Mechatronics, Automation and Design

The Mechatronics, Automation and Design Research group (MAD)

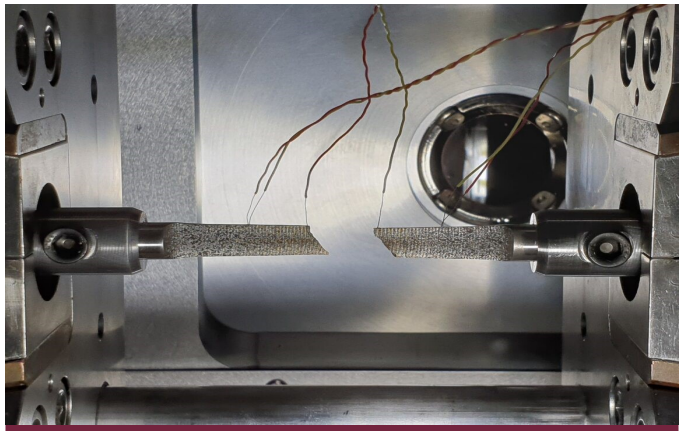
The MAD group focusses on two research themes: digital twins for complex systems and human-system integration in operational environments.

The research on digital twins has a strong focus on the design of software systems that enable the effective integration of data, models and software services.

The human-systems integration work aims to develop technology that makes people safer and more effective, by supporting their decisions, guiding their actions and performing selected actions on their behalf.

The research is applied to different domains, including manufacturing, healthcare, mining and agriculture. The research group also has access to excellent facilities in the Automation Laboratory and Smart Integrated Mining Laboratory.

Gear up for the future!



Solid Mechanics

The study and investigation of a solid material which undergoes deformation due to externally applied loads. Various techniques are utilised to understand the material's response, for reasons such as:

- **Design and analysis of a structure.**
- **Select an appropriate material and optimise a design for structural integrity.**
- **Predict the conditions under which the material and/or structure will fail.**

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2024

Student guide

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Biomedical Engineering

Solving and improving healthcare

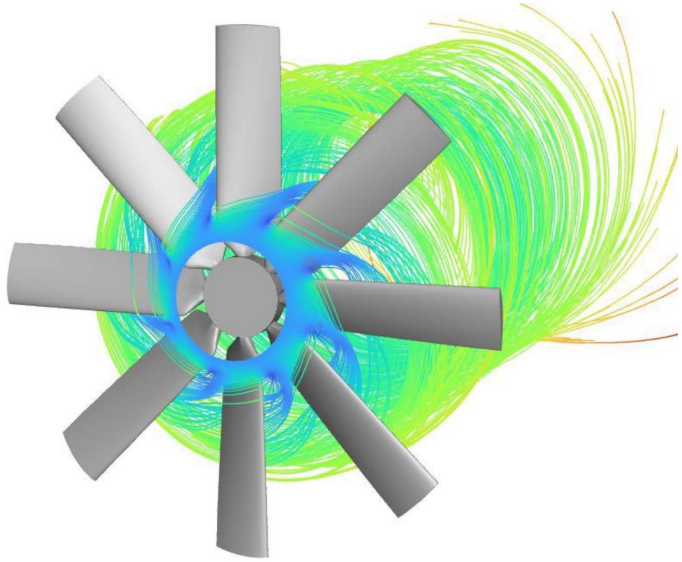
The use of expertise in physics, mathematics and all disciplines of engineering, biology and medicine to make the world a healthier place.

Together with Electrical and Electronic and Industrial Engineering we work in close collaboration with the Faculty of Health Sciences.

Computational Engineering

Machine Leaning & Optimisation for Structural, Thermo-fluids and Granular Flow Analysis

- Expert training in Finite Element Methods (FEM), Computational Fluid Dynamics (CFD) and Discrete Element Methods (DEM)
- Well equipped labs for validation and data collection
- DEM for earth moving, food production and agriculture
- CFD for turbomachinery, combustion and renewable energy technology applications
- FEM for structural analysis, from biomedical to industrial applications.



Energy and the Environment

South Africa is home to some of the sunniest and clearest skies in the world.

By using Concentrated Solar Power (CSP) plants, we can generate electricity for the power grid, produce hydrogen for a hydrogen economy, and provide heat to various industries. Harnessing solar energy not only has environmental benefits but also creates job opportunities and promotes economic growth.

The Solar Thermal Energy Research Group conducts research projects related to CSP and trains students to pursue a career in this field.

https:www.mecheng.sun.ac.za