

Development of an interactive tool to support laboratorial classes in adhesive bonding

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INTRODUCTION

Novel software tools, designed to educate mechanical engineering students are crucial to aid learning. We have developed a novel tool to support teaching of adhesive bonding. This tool provides a comprehensive learning experience, simulating the entire manufacturing sequence, from surface preparation and adhesive application to joint testing. This virtual environment allows students to practice and gain familiarity with the procedures before engaging in real-world laboratory activities.

IMPLEMENTATION

The software was implemented in laboratorial classes dedicated to advanced joining processes for the aeronautical industry and tested with a group of fifth-year mechanical engineering students, who were encouraged to utilize the tool prior to their laboratory classes. Feedback from the students was gathered on the establishment of new laboratorial activities and to guide the design of this tool.

METHODOLOGY

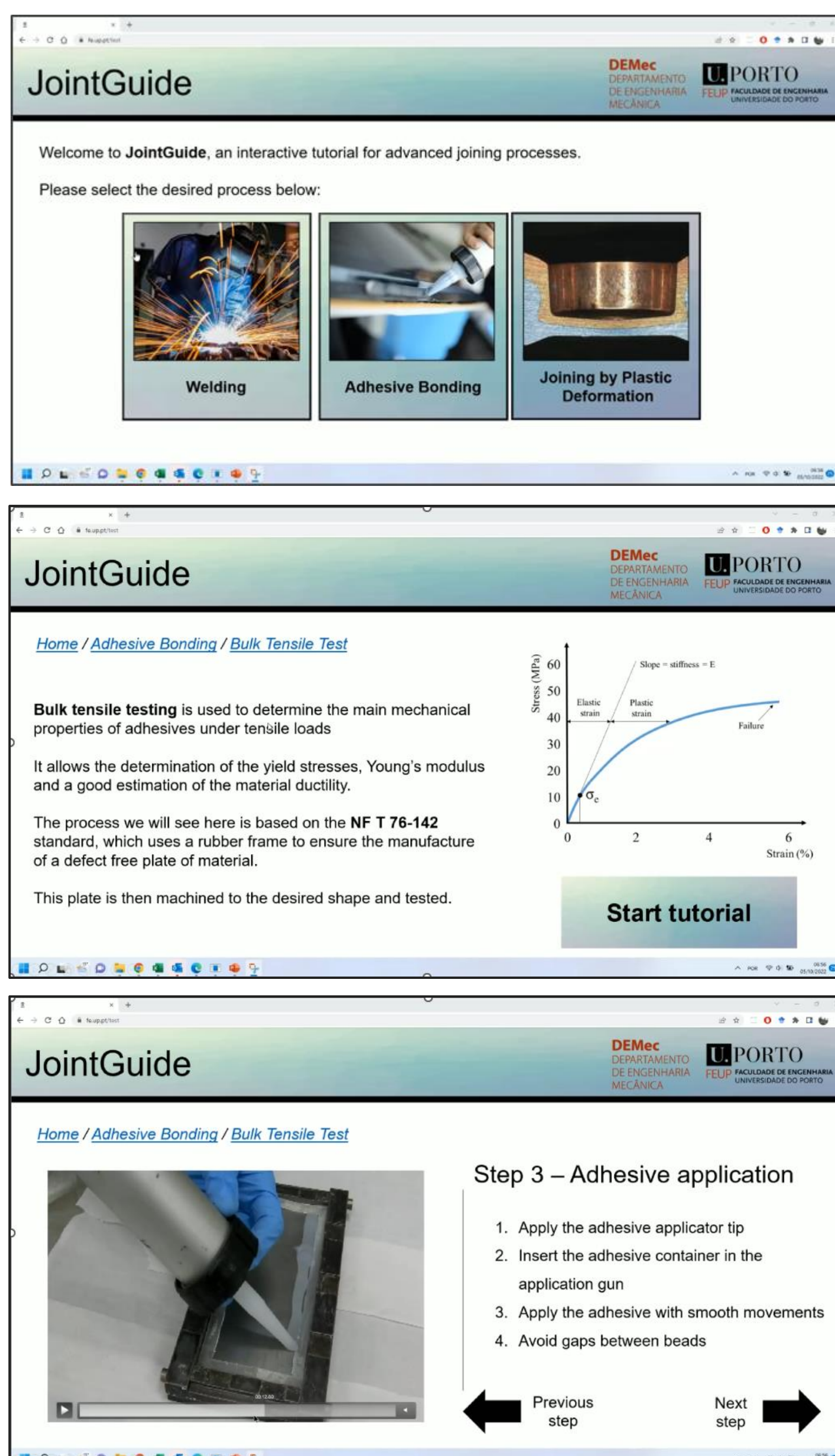
- Create a set of innovative laboratorial works, using hands-on and virtual processes.
- Ensure that the students understand, via firsthand experience, the key parameters of each process, in a safe and controlled environment – **JointGuide tool**.

The JointGuide tool

Expansion of multiple future modules, on welding, and joining by plastic deformation.

