

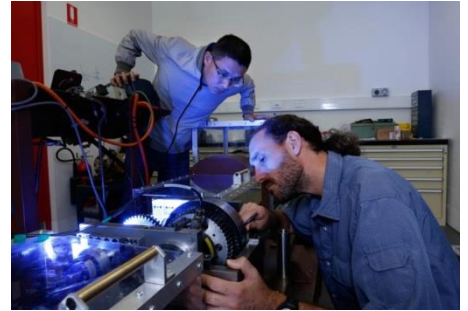
Tribology and Machine Condition Monitoring

What we do

Our group brings together two main areas of expertise – wear debris and vibration analyses – for applications largely in machine condition monitoring. We are a global leader in the field, with close research partners in Europe, Asia and the USA.

In wear debris analysis, we examine wear and fracture mechanisms using advanced techniques such as 3D imaging and quantitative analysis methods at a micro- and nanometre scale.

In vibration analysis, we develop and apply advanced signal processing techniques, and develop simulation models, for the diagnostics and prognostics of rotating machinery.



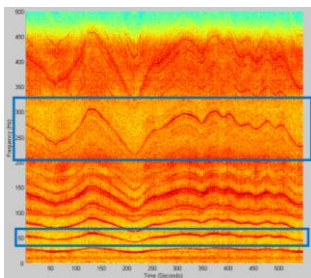
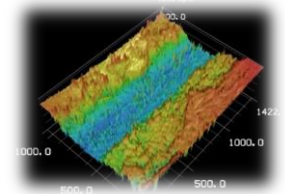
Key areas of expertise

1 Machine health monitoring and prediction

- Integrating wear and vibration analyses for machine condition monitoring and remaining life time prediction
- Estimation of gear surface roughness and remaining life using vibration, acoustic emissions and wear analysis techniques

2 Wear debris and root-cause analysis

- Wear of engineering materials and biomaterials
- Friction and wear of rolling-sliding contact



3 Monitoring machines under variable speed and load

- Development of novel techniques to determine instantaneous angular speed of variable speed machines using the vibration signal alone
- Gear and bearing diagnostics under variable speed and load
- Development of advanced signal processing techniques
- Simulation models
- Separation of signals from different sources
- Planetary gearbox monitoring

Facilities

- Two gearbox test rigs (planetary & parallel) and one bearing rig for fault diagnosis and prognostics
- Engine test cell for diagnosis of bearing knock and piston slap
- Tribometer and rolling/sliding test rig for wear testing and analysis
- Wear particle analysis facilities (inline & offline particle analysers, filtergram and ferrography) for machine condition monitoring
- Extensive vibration instrumentation (including acoustic emissions) and advanced signal processing packages developed in-house

