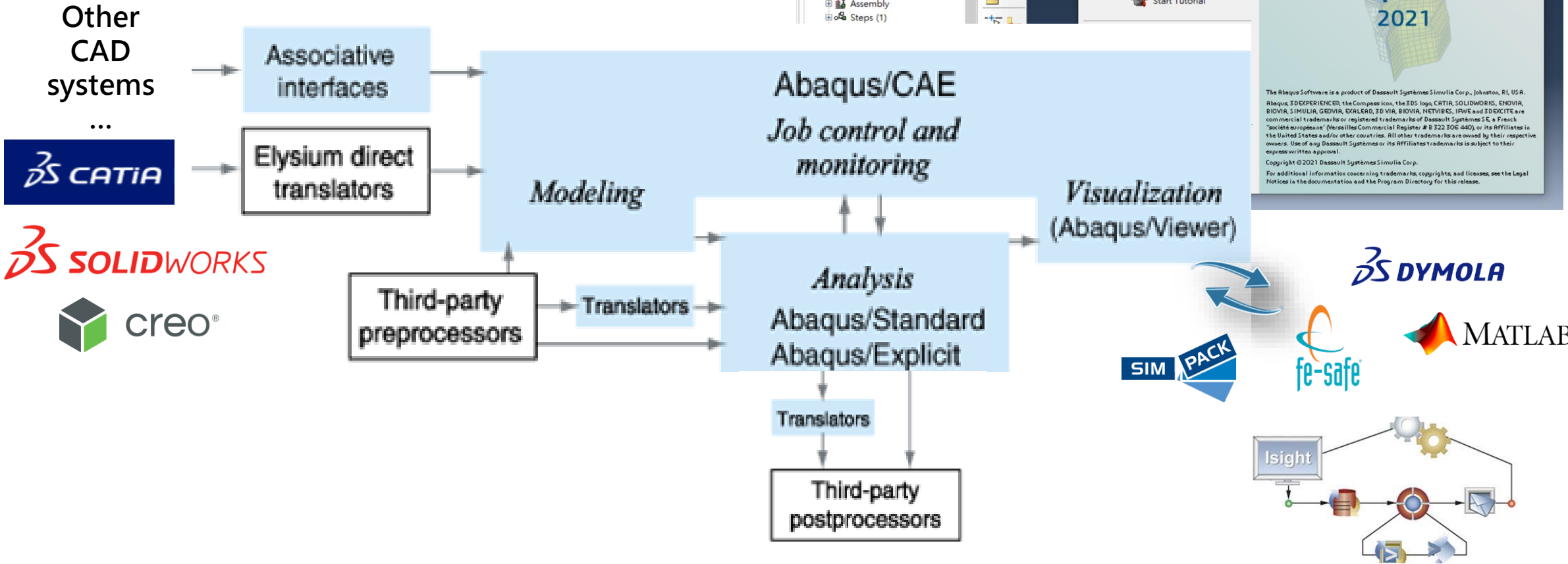
二次開發

根據客戶需求提供客製化
程式開發

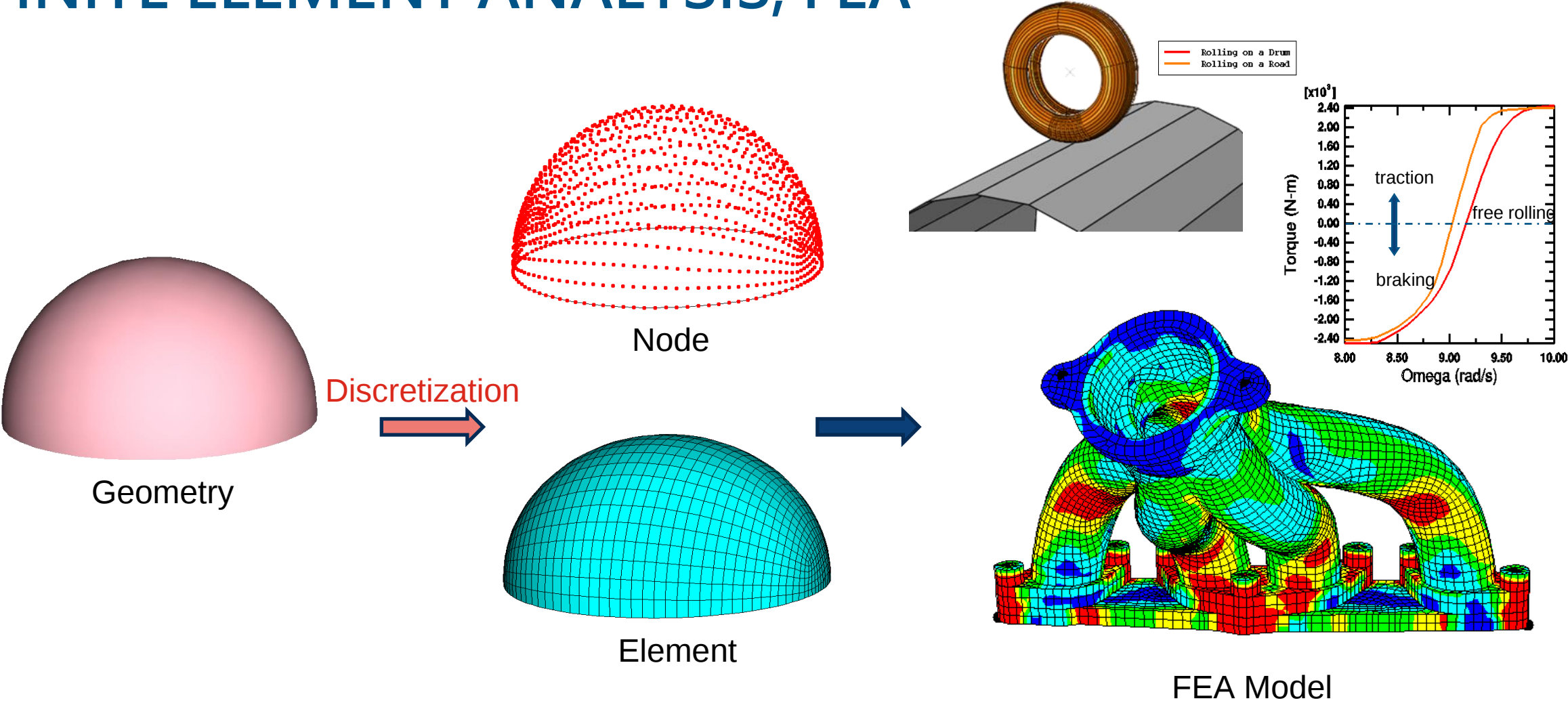
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ABAQUS UNIFIED FEA



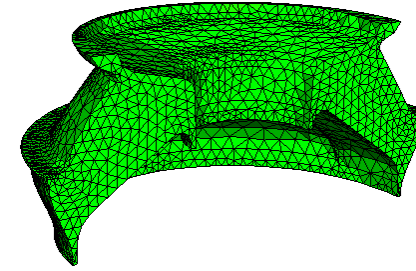
FINITE ELEMENT ANALYSIS, FEA



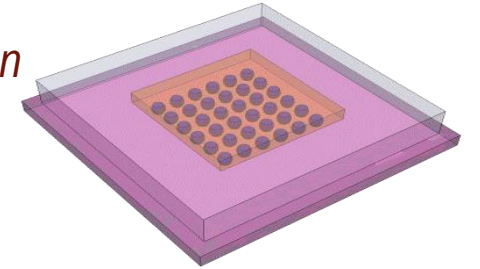
Abaqus Analysis Products

Abaqus/Standard

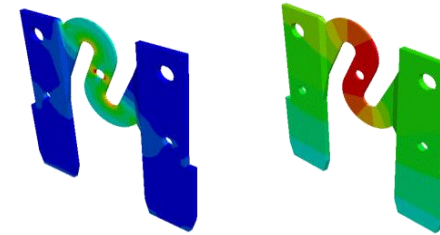
- ▶ Based on implicit solution techniques
 - ▷ Intended for static and structural dynamic events
 - ▷ Linear or nonlinear behavior
- ▶ Wide range of multiphysics procedures:
 - ▷ Static stress/displacement
 - ▷ Dynamic stress/displacement
 - ▷ Mode-based linear dynamics
 - ▷ Heat transfer
 - ▷ Coupled temperature/displacement
 - ▷ Coupled thermal/electrical
 - ▷ Acoustics
 - ▷ Pore fluid flow
 - ▷ More . . .



