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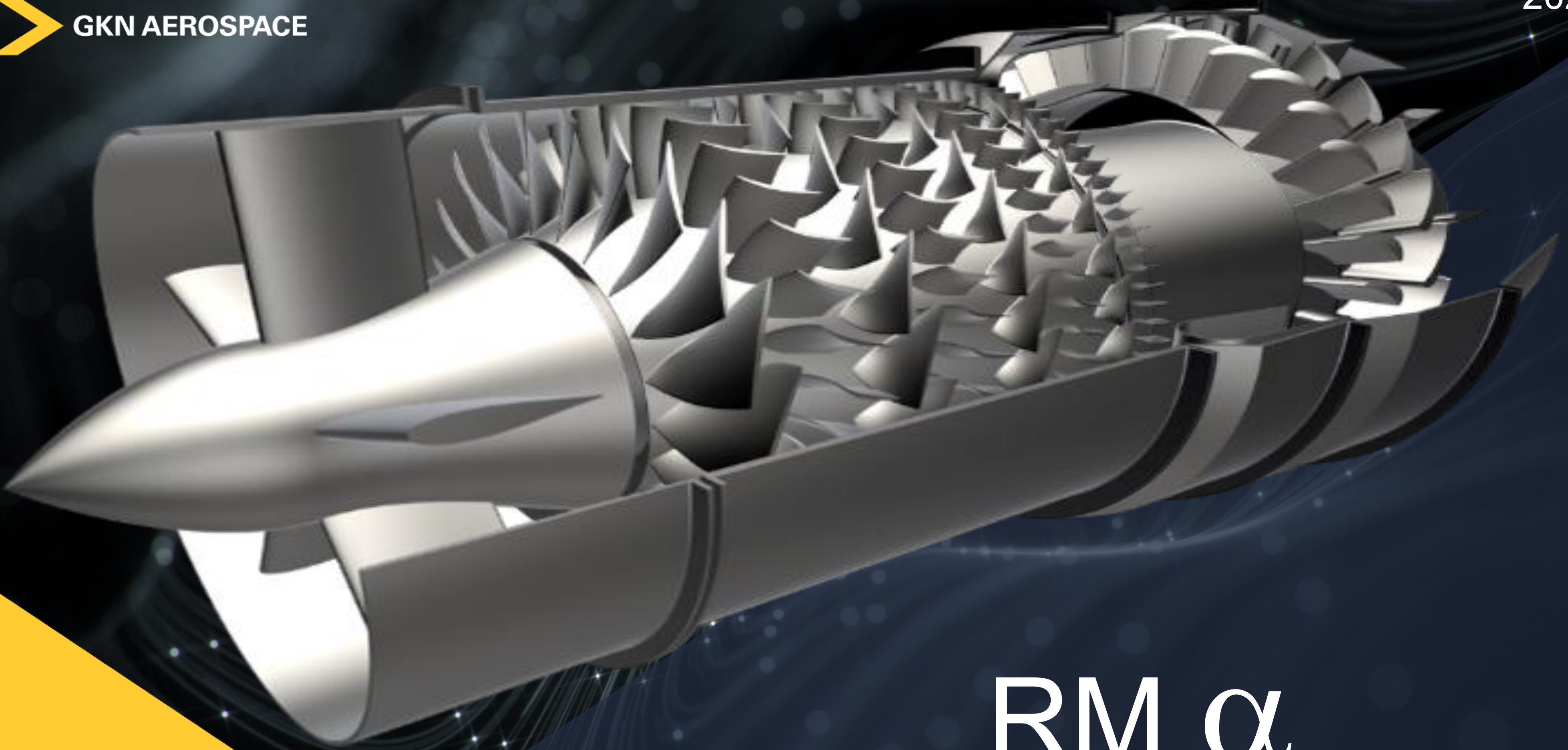


