DYNACOMP

Dynamic behaviour of composite materials for next generation aeroengines

D7.4 Data management plan

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The DYNACOMP consortium:

- Fundación IMDEA Materiales (IMDEA) (Project Coordinator)
- Hexcel composites Limited (HEXCEL)
- Micro Materials Limited (MM, Partner Organization)
- Fundación Madri+d para el conocimiento (MADRI+D, Parter Organization)
- Universidad Politécnica de Madrid (UPM, Partner Organization)

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3 FOREWORD

DYNACOM (Dynamic behaviour of composite materials for next generation aeroengines) is an European Industrial Doctorate (EID) programme focused on the **design of the next generation of structural composite materials for high strain rate applications**. This goal will be achieved by the development of a consistent, physically based multiscale simulation strategy informed by the dynamic properties of the constituents (fibre, matrix and fiber/matrix interface) measured with a novel micromechanical testing methodology. Two of the major milestones of this EID are: (1) to offer 2 Early Stage Researchers (ESRs) a multidisciplinary and intersectorial training with the objective of establishing a new design paradigm in structural design of composite materials and (2) to provide the European industry with new tools towards a knowledge-based incorporation of composite materials into new components, without the need of inefficient and expensive traditional trial and error approaches. In this sense, the technological focus is put into the introduction of new composite components into the next generation of aeronautical engines, but the implications are numerous in other sectors where composite materials have been identified as a key enabling technology (such as in transport, energy generation and biomedical applications).

The scope of this deliverable, which is part of the dissemination and exploitation of project results Work Package (WP), is to elaborate a **realistic Data Management Plan** (DMP) for the project. The main objective of the first version of this document is to provide on a dataset by dataset basis: dataset reference and name, Data set description, standards and metadata, data sharing and archiving and preservation (including storage and backup). This document will be updated at least twice along the project (on month 24, August 2018) and on month 42 (February 2020)).

This DMP was created using DMPOnline.

4 ACRONYMS

CA: Consortium Agreement

CSMD: Core Scientific Metadata Model

CSV: Comma-Separated Values

DMP: Data Management Plan

DoA: Description of the Action

EID: European Industrial Doctorate

ESR: Early Stage Researcher

EU: European Union

ITN: Innovative Training Networks

MSCA: Marie Skłodowska-Curie Actions

REA: Research Executive Agency

WP: Work Package

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5 DATA SUMMARY

The purpose of the data will be to create a database of material properties regarding the dynamic behavior of the following **three composite materials:**

- **HexPly® M91** (UD prepreg system, area weight of 268 gsm, cpt of 0.25 mm) with PES and Polymide particles), that shows evidence of displaying a good dynamic behaviour.
- **RTM250** (RTM resin with core shell particles), using a **Hexcel® 46290 WB1010 (5-harness)** (area weight of 280 gsm, cpt of 0.3 mm) fabric, that shows evidence of displaying a good dynamic behaviour.
- **HexPly® 8552** (UD prepreg system with PES), which is not is not suitable for high rate impact behavior.

The following properties will be collected as a function of loading rate:

- Longitudinal tension (LT)
- Transversal tension (TT)
- Longitudinal Compression (LC)
- Transversal Compression (TC)
- In-Plane Sehar (IPS)
- Interlamintar Toughness Mode I (GIC) and Mode II (GIIC)
- Intralaminar toughness (G1+)
- Impact (IMP)

The following micromechanical properties will be collected as a function of loading rate:

- Hardness
- Indentation elastic modulus

The following micromechanical properties will be collected as a function of impact energy and indentation strain rate:

- Dynamic hardness
- Coefficient of restitution

The data generated will be numerical, including the load-displacement curves, as well as the mechanical properties derived from such curves.

The origin of the data will be mechanical tests carried out at the participating institutions. The data will be used internally and will serve as a database against which to compare the results of the simulations that will be produced in the framework of the project.

6 FAIR DATA

6.1 Making data findable, including provisions for metatata

A large number of tests will be produced. Each test will generally produce a CSV file, with the data acquired from the mechanical testing machine, that is typically load, displacement and time. The Core Scientific Metadata Model (CSMD) will be considered as a reference.

The names of the files must identify the test unambiguously. **The following criteria is proposed:**

XXX_YY_ZZ_NN

where:

XXX: refers to material type: M91, RTM250 or 8552.

YY: refers to type of test: LT, TT, LC, TC, IPS, GIC, GIIC, G1+,IMP

ZZ: cross head speed

NN: number of sample

A header will be added with the information about the material, the stacking of the composite laminate, the type of test and the dimensions of the specimen.

For micromechanical test results:

Impact indentation:

AAAA_BBB_CC_D

where:

AAAA: refers to material type: M91, RTM250 or 8552.

BBB: refers to impulse load

CC: refers to impulse distance

D: refers to number of test: 1,2,...o each type.

Strain rate-constant quasistatic indentation:

AAAA_BBB_CC_D

where:

AAAA: refers to material type: M91, RTM250 or 8552.

BBB: refers to maximum load

CC: refers to strain rate

D: refers to number of test: 1,2,...o each type.

6.2 Making data openly accessible

Initially, and due to the commercial value of the data, the **data generated will be confidential and only opened to the members of the consortium** (see ownership of results in the Consortium Agreement, CA). **When results of the research are made available**, for instance through a research publication, **and clearance is received** from the industrial partners (HEXCEL and MM), **efforts will be made to make the accompanying data publicly available through an open repository**. In such case, due to the simplicity of the data (CSV file), no special software is needed to access the data. The Zenodo repository will be considered in those cases.

6.3 Making data interoperable

The data is easily interoperable as the mechanical tests provide standard signals such as load, displacement and time.

6.4 Increase data re-use

In those case where the data is publicly available (for instance linked to a publication, see section 6.2), it is expected that the data will be licensed under Public Domain.

7 ALLOCATION OF RESOURCES

The costs are minimal as open and free tools are considered for making data publicly availability. The project management office (PMO) at IMDEA is responsible for data management, under the supervision of the project coordinator (D. Jon Molina), which is covered by funding received by funding from the REA.

8 DATA SECURITY

Zenodo open repository is considered safe for long-term preservation.

9 ETHICAL ASPECTS

Whenever data is considered publicly available, written consent will be seek from the participating partners.

10 REFERENCES

[1] Consortium Agreement for the DYNACOMP project.

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