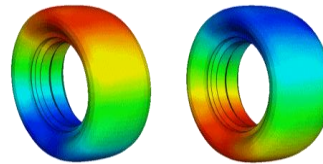
Rubberdome deformation



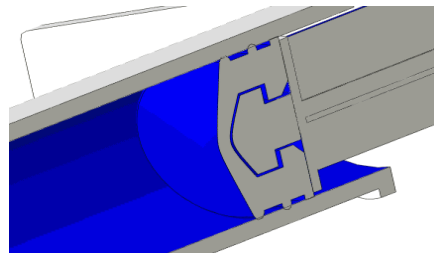
Solder joint fatigue



Electrical fuse heating



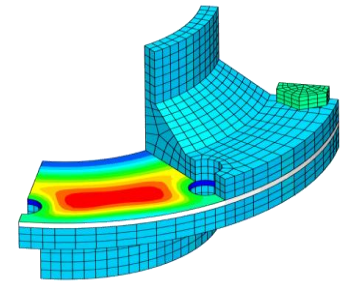
Tire noise



Sealing Analysis



Bicycle frame stress

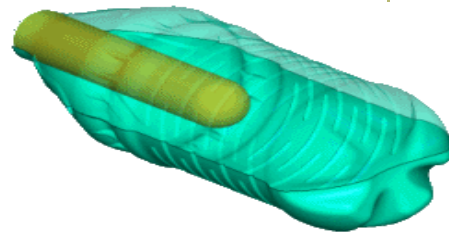


Gasket sealing

Abaqus Analysis Products

Abaqus/Explicit

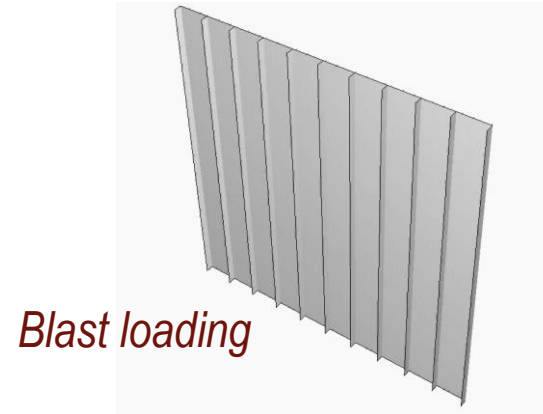
- ▶ Based on explicit time integration
 - ▷ Intended for high-speed transient dynamic events
 - ▷ Also suited for highly nonlinear quasi-static events
- ▶ Range of solution procedures:
 - ▷ Stress/displacement
 - ▷ Thermal stress
 - ▷ Acoustic-structural coupling
 - ▷ Coupled Eulerian-Lagrangian



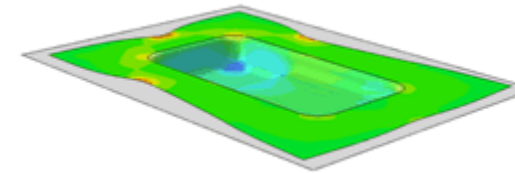
Blow molding



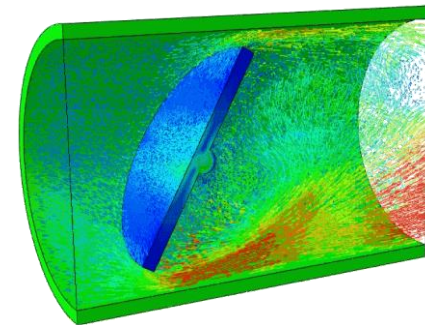
Bottle drop



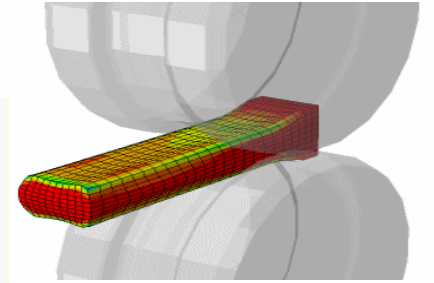
Blast loading



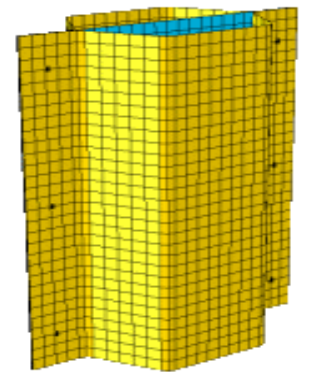
Deep drawing



Energy absorption



Metal rolling

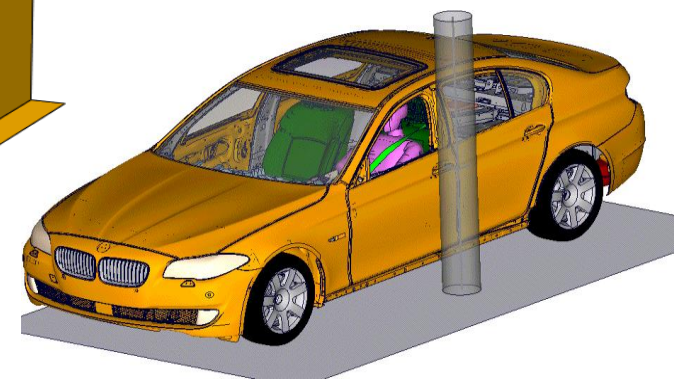
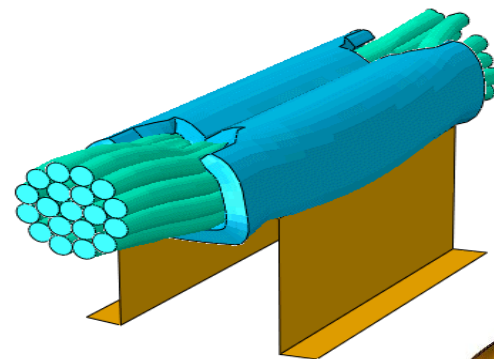
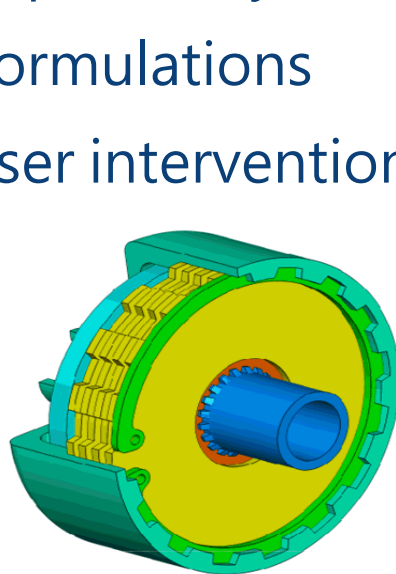
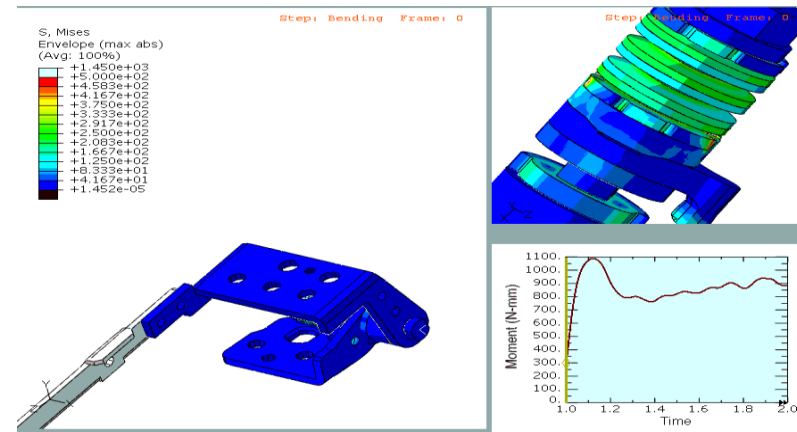


Energy absorption

Abaqus features

Easy-to-use general contact

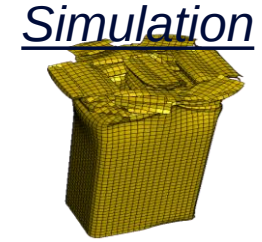
- ▶ Concise whole-model contact definition
- ▶ Accounts for large relative motion & friction
- ▶ Not based on initial proximity
- ▶ Robust numerical formulations
- ▶ Minimal need for user intervention



