

PROJECT

## PANTHER

# Performant Alternative to Nickel-based alloys for Turbine of Helicopter Engine Replacement

**Funding:** European (Horizon 2020)

**Duration:** Jan 2019 - Jan 2021

**Status:** Complete

**Total project cost:** €549,513

**EU contribution:** €549,513



**Call for proposal:** H2020-CS2-CFP07-2017-02

[CORDIS RCN : 218024](#)

### Objectives:

The work presented in this proposal will help the topic leader to evaluate the ability of an innovating TiAl material to replace nickel-based super-alloys for low-pressure turbine application. The PANTHER project will focus on the investigation of the resistance of TiAl alloy under high strain rate, high temperature and different stress triaxiality levels. A combined approach between numerical simulations and original experiments will help creating a reliable transient dynamics material model for behaviour and failure. An upstream methodology will be applied, aiming at testing the material from a microscopic scale to a structure scale.

### Methodology:

The work will begin by numerical simulation of a blade-off in order to evaluate the important parameters to take into consideration in the model. The results of this preliminary study will drive the experimental conditions for the material testing on Split Hopkinson Bar apparatus. A first couple of parameters will be fitted thanks to this first test campaign.

The study will go on with simplified impact testing (two impact configuration) with highly instrumented targets. These tests will reveal the behaviour and failure mode of the TiAl under dynamic conditions. Numerical simulations of these experiments will be performed and material model parameters will be adjusted to correlate simulation results to experimental ones. The goal of the last testing campaign (three impact configurations) is to reproduce the real events that can occur during the life operation of an engine turbine. A last batch of numerical simulation will allow to confirm the ability of the established material model to accurately predict such complex events. The call is in THIOT's core business and strategy. With the PANTHER project, THIOT is submitting an innovating proposal that will maintain the European industry at the cutting edge of the turbine design.

### Parent Programmes:

[H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport](#)

**Institute type:** Public institution

**Institute name:** European Commission

**Funding type:** Public (EU)

**Other programmes:** JTI-CS2-2017-CfP07-ENG-01-29 Characterization of the resistance of TiAl turbine blades to impact

### Lead Organisation:

**Thiot Ingenierie**

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**EU Contribution:** €549,513

**Technologies:**

Aircraft propulsion  
Superalloys for turbine blades

**Development phase:** Validation

**STRIA Roadmaps:** Vehicle design and manufacturing

**Transport mode:** Air transport

**Transport sectors:** Passenger transport, Freight transport

**Transport policies:** Other specified

**Geo-spatial type:** Other