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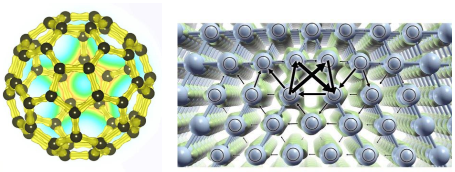
High Performance Computing @MUL

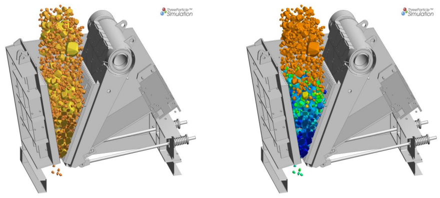
The new High Performance Computing Cluster empowers Research Output

Applications:



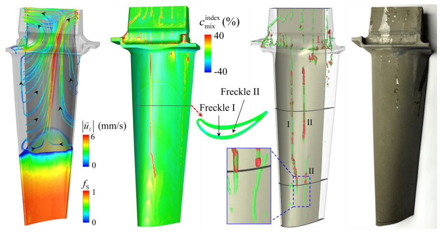
courtesy of David Holec, Priv.-Doz. Mgr. PhD and Lorenz Romaner, Univ.-Prof. Dipl.-Ing. Dr.techn.
Department of Materials Science

Materials can be simulated on the atomic scale to understand their electronic structure and geometry which is useful for designing materials properties.



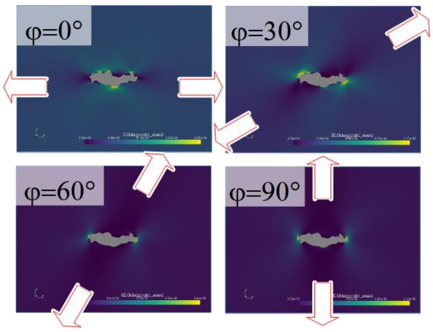
courtesy of Eric Fimbinger, Dipl.-Ing. Dr.mont.
Chair of Mineral Processing

This example shows a DEM simulation of particles being crushed into smaller sizes within a jaw crusher.
Besides breakable particles, the setup also incorporates multiphysics, accounting for the multibody kinematics/dynamics of moving parts and wear effects.



courtesy of assoc. Prof. habil. Dr.-Ing. Menghuai WU
Lehrstuhl für Modellierung und Simulation metallurgischer Prozesse

Superalloy single-crystal turbine blades are key components in aero-engines and industrial gas turbines. A volume-average multiphase solidification model was used to ***digital-twin*** the production process of directional solidification, targeting at the minimization of the possible casting defects (e.g. freckles).



courtesy of Michael Stoschka, assoz.Prof. Dipl.-Ing. Dr.mont.
Lehrstuhl für Allgemeinen Maschinenbau

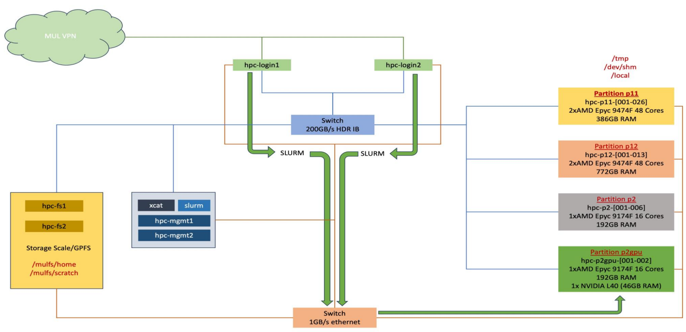
The High Performance Computing @MUL Cluster was successfully invoked to compute the fatigue life of metallic materials exhibiting macroscopic imperfections. The applied design method bases on notch fatigue assessment of each point of the planar defect contour and was developed within the CD-Laboratory for Manufacturing Process based Component Design. Key tasks are the evaluation of the point-based defect curvature in pre-processing and the accumulated strain energy for each control volume in post-processing. The methodology bases on scripted Tcl-Altair® and Python3 extensions, invoking multiprocessing for dedicated modules. Comparing the available node configurations, the partition P11 with 24cores is well suited for this scientific task.

Hardware – Specs:

- 3.872 CPU Cores
- 21.5TB RAM
- 51.200 CUDA Cores
- 500 TB Storage (NVMe and NL-SAS)
- 200 GB Infiniband Network
- 47 powerful compute nodes

Partitons	Nodes	CPU	Cores	Memory
P11	26	2x AMD 9474F @3.6GHz	96	384 GB
P12	13	2x AMD 9474F @3.6GHz	96	768 GB
P2	6	1x AMD 9174F @4.1GHz	32	192 GB
P2gpu	2	1x AMD 9174F @4.1GHz	32	192 GB

Partition Overview



Cluster Topology Diagram

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Application Areas:

- Computational Fluid Dynamics
- Multiphysics Simulations
- CAE and Advanced DEM
- Atomistic Simulations
- AI and Deep Learning