RM α

- Engine Technology Platform

GKN Aerospace in Numbers

£3.5bn
SALES in 2024

32
MANUFACTURING LOCATIONS

16,000
PEOPLE

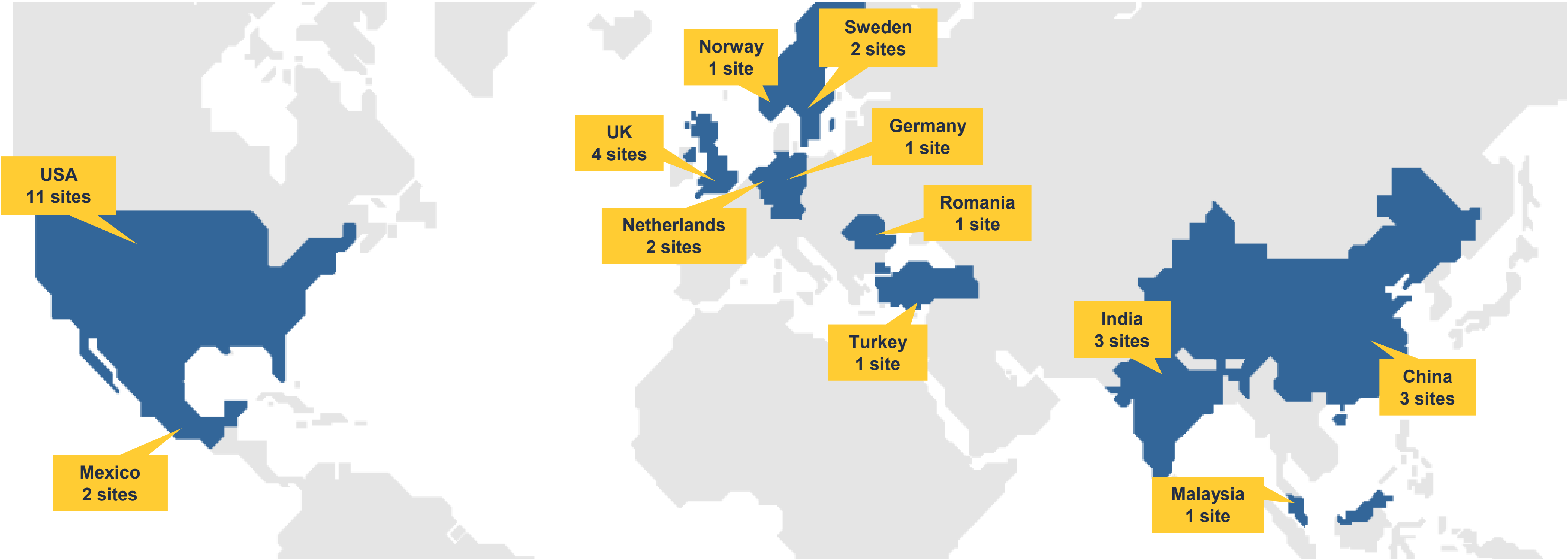
4 GLOBAL TECHNOLOGY CENTRES

12
COUNTRIES

ON BOARD
100,000
FLIGHTS A DAY

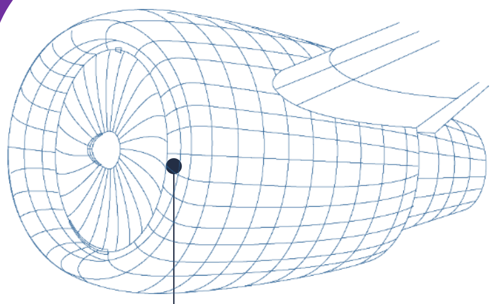
Our Global Footprint

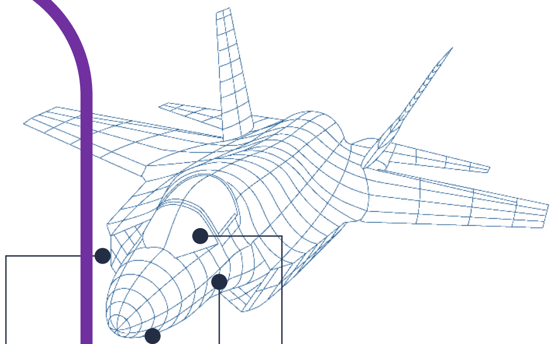
GKN Aerospace is the world's leading tier one aerospace supplier of systems and components

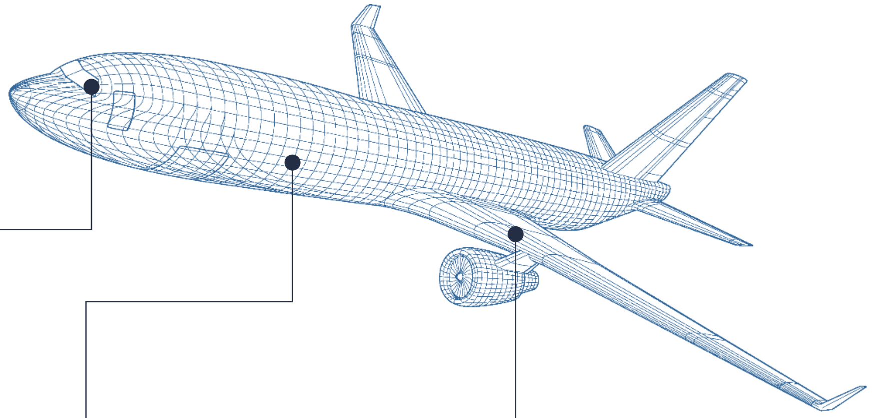


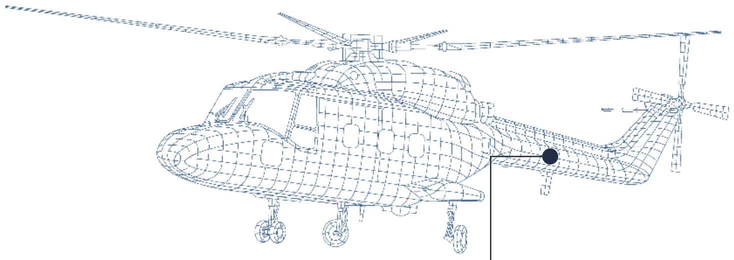
12 Countries > 32 Sites > One Global Team

Our Current Core Technologies









Engine Structures
- Turbine Statics
- Compressor Statics
- Fan Statics (cases and OGV's)

