



Club Project proposal
Damage Prediction and Mechanical Performance
for different PM Techniques
Open Meeting
Sunday 13th October 14:00-16:00
Maastricht, MECC
Room 2.9/2.10

EPMA's Club Projects are already established as a very simple collaborative tool that allows companies to obtain interesting and useful data and information in a short time, by jointly assigning a research task to one or more research contractors, sharing the costs of the activity with other companies, competitors, suppliers or customers. EPMA coordinates the projects and often hosts the necessary meetings in connection with large relevant events EPMA organizes.

In the occasion of the Euro PM2019, that will take place in the beautiful city of Maastricht, The Netherlands, we invite you to **show your interest for a meeting that will be held on Sunday 13th October**, from 14:00 to 16:00 in the Maastricht Congress Centre, that will be dedicated to a possible new multidisciplinary Club Project.

This project is proposed by the Spanish **IMDEA Materials Institute**, and is focused on the **analysis of the mechanical behaviour and the evolution of microstructure in PM materials**: the idea is to study, in deep, the mechanical properties and damage prediction of one selected material (yet to be defined, initial proposals are a stainless steel like 316L or a superalloy like an Inconel). They would use advanced techniques that allow to analyse the mechanical behaviour using on rather small samples. A brief description and one example of the DIC technique (Digital Image Correlation, one of the techniques that will be used in the project) is available [here](#). It would be possible to compare samples produced with different manufacturing techniques, such as **Press&Sinter, Additive Manufacturing both with Powder Bed Fusion and with Binder Jetting (or similar), HIP, or Metal Injection Moulding**: the scope of the project, i.e. which manufacturing techniques should be addressed, can be decided by the consortium. Company roles in the project (to be also discussed) could be to produce the blanks for the study by their respective technologies.

The study will comprise two different aspects:

- 1) Mechanical and microstructural behaviour. It will be studied by means of standard tensile samples as well through special “in-situ” micro tensile samples machined from blanks produced by the different PM techniques. In the case of AM, the tensile specimens will be obtained in the direction of the build and the perpendicular direction.
- 2) Damage analysis and damage prediction in samples obtained by the different methods. Damage will be investigated under tensile stresses at room temperature. The damage will be evaluated as a function of the plastic strain, estimated by digital image correlation (DIC), and these data will serve as inputs for the development of a continuum numerical modelling (UMAT), which could later be used as a predictive tool.

After having defined the number of PM techniques (and in case of AM or HIP, how many different tensile samples to be extracted from the blanks), a realistic working plan and a budget could be made, the minimum budget being about 65000 € per year of activity, to be shared among the partners. The project could be extended up to 18 months.

The meeting on Sunday 13th is a preliminary meeting to discuss this possible project. If you are from a **company** that may be interested to join this project you are kindly invited to **send an E-Mail to our Technical Manager Bruno Vicenzi (bv@epma.com)**, stating that you wish to know more about the project, and in order to attend the meeting (participation will be of course free of charge).

In case you were interested, but had no chance to attend the meeting, feel free to contact us anyway to discuss other possible arrangements.