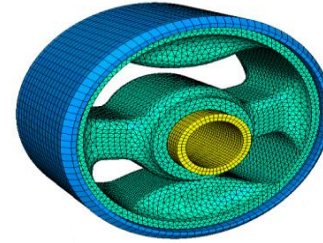
Abaqus features

Extensive selection of materials

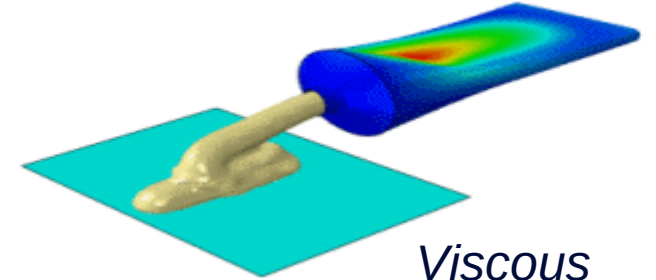
- ▶ Metals, rubbers, and composites
 - ▷ Linear/nonlinear elasticity and plasticity
 - ▷ Isotropic or anisotropic
 - ▷ Rate and temperature dependence
- ▶ Additional materials include:
 - ▷ Soils and rocks
 - ▷ Concrete and ceramics
 - ▷ Pastes and polymers
- ▶ Damage & failure modeling



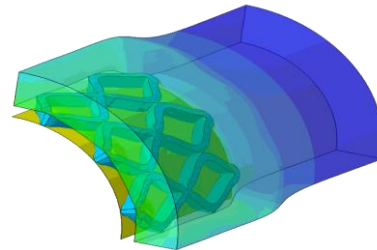
Sheet failure



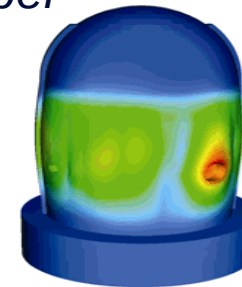
Viscoelastic rubber



Viscous paste



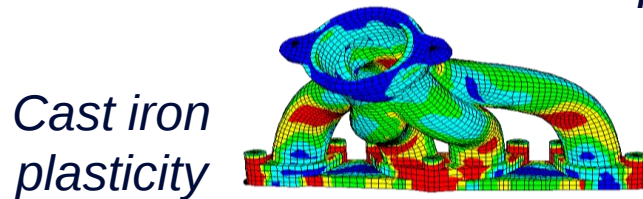
Human tissue



Reinforced concrete



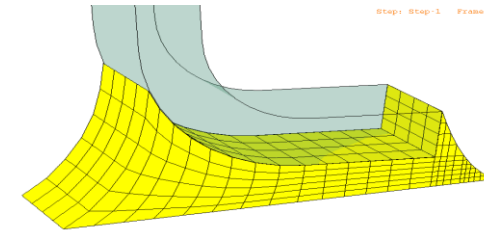
Soil & rock



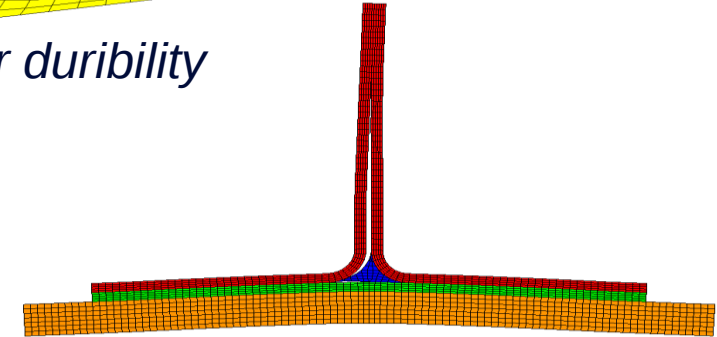
Abaqus features

Fracture & crack propagation

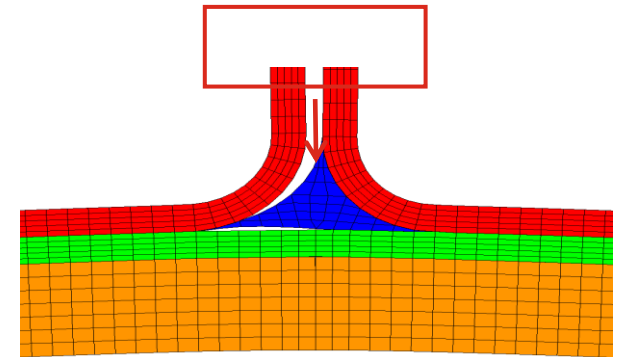
- ▶ Mesh-independent crack modeling with XFEM
- ▶ Virtual Crack Closure Technique (VCCT)
- ▶ Cohesive elements
- ▶ Low cycle fatigue



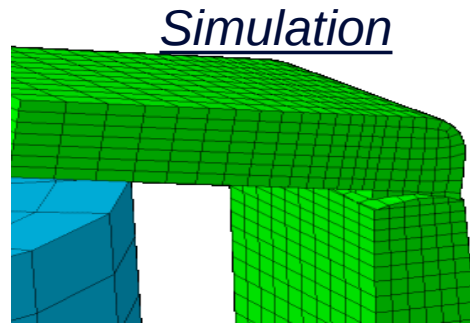
Solder durability



Bone fracture in sports injury

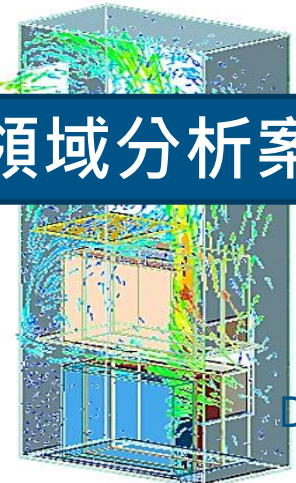


Modeling debonding in a T-joint w/ VCCT



電子領域分析案例

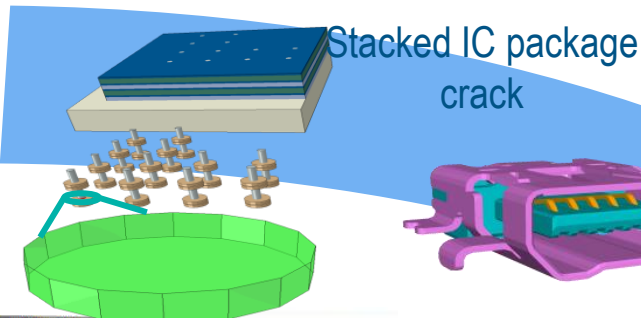
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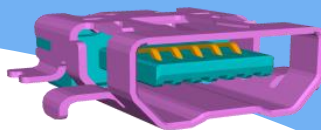
Disk rack thermal and flow analysis



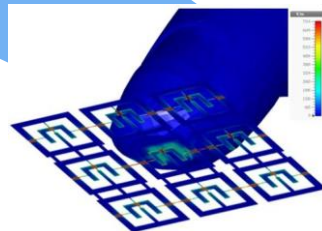
Wafer lattice mismatch deformation



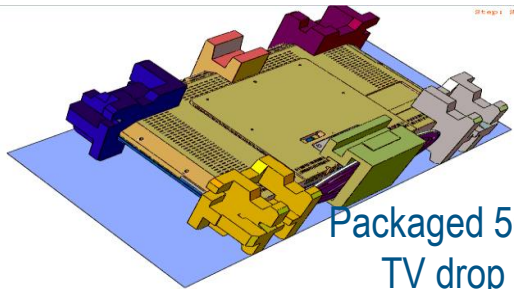
Stacked IC package crack



Electric connector insert/withdraw



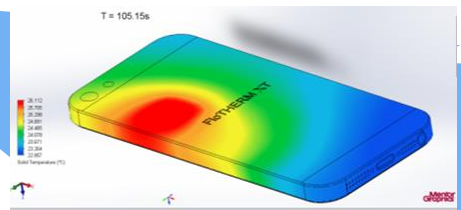
Touch sensor



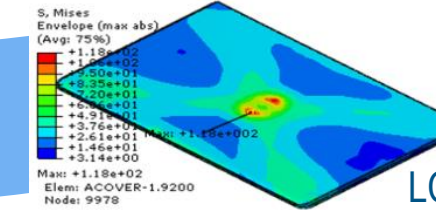
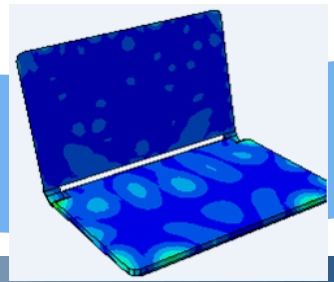
Packaged 50" LCD TV drop test