Blades & Vanes
- Manufacture
- MRO

Shafts & LPT Cases

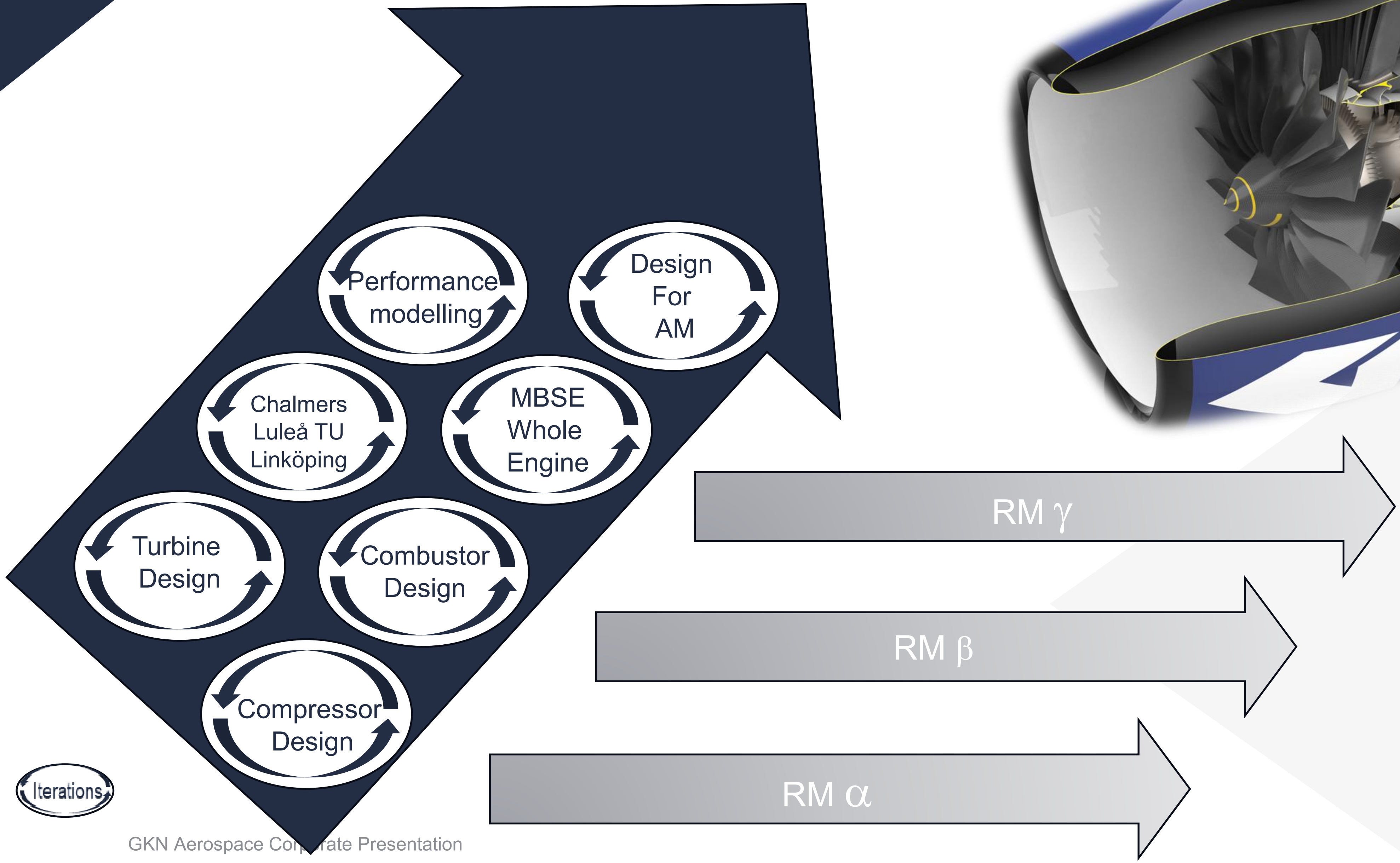
OEM-level responsibility for RM12 engine

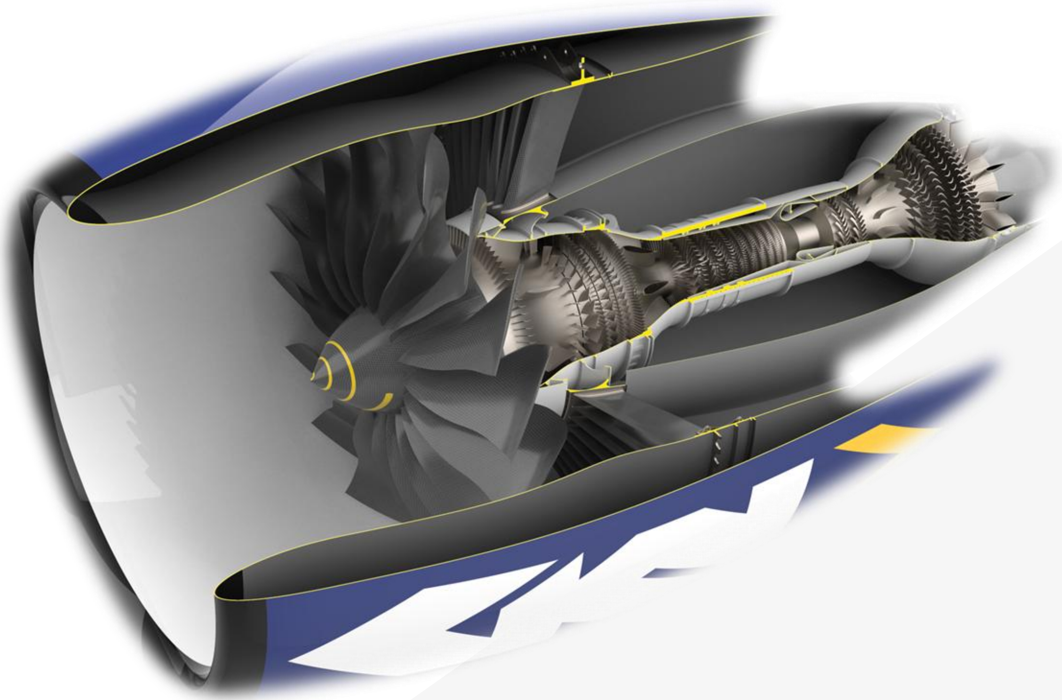
Transparencies
- Cockpit windscreens
- Cabin windows
- Defence Canopies

Electrical Installations
- Wiring and interconnections

Major Structural Assemblies
- Fixed Trailing Edge
- Empennage
- UAM Airframe Structures

