

# Characterization by synchrotron X-ray tomography of the fatigue damage of epicyclic gear trains

## Context

### The main objective of this project:

- Provide validated criteria for the design and evaluation of more reliable epicyclic gear trains for aerospace applications.

Legend of figures (calibri, 10 pt)

### Project Flow:

- Modeling and finite element simulation (L'Université libre de Bolzano )
- Design and manufacture of samples with artificial defects and perform fatigue test (l'institut Polytechnique de Milan et University of Brescia )
- Characterization of cracks by X-ray tomography (INSA LYON)

## Method and tools

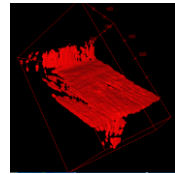
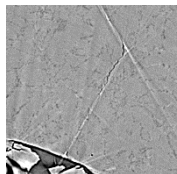
### Observation of cracks in rolling fatigue by X-ray tomography



Under load laboratory tomography  
Under load laboratory synchrotron

### Segmentation of crack images

- Method of extraction of characteristics
- Method of deep learning



## Results

### Expected result:

- Under load tomography can increase the visibility of cracks with low opening
- The effective methods for extracting complete 3D crack images
- The complete 3D crack image can be applied to the finite element model to get results consistent with the experiment.