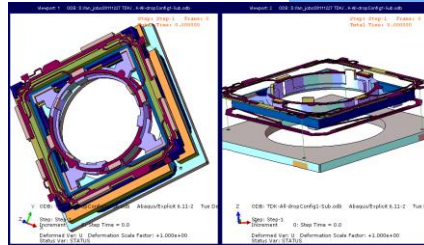
Cell phone drop test



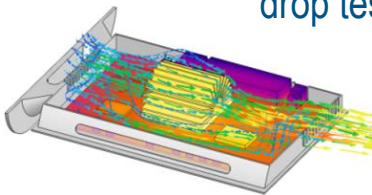
Laptop frequency response



LCD module pressure intensity

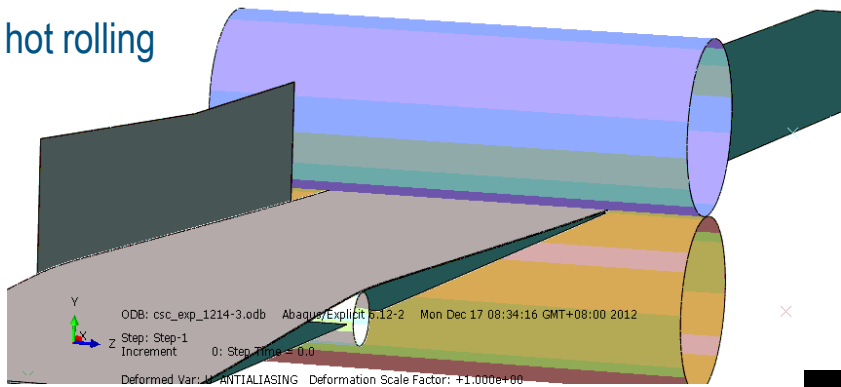


Smartphone camera drop test

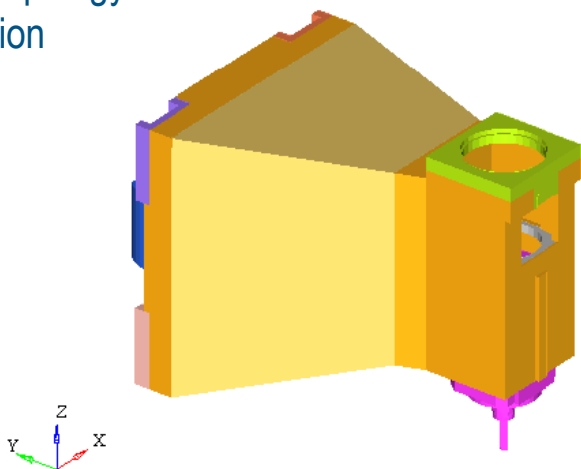


製造領域分析案例

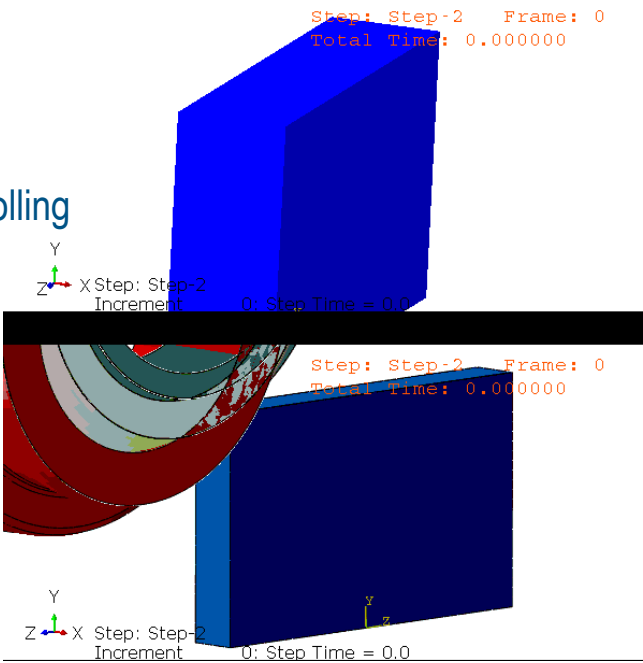
Steel sheet hot rolling



Industrial tool topology optimization



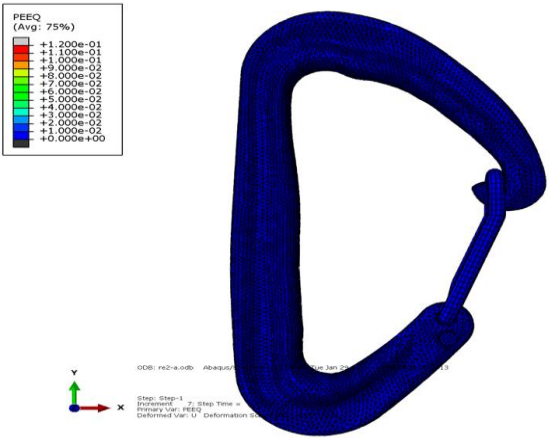
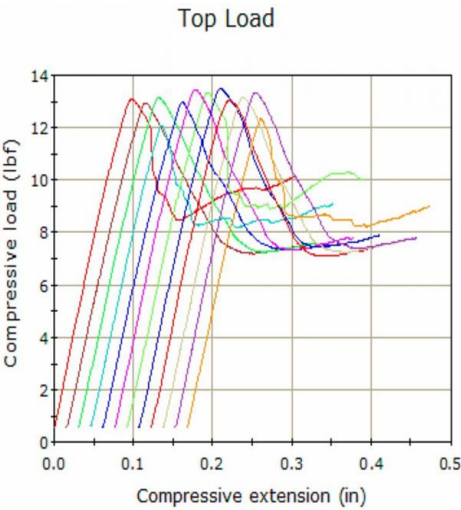
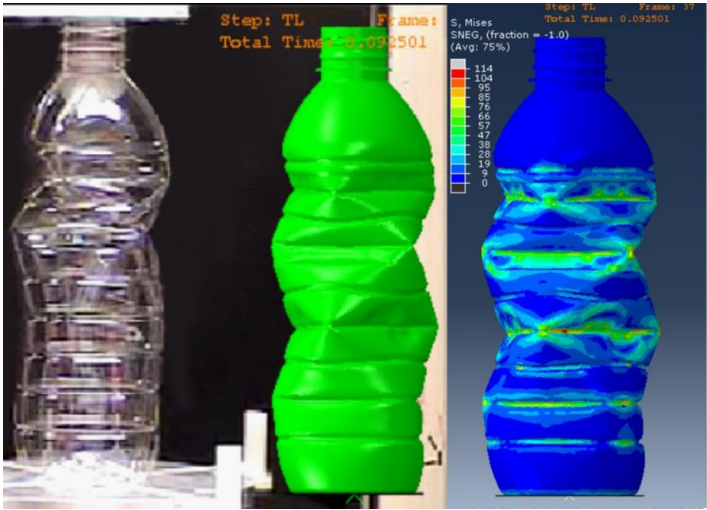
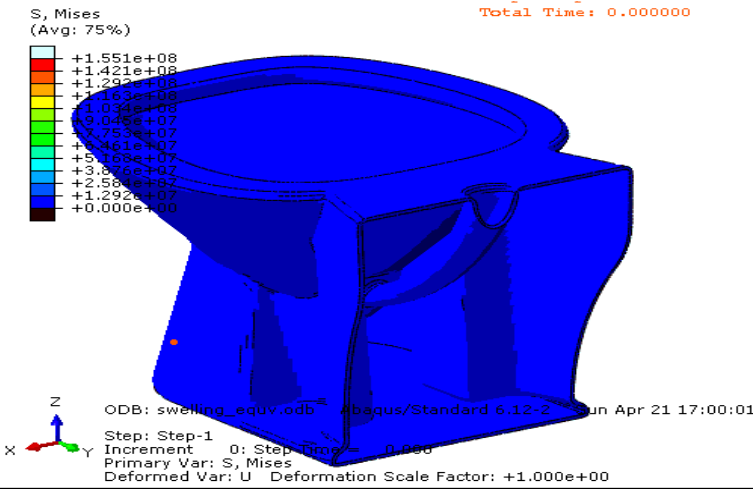
I-beam cold rolling



