

## LASTTS – LASer cutting Technology for Tubular Structures

### Summary

In the LASTTS project, tubular structures will be designed using LCT joints with different configurations, their key components will be tested, and parametric analyses will be performed at local and global levels. With this large database of research, design guidelines and worked examples will be produced and disseminated for a major market penetration of innovative steel tubular applications into the EU construction sector. The final impact will be to let engineers and architects exploit the outstanding structural and architectural properties of steel hollow sections in the future building projects.

The specific objectives of the project are:

- Design new tubular structures with complex architectural geometries employing laser cutting technology (2 design sets), using CHS and RHS profiles.
- Derive specimens to experimentally investigate their load bearing behaviour under monotonic/cyclic (low cycle fatigue) loading as well as fire exposure.
- Assess fabrication procedures and tolerances of the new configurations, aiming at increased automatization and minimized welding.
- Design LCT joints with composite columns for fire loading.
- Derive specimens as well as suitable test setups.
- Define numerical analysis protocols that are commonly used by all partners and allow for better comparison of numerical results.
- Perform preliminary simulations on test specimens designed in WP1 under testing boundary conditions to estimate testing dimensions, forces and displacements.
- Perform local investigations in the weld zone with the objective of minimizing the welding included in the joints.

- Experimentally characterize the behaviour of LCT-joints and their basic components.
- Experimentally characterize the fire performance of LCT-joints to investigate the possibility to limit fire protection on connection.
- Validate and calibrate numerical models based on experimental tests.
- Perform parametric studies to identify the influence of component dimensions, welding configurations, material properties and fabrication tolerances on the load bearing behaviour of the investigated joints.
- Develop building-scale numerical simulations on the results of parametric studies.
- Develop design guidelines for the joints studied in the project under static, seismic and fire loading conditions.
- Prepare worked examples.
- Quantify economic and environmental impact of the new structures with LCT joints;
- Disseminate project outcomes for a major market