

## Introduction

The Advanced Joining Processes (AJP) is an autonomous research unit at the Institute of Science and Innovation in Mechanical and Industrial Engineering (INEGI) that works closely with the Faculty of Mechanical Engineering of the University of Porto (FEUP). This unit is staffed by professors, post-doctoral researchers, PhD students, MSc students and research fellows.

The AJP unit has robust and fully independent competences in the manufacture of experimental specimens and components. The unit operates a fully equipped laboratory with all facilities necessary to manufacture, an extensive experience in testing, complementarily, a strong machine design capability, and robust numerical simulation competencies.

These capabilities enable the AJP unit to undertake new and challenging research projects, reacting quickly to current industrial demands and scientific trends, due to its autonomy. One of the hallmarks of the AJP unit success is its capability to work efficiently and quickly respond to new research trends and meet industrial requests.

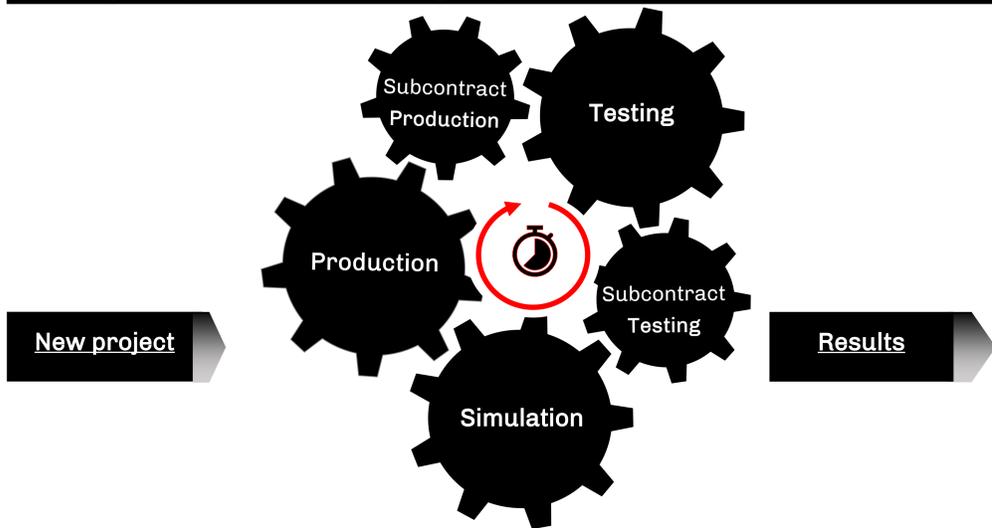
## Competences

Research groups can be classified as partially or fully independent.

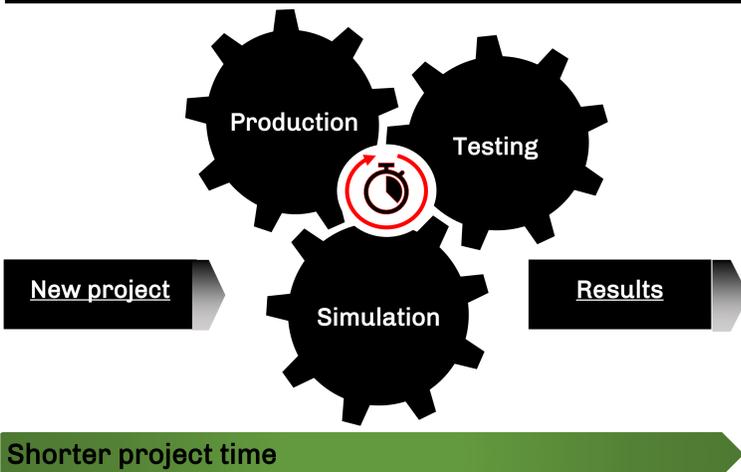
The partially independent groups often do not master all or at least some of competences and must rely on established partnerships and/or subcontract experimental and numerical work necessary in a research project. However this subcontracting will act as an interruption in the normal flow of the project, which represents losses in time, money and, more importantly, in the competitiveness and response capability of the group.