Example of theoretical background provided before tutorial.

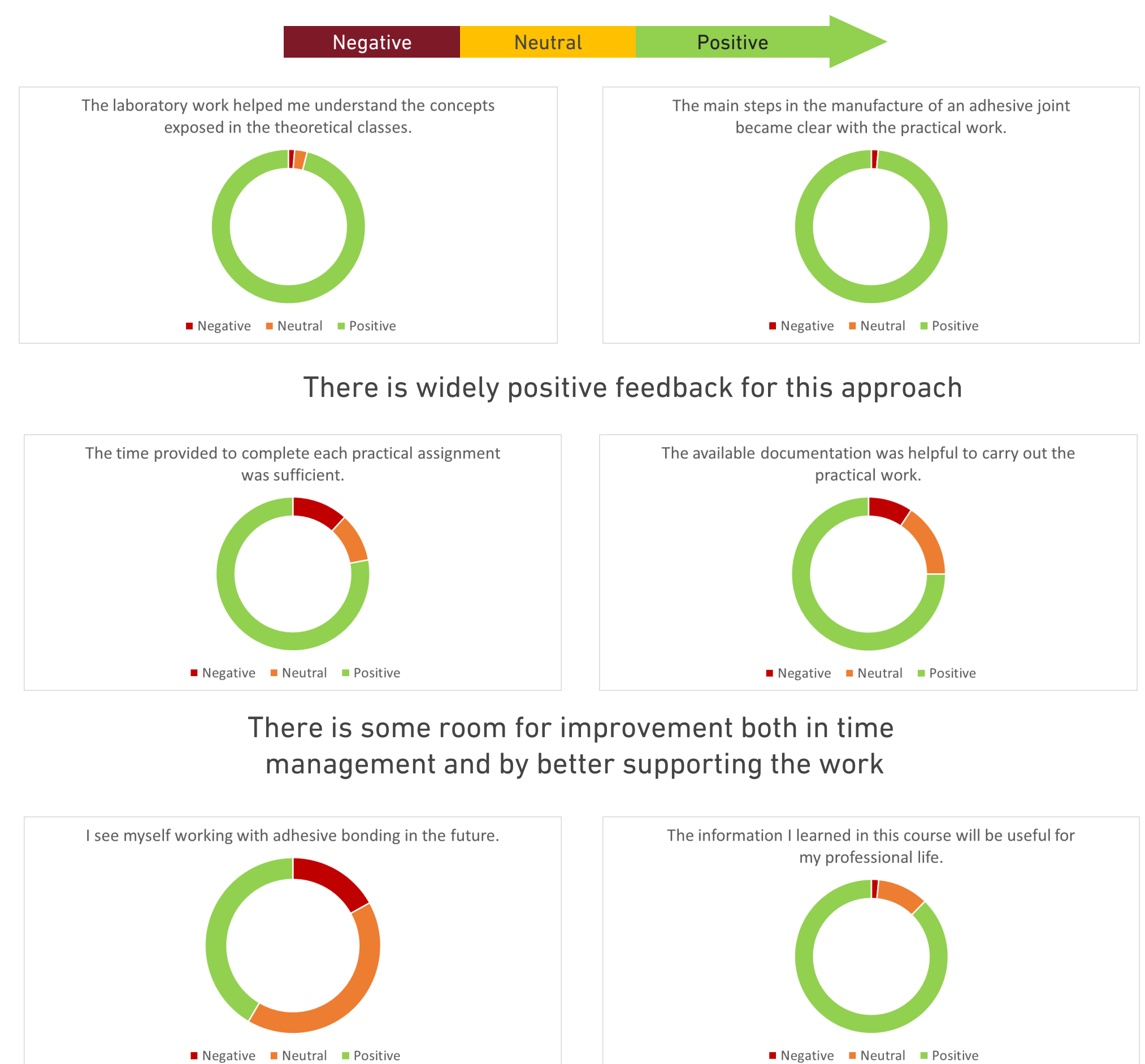
Example of video on adhesive application.



Scan for demo!

FEEDBACK OF STUDENTS

A survey at 68 students of 1st year of Mechanical Engineering Master at Faculty of Engineering of University of Porto (FEUP), was carried out provide an indication about the usage of this type of software and the type of works to be carried out. A simple negative, neutral and positive scale was used.



There is widely positive feedback for this approach

There is some room for improvement both in time management and by better supporting the work

Students recognize value in learning, even if they do not envision themselves using this Technology.

- Additional students' comments

- "Very useful to relate the theoretical concepts with the practice"
- "It is very motivating to have the chance to do things experimentally"
- "It should be expanded for other courses"

CONCLUSION

- Students widely approved these new changes, but suggested the implementation of new supporting tools and documentation
- An effort was made to produce new media content and develop new supporting tools.

ACKNOWLEDGEMENTS

RJC Carbas gratefully acknowledge the FCT for supporting the work presented here, through the individual grant CEECIND/03276/2018 and the Project No. PTDC/EME-EME/2728/2021.

