

# EUREKA

# UK-Sweden call

*Project ideas*

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Includes the following technology areas (our focus areas highlighted in bold):

- Structures
- **Materials**
- Systems
- Propulsion
- **Manufacturing processes**
- Through Life Engineering Services (TES)

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## **Main project idea:**

Mechanistic understanding of thermo-mechanical fatigue (TMF) crack initiation in nickel-base superalloys for turbine disc applications

## **Partners:**

Rolls-Royce plc, UK: validation

Swansea University, UK: testing

Linköping University, Sweden: characterisation/analysis

Dirlik Controls (SME, UK): software development

**Budget:** about £1M

**Duration:** 36 months

**TRL:** 5-6

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## **Other project ideas:**

- Effects of defects on mechanical properties at high temperatures, including probabilistic lifing,
- Effect of manufacturing and its defects on mechanical properties,
- Development of functional graded materials, functionally graded discs with variable thickness, effect of density of thickness of the disc,
- Effect of different heat treatments on different parts of turbine discs, e.g. effect of cooling rates on gamma prime, compare more dense grain sizes, etc.
- Phase angle effects on fatigue crack initiation and growth,

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## **Other project ideas:**

- TMF crack growth facility development towards a standard (CoP in progress now),
- IP/OOP TMF in CMSX-4,
- Coated CMSX-4,
- TMF crack growth in Ti6246,
- Multiaxial/environment/thermal gradients and their effects on fatigue life,
- Modelling and prediction of TMF, both initiation and propagation,
- Phase and precipitate predictions,
- Hybrid metal/ceramic material for enhanced surface properties in Ti-alloys and as alternative to hard chrome,

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## **Other project ideas:**

- Development of design strategies (e.g. TO) taking into account additive manufactured (AM) specific properties such as anisotropy and inhomogeneity in both strength and elasticity as well as manufacturing constraints (e.g. overhang),
- Development of integrated design tools for design automation and optimisation with AM applications,
- Methods for surface improvement and their effect on mechanical properties of AM materials, effect of defects,
- Effect of manufacturing on mechanical properties in AM materials,

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## **Other project ideas:**

- Novel AM techniques to join composite to metal materials (contact [Mohamed.Loukil@swerea.se](mailto:Mohamed.Loukil@swerea.se))
- Damage tolerance, lattice design and performance prediction in AM materials,
- Relating different as-built surface textures (different build angles) to fatigue performance,
- The use of compliant mechanisms in aerospace, etc.

# Contact information

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