GKN Technology Development for Whole Engine System Design

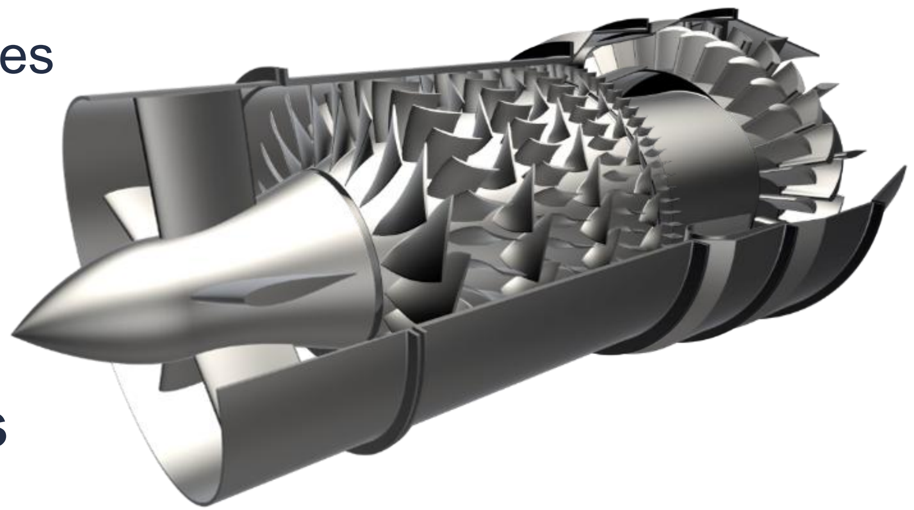




RM-α objectives

Fast development of a small, short-life and low-cost turbojet engine

- From a clean-sheet design to testing in a short lead time
- Improve our internal design, manufacturing and testing capabilities
  - Additive manufacturing for all the major components
- Change development philosophy: AGILE



Build a research platform for developing jet engines

- Collaboration with universities
  - Student projects
  - Test data for research and validation
- Build knowledge: internal and external
  - Train our young and future engineers on aero-engine development

Collaboration with universities

Chalmers University of Technology

> Aircraft conceptual design course:

Students are sizing a hydrogen biz jet that could be powered by a future variant of RM-α

Luleå University of Technology (SIRIUS)

> Develop a design proposal for serial production of a small gas turbine powered by SAF

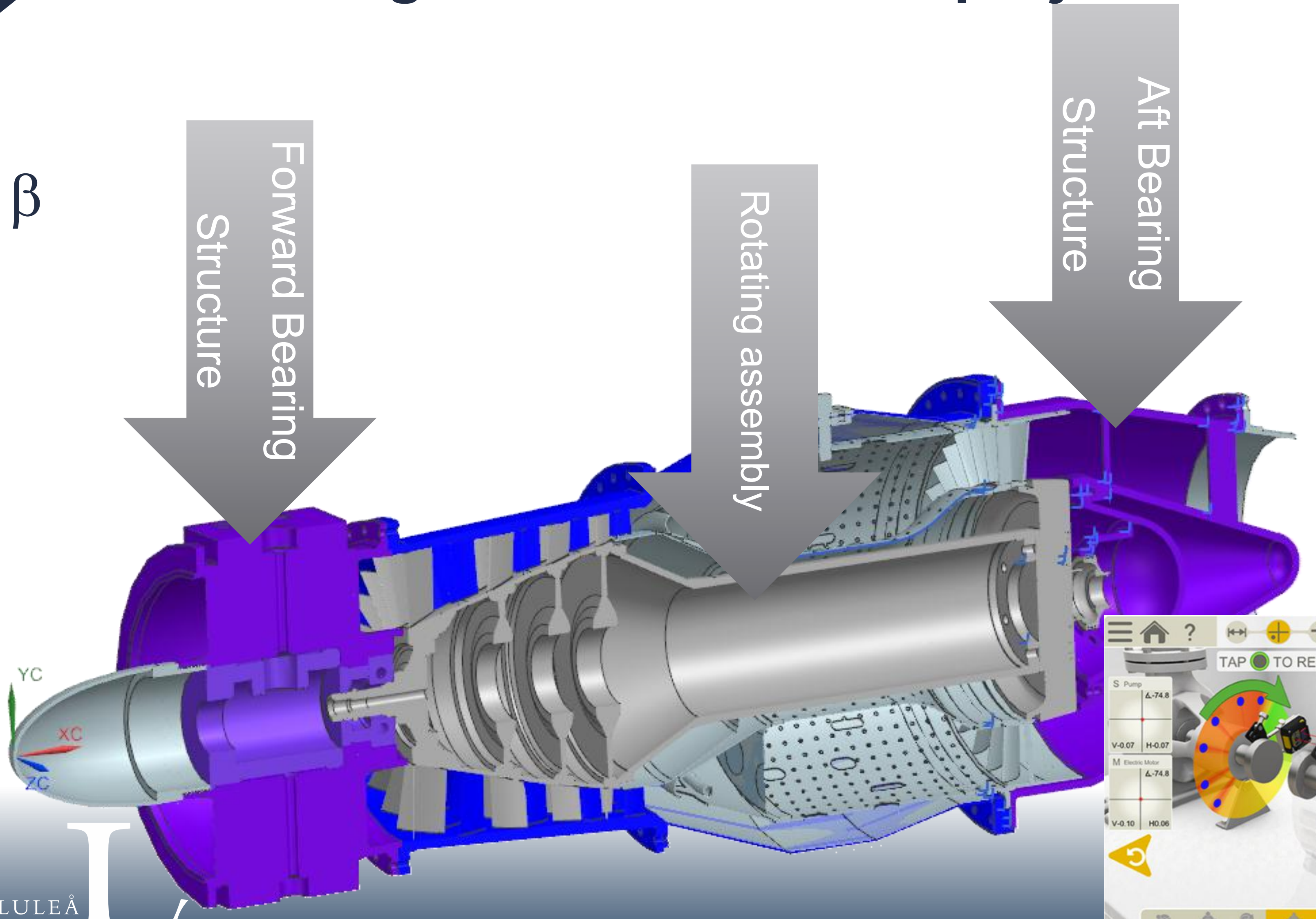
> Prepare for manufacturing and plan production unit for a total lead time of 2-4 weeks.