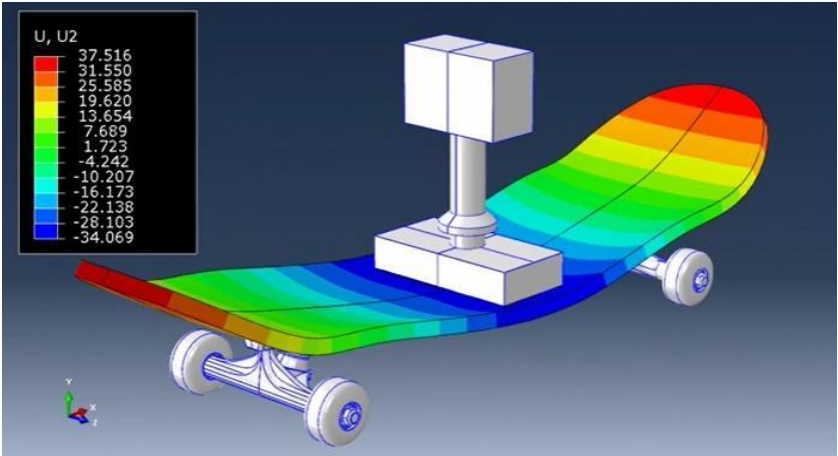
Wheel spin rolling

消費產品領域分析案例

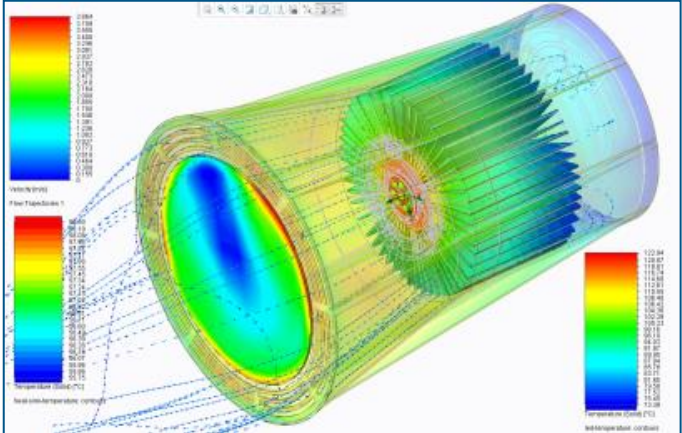
Ceramic toilet sintering study



Hook shape optimization



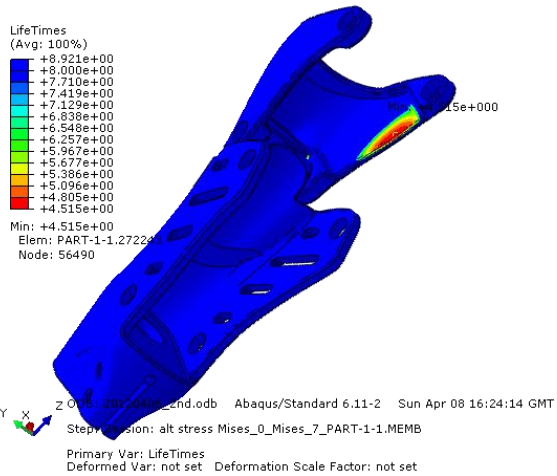
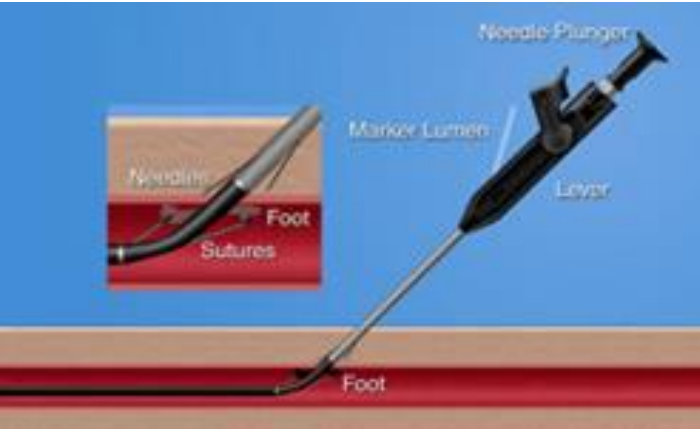
生醫領域分析案例



Stent deployment device

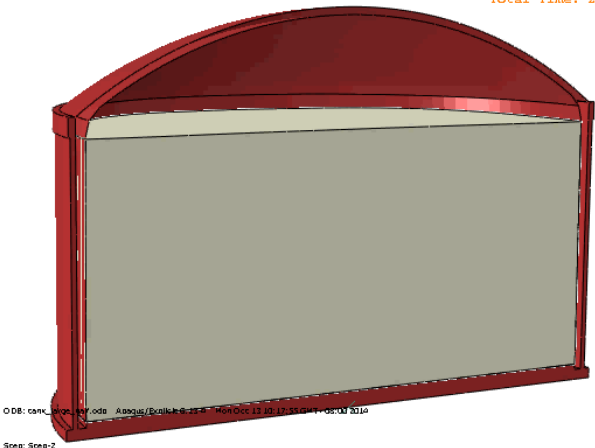


Prostheses fatigue analysis

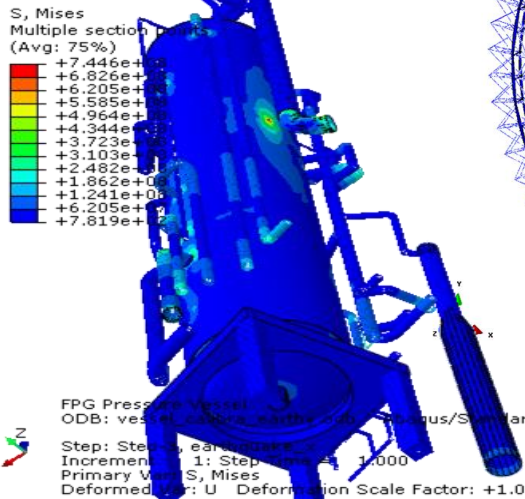


建築與能源領域分析案例

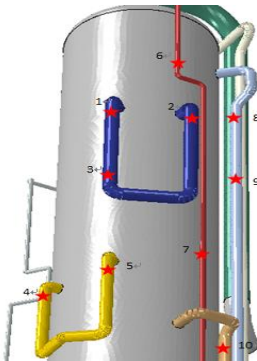
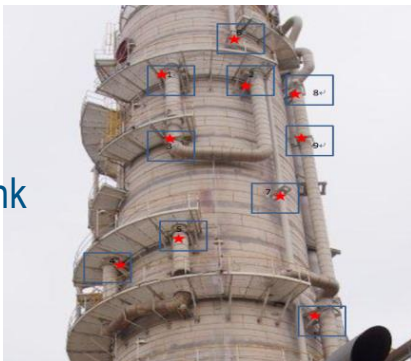
LNG tank sloshing analysis



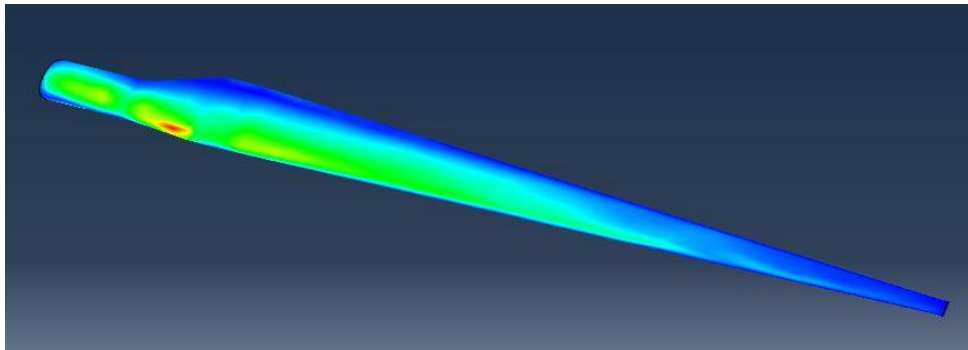
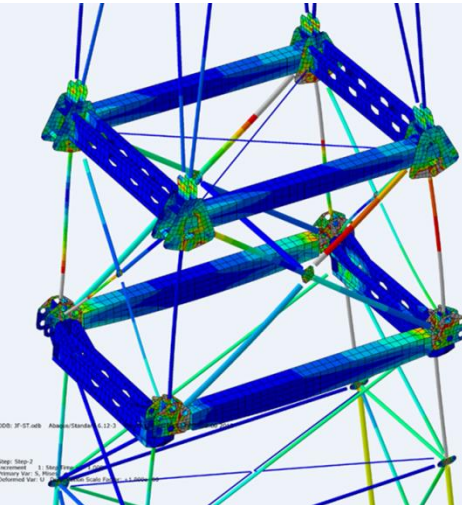
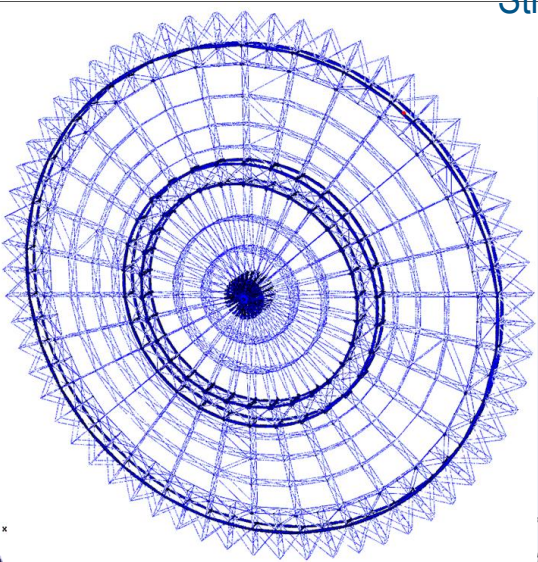
Step: Step-2 Frame: 0
Total Time: 2.000000