A fully independent research group has complete autonomy in the main competencies and skills required to successfully conduct a research project.

### Partially independent research group



### Fully independent research group

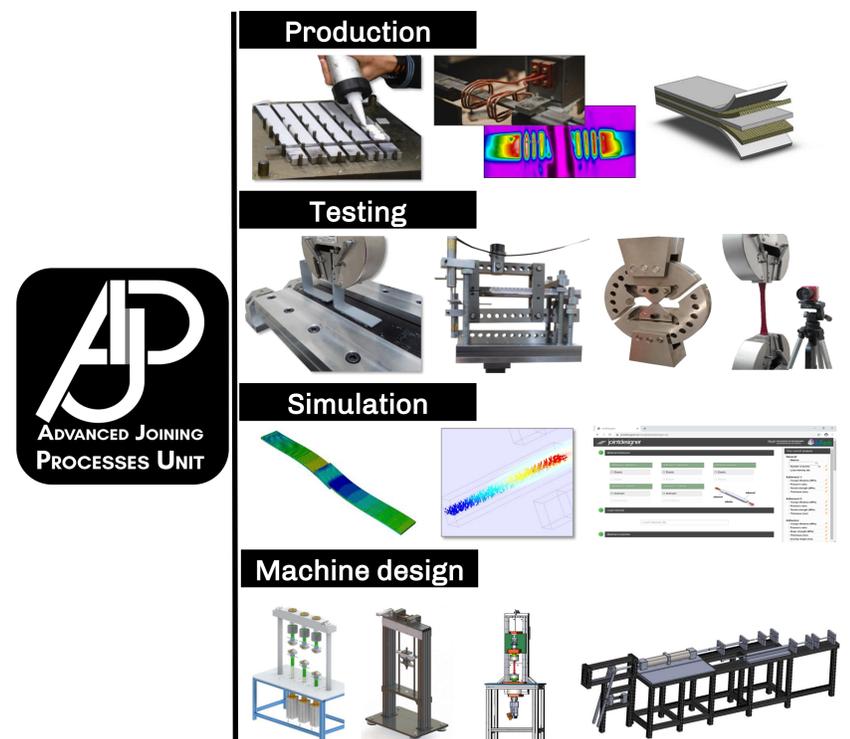


## References

- [1] Etzkowitz, H. (1992). Individual investigators and their research groups, *Minerva* 30:28–50.
- [2] Agnete Vabø, Aina Alvsvåg, Svein Kyvik & Ingvild Reymert (2016) The establishment of formal research groups in higher education institutions, *Nordic Journal of Studies in Educational Policy* 2-3:33896.
- [3] da Silva, L.F., Öchsner, A. and Adams, R.D. (2018) *Handbook of adhesion technology*. 2nd ed. Springer Science & Business Media.

## AJP unit competences

The AJP unit is a fully independent group and has developed strong competences in four different fields. These are production, testing, simulation and machine design [3].



These competences allow to conduct research projects with several industries such as:

- Adhesive manufacturers: Nagase Chemtex, Henkel, Jika, DOW
- transport industries: JOHN DEERE, ASURUMAXIN, R&D Honda R&D Co., Ltd., SAFRAN
- Electronics industry: BOSCH, HUAWEI, Infineon, GE Power & Water
- Other industries: BICAFFÉ coffee capsules, AMTROLGA, colep, SAINT-GOBAIN ABRASIVES, cipade

## Conclusions

The main conclusions that can be drawn from the operating mode of AJP unit are:

- in order to be possible to work in complex research activities and create innovative techniques, equipment and tools it is fundamental to build a team that includes personnel with different areas of expertise;
- The in-house development of highly specific devices and technologies allows the unit to respond quickly and efficiently to complex research demands;
- An effort must be made so that members of the group are aware of the most recent research trends and constantly update their competences;
- Work developed in cooperation with industrial partners must be carried out in an accelerated pace and this is only possible if the group masters all the necessary tool and skills necessary for the completion of the project, ensuring that it can work independently.