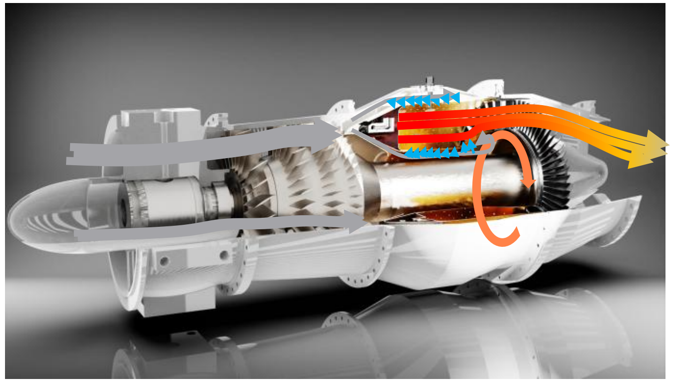
Linköpings University

> Thesis assignment MBSE

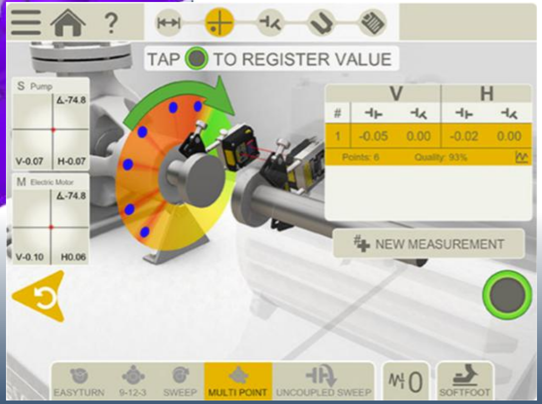
Luleå University of Technology – SIRIUS
Second generation student project

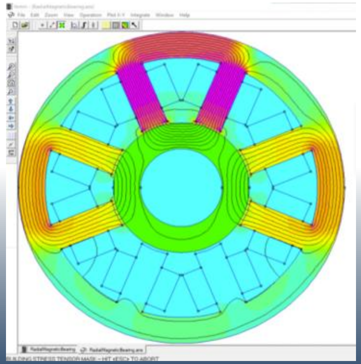
RM β





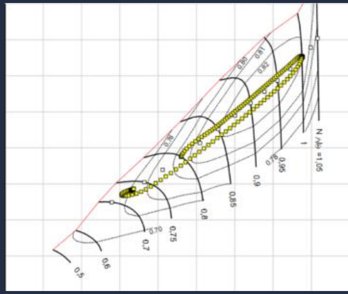
RM α



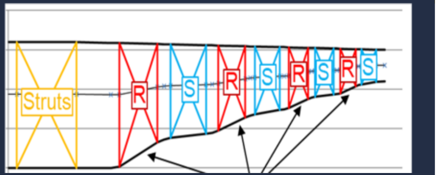


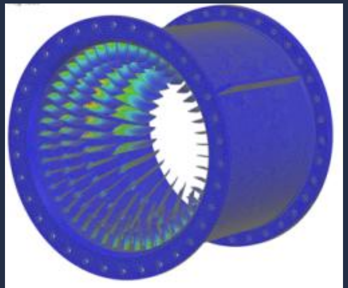
RM-α Development

CYCLE ANALYSIS AND CONCEPTUAL DESIGN

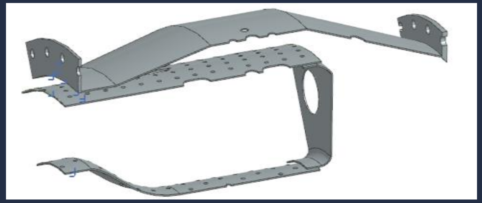


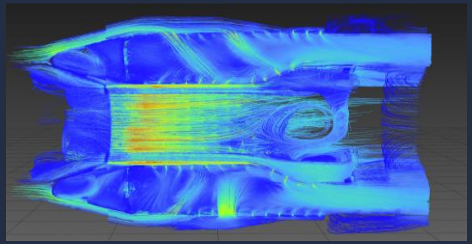
TURBOMACHINERY AERO DESIGN: FROM MEANLINE TO CFD