Fatigue analysis of a tank



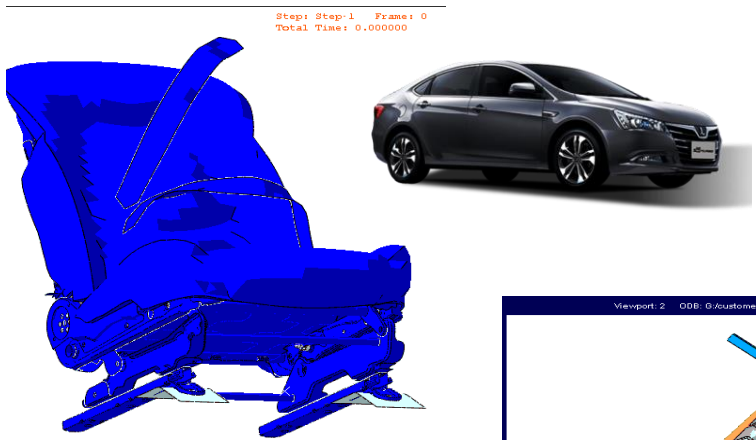
Structural analysis of the 4th largest Ferris wheel in the world.



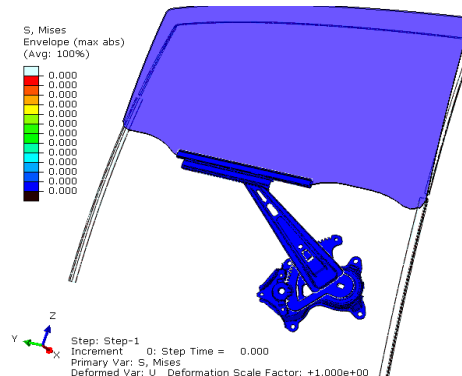
FSI analysis of a composite wind turbine blade

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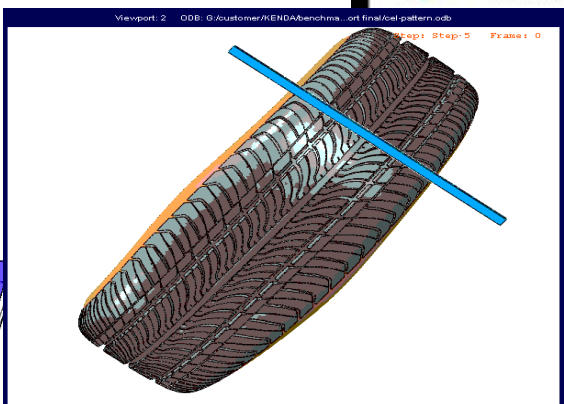
運輸領域分析案例



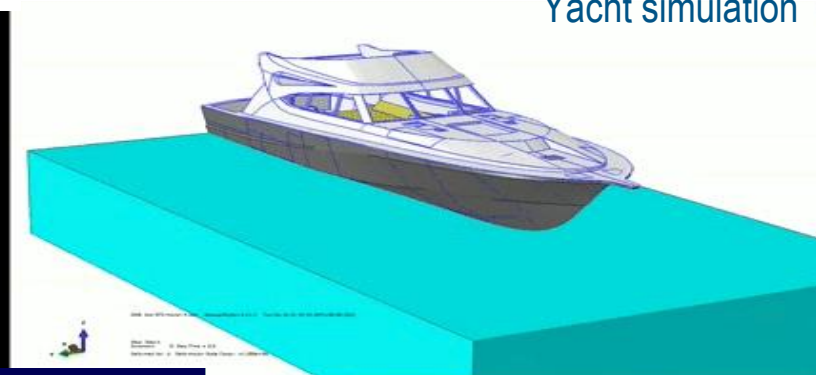
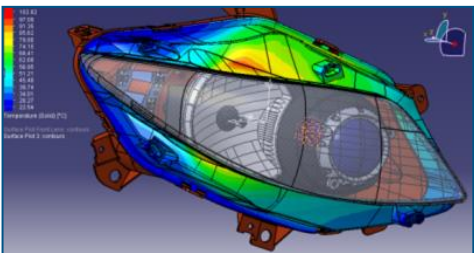
Car seat front impact



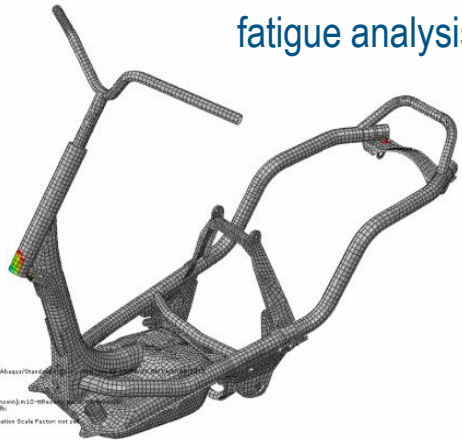
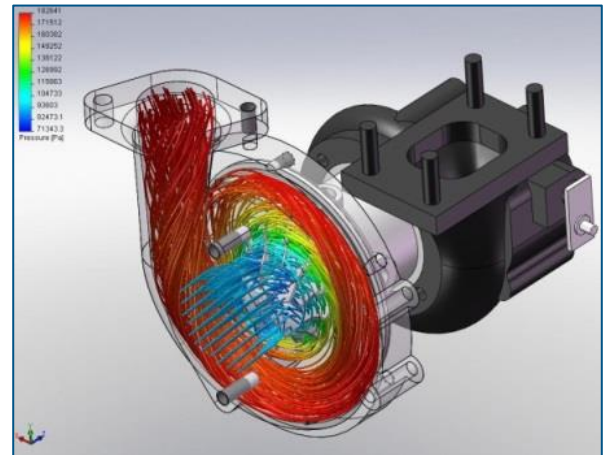
Car window action



Tire aquaplaning



Yacht simulation



Motorbike frame fatigue analysis

Fast App: Luxury Yacht Design Takes a New Tack Simutech Solution Corp. uses realistic simulation to craft a better boat

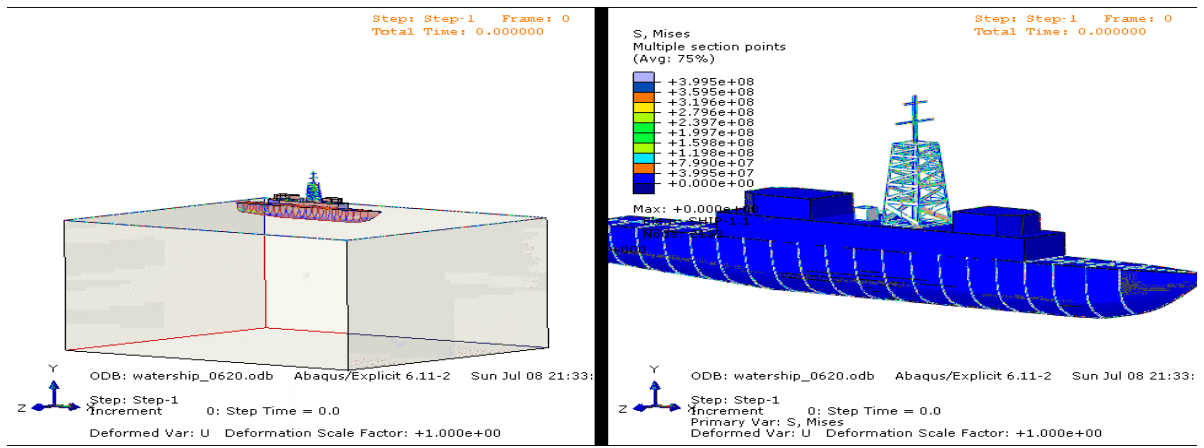
by DE Editors | Published March 10, 2014

While it's widely recognized that HTC smartphones, Garmin GPS devices and a sweeping array of big-brand laptops are staples of the Made in Taiwan (MIT) effort, it's a lesser-known fact that luxury yachts (those measuring 80 to 120 ft.) are a booming business in Taiwan. The country is now sailing port-side with market leaders like the United States, Italy, The Netherlands and Germany.