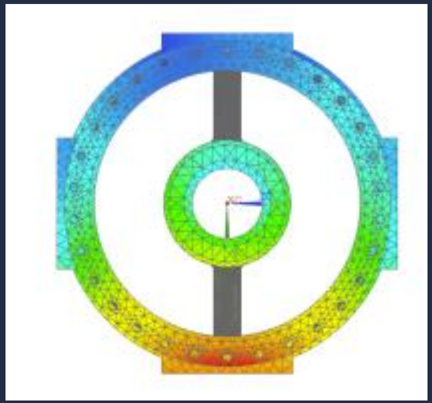


COMBUSTOR AERO DESIGN: FROM CONCELPTUAL TO CFD





STRUCTURAL DESIGN: STRENGTH, FATIGUE, DYNAMICS, BOLTS AND JOINTS



Design of:
Engine GA
Engine components

CONTROLS SYSTEMS DESIGN

Sec Air SYSTEMS DESIGN

FUEL SYSTEMS DESIGN

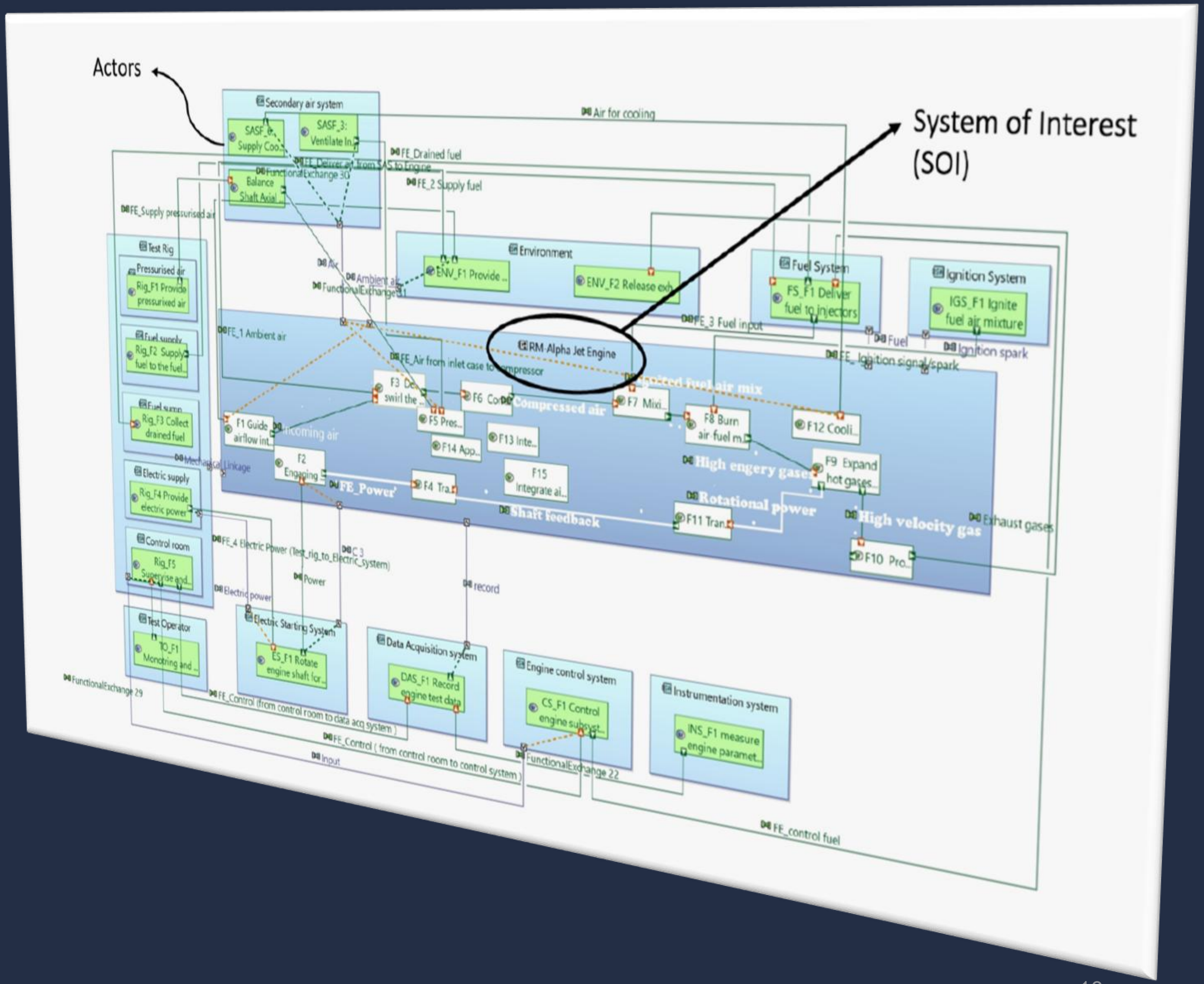
TEST RIG DESIGN AND INSTRUMENTATION

MANUFACTURING

ASSEMBLY AND TESTING

Model Based System Engineering

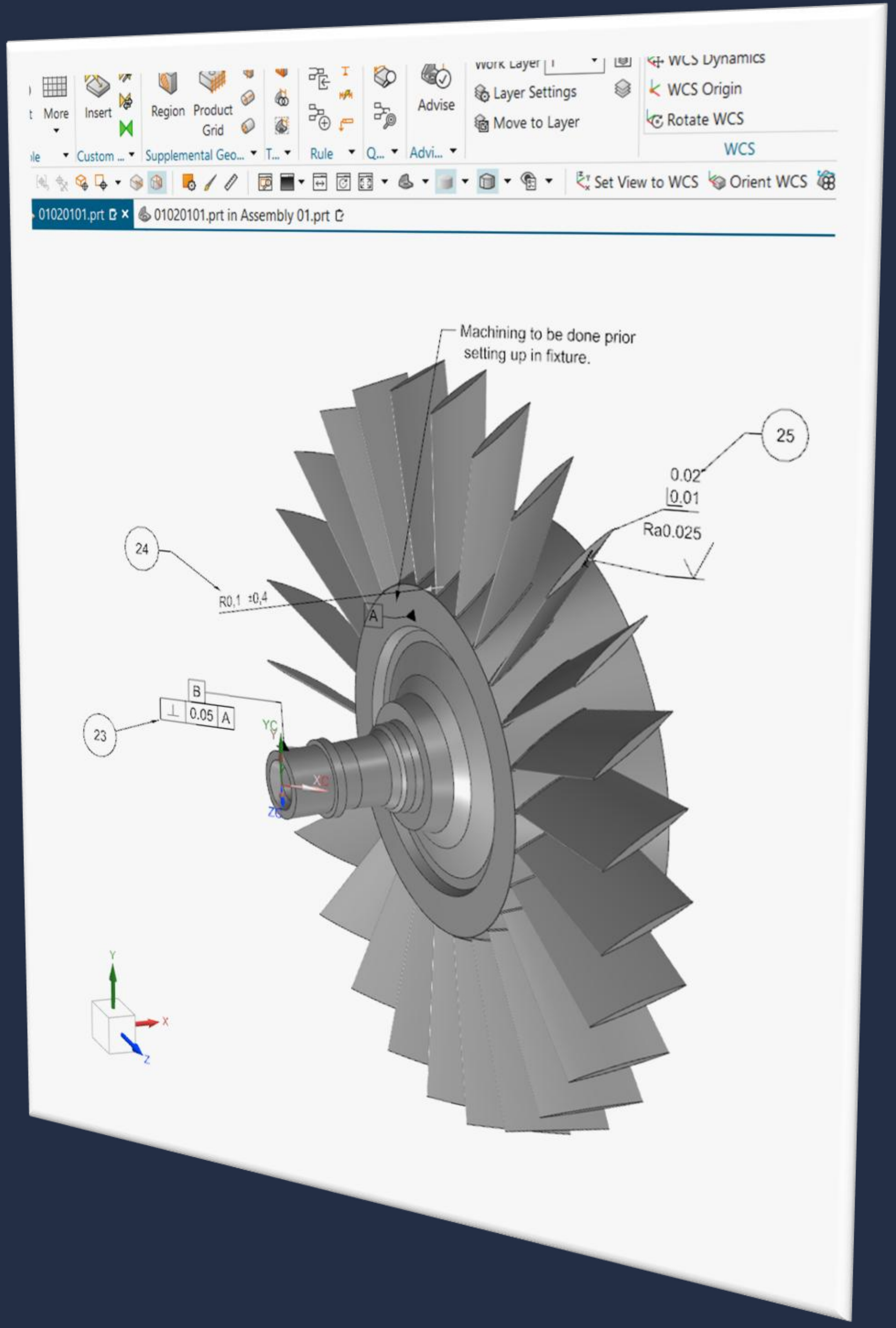
- Document Based -> Model Based
- The digital thread
- Modelling of function, requirements & verification
- Support FMEA & Non conformance activities



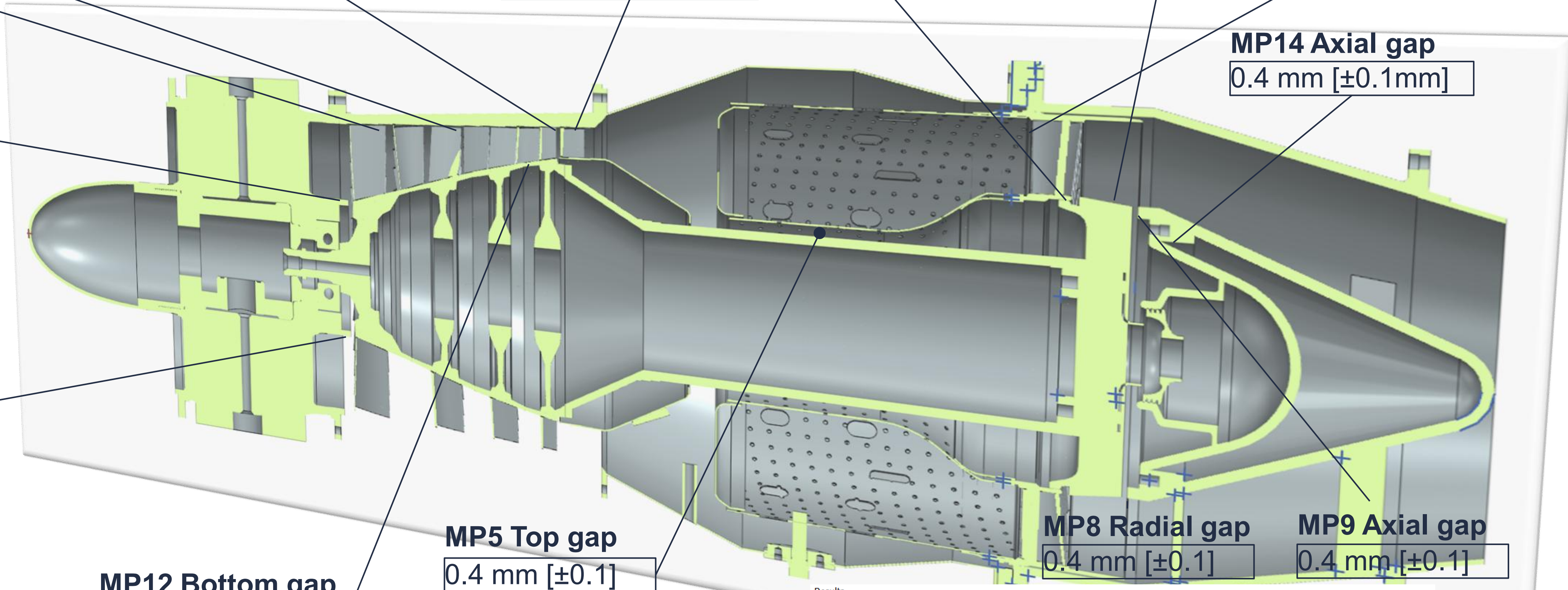
GKN AEROSPACE

Model Based Design –
Product & Manufacturing Information

- Setting the requirements directly in the 3D model.
- Fast stack-up analysis for assembly's.
- Enabling automatic downstream capture of requirements on associated surfaces for NC preparation.

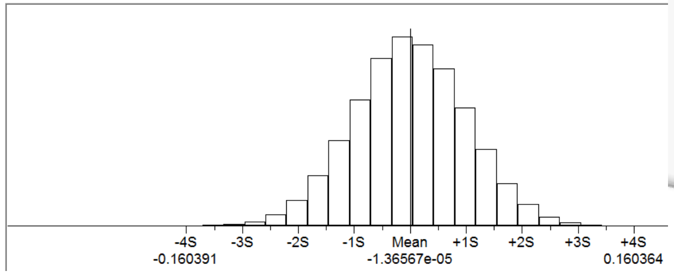


Variation analysis in different interfaces



Results

Runs	100000
Mean	-1.36567e-05
Nominal	0
STD	0.0400944
6 STD	0.240566
8 STD	0.320755
Range	0.376616
Min	-0.209028
Max	0.167588
Rel. Min	-0.209028
Rel. Max	0.167588
Mean shift	-1.36567e-05
P-Value	0.19628