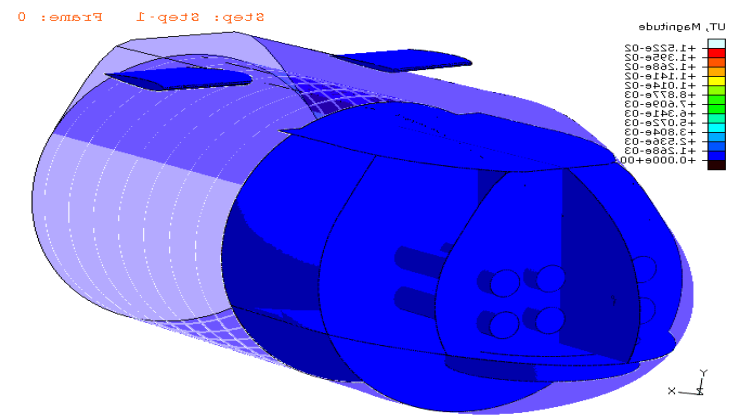
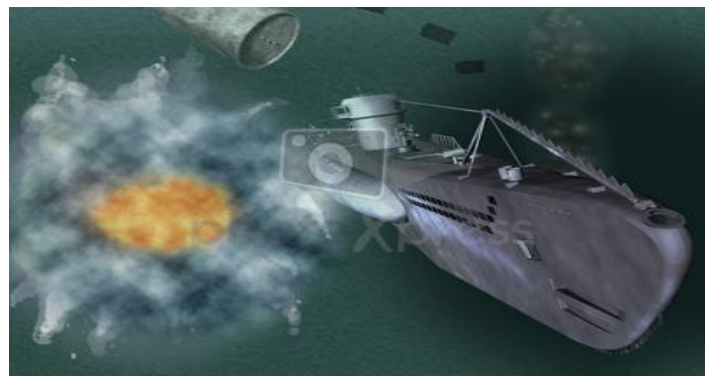


軍事領域分析案例

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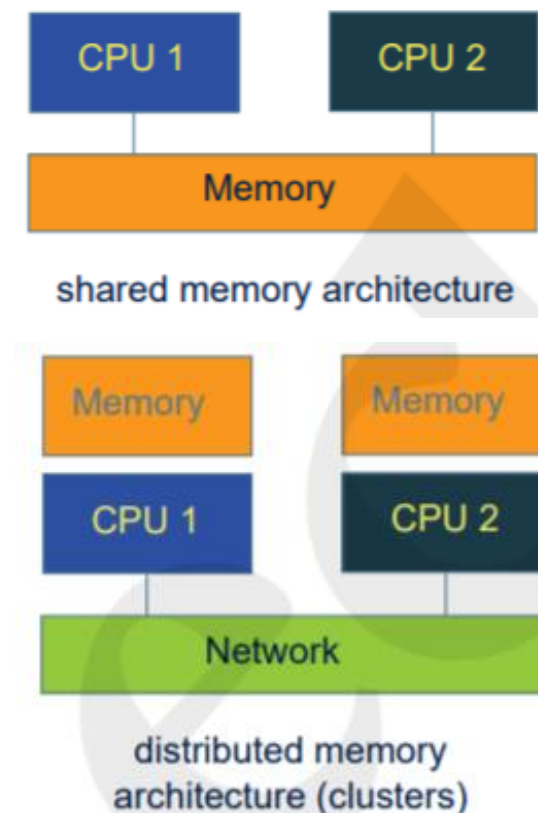
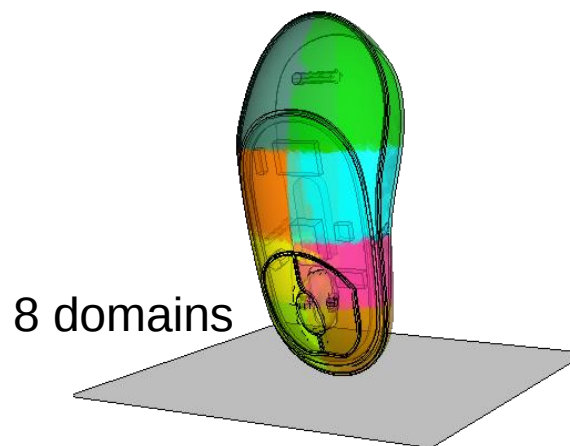
Underwater explosions

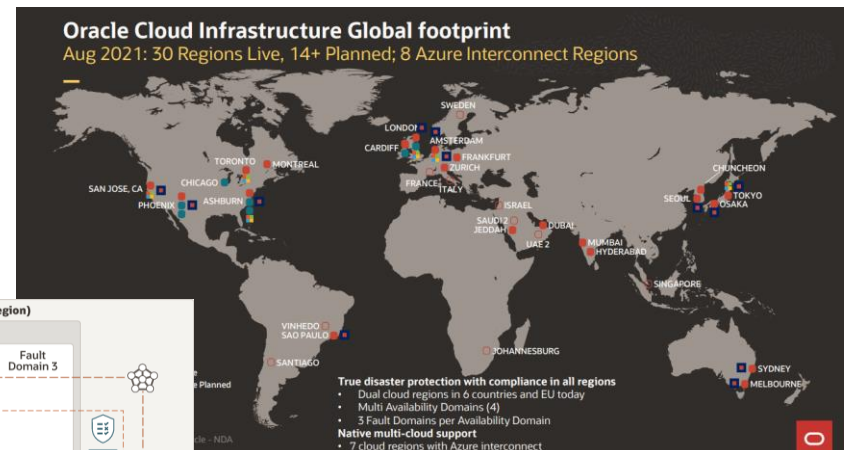


領導水準級求解效能

- ▶ Parallel execution in SMP & DMP, even HMP architecture.
- ▶ GPU acceleration using multiple GPUs.
- ▶ Key solver technologies:
 - ▷ Direct sparse solver
 - ▷ Iterative solver
 - ▷ AMS eigensolver
 - ▷ Domain decomposition explicit solver

Domain decomposition of a car sinking

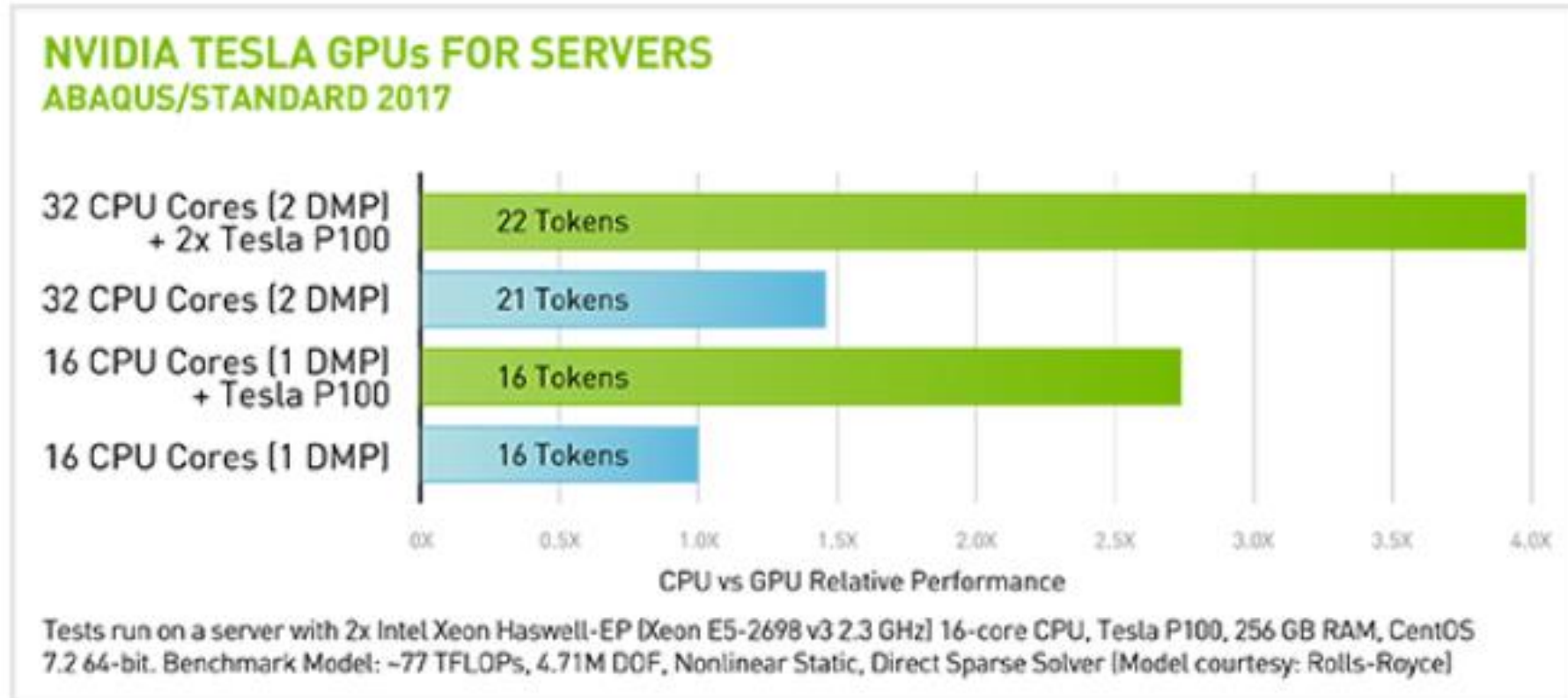




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GPU Accelerated Performance

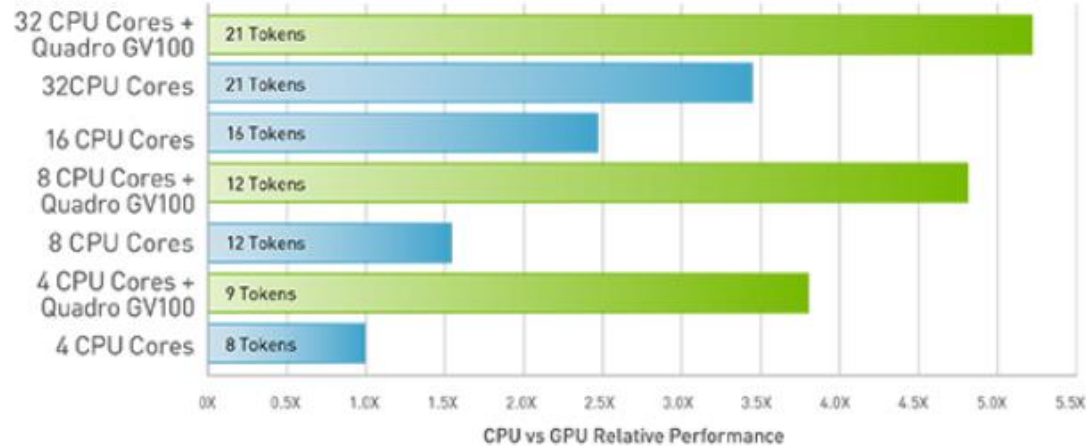
TESLA P100



GPU Accelerated Performance

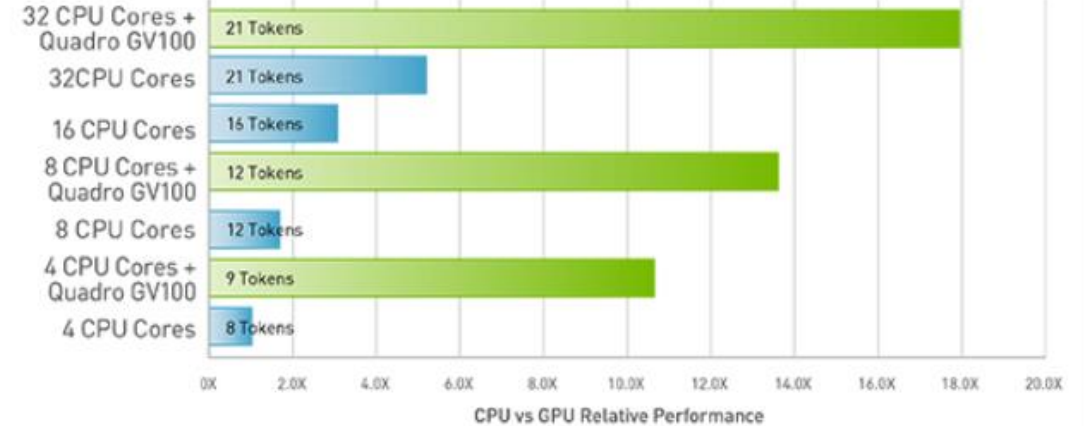
TESLA V100

NVIDIA QUADRO GPUs FOR WORKSTATIONS Abaqus/Standard 2018 Automotive Powertrain model



Tests run on a workstation with 2x Intel Xeon Broadwell-EP (Xeon E5-2699 v4 Base- 2.2 GHz Turbo- 3.6 GHz) 22-core CPU, HT Off, Quadro GV100, Driver - 390.40, TCC, 256 GB RAM, Cent OS 7.2.1511 64-bit
Benchmark Model: ~75 TFLOPs, 9.4M DOF, Nonlinear Static, Direct Sparse Solver (Model courtesy: Automotive OEM)

NVIDIA QUADRO GPUs FOR WORKSTATIONS Abaqus/Standard 2018 Elastomeric Bearing model



Tests run on a workstation with 2x Intel Xeon Broadwell-EP (Xeon E5-2699 v4 Base- 2.2 GHz Turbo- 3.6 GHz) 22-core CPU, HT Off, Quadro GV100, Driver - 390.40, TCC, 256 GB RAM, Cent OS 7.2.1511 64-bit | Benchmark Model: ~450-550 TFLOPs, 5.9M DOF, Highly Nonlinear Static, Axisymmetric model with non-axisymmetric loading and twist, Direct Sparse Solver (Model courtesy: SIMULIA)

Oracle Cloud Infrastructure

HPC Shape

Shape	OCPU	GPU Memory (GB)	CPU Memory (GB)	Local Disk (TB)	Max Network Bandwidth	Max VNICs Total: Linux
BM.Optimized3.36 (Intel)	36	-	512	3.84 TB NVMe SSD (1 drive)	2 X 50 Gbps 1 X 100 Gbps RDMA	256

- Analysis types:
Domain Decomposition Explicit solver

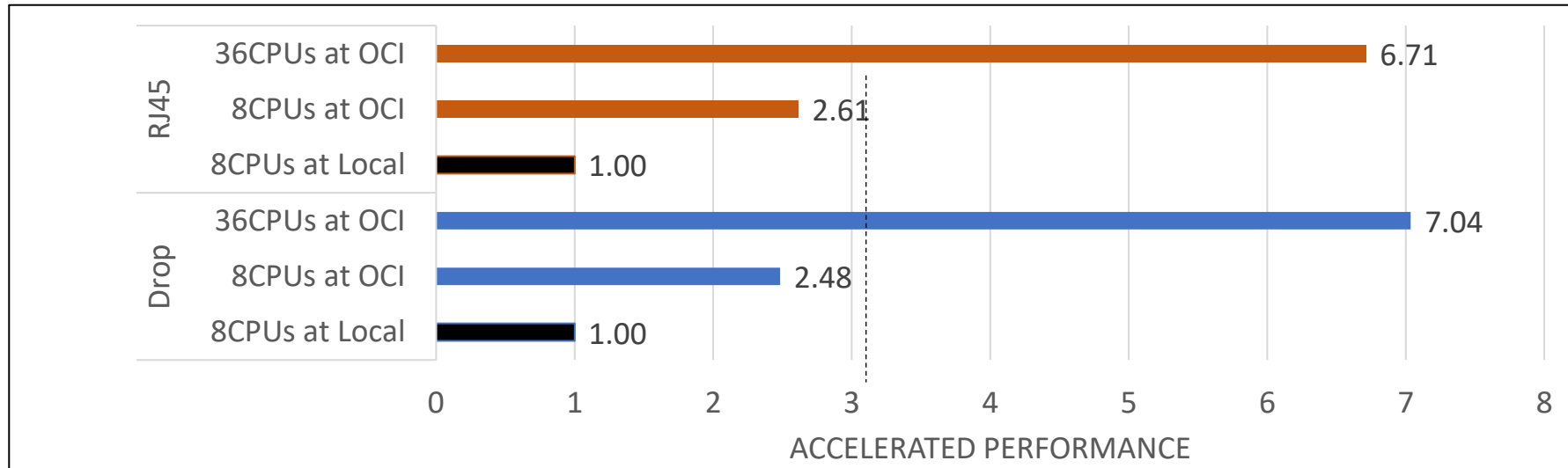
- For the consideration of the cost of tokens running a job, the combination of CPUs in solver settings are:

- 8 CPUs at Local (Simutech workstation)
- 8 CPUs at OCI
- 36 CPUs at OCI

	Computer system	Operating system	Processor	Core per socket
Simutech workstation	Windows 10 Pro	64-bit x64	Intel® Xeon® CPU E5-2697 v2 @2.7GHz	24

Abaqus/Explicit in HPC Shape

- ▶ Accelerated performances ratio based on 8 CPUs at Local (Simutech workstation),



ACCELERATED PERFORMANCE = Simulation time ratio to 8 CPUs at Simutech

- ▶ Significant accelerated performance.

	Drop (hr.)	RJ45 (hr.)
Local	13.37	4.44
OCI	5.37	1.7

Hello



歡迎聯絡我們

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