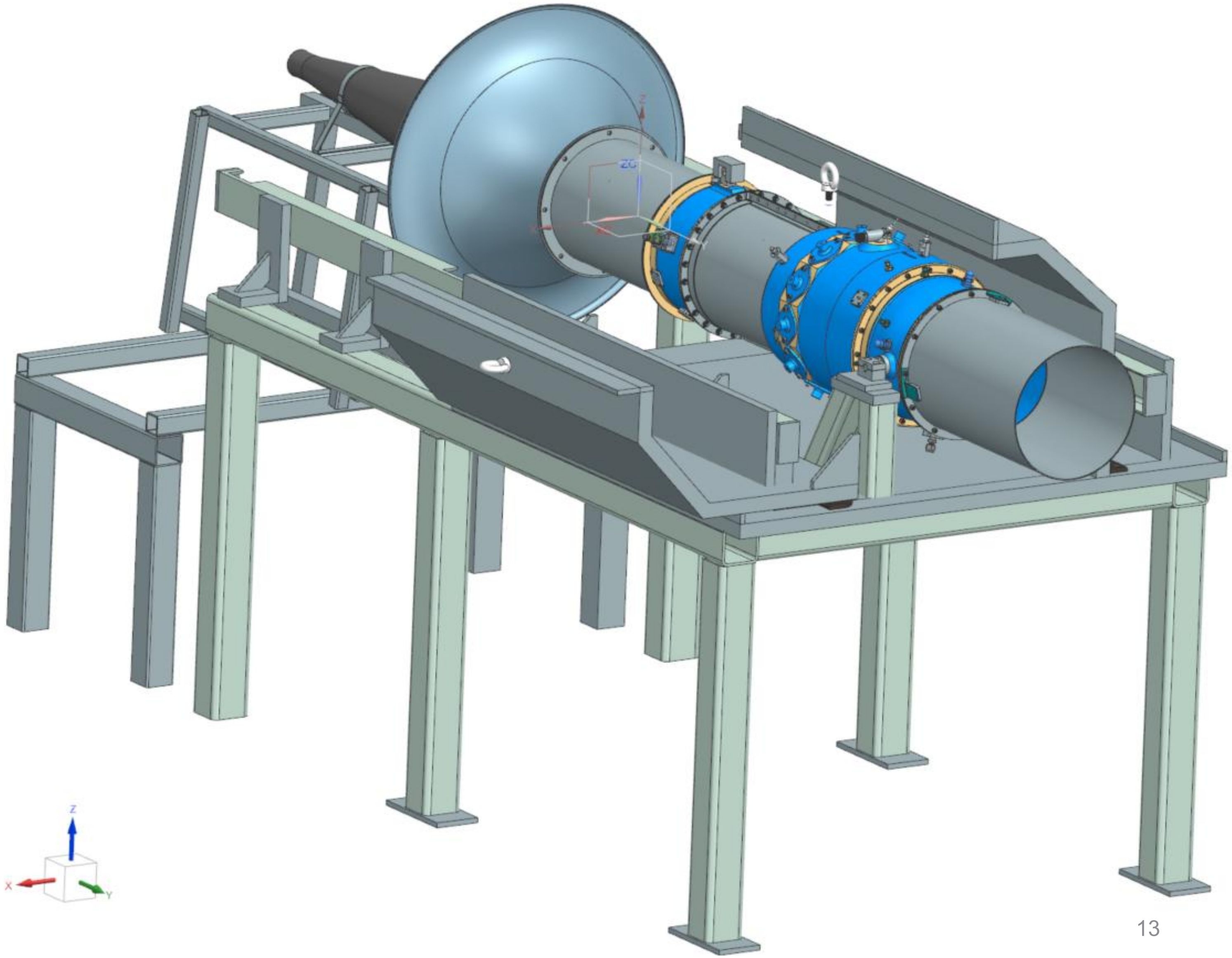


MP = Measure Point

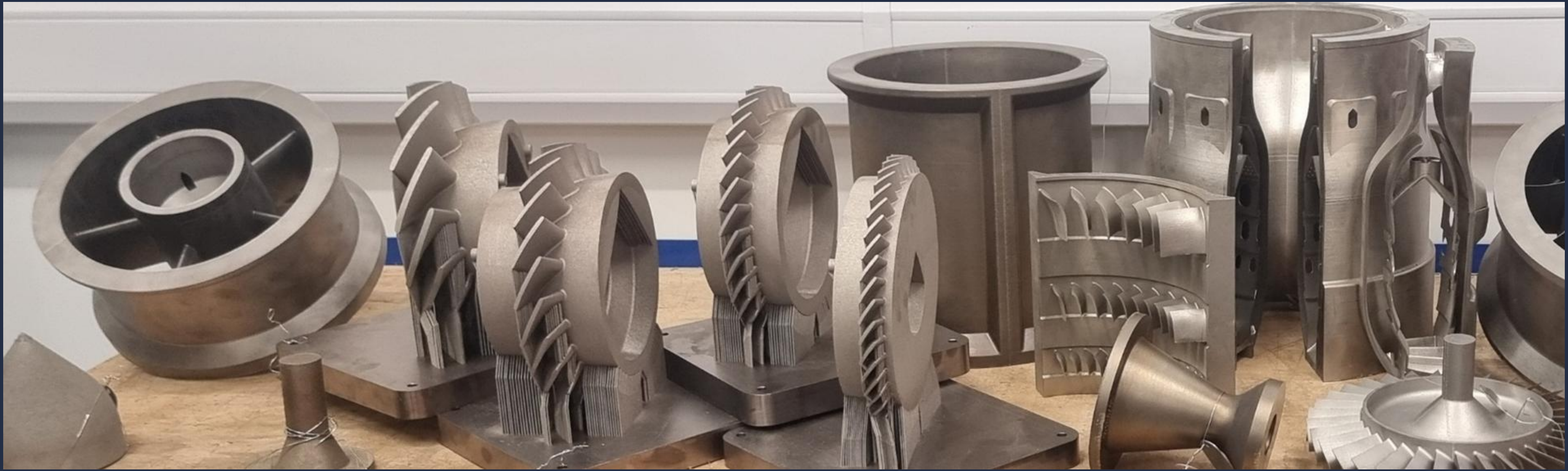
Illustration from the SIRIUS project with LTU

Building engine and rigg

Currently 3234 Parts in one assembly



Printed parts – Ti64 and In718



GKN AEROSPACE

More important than anything else is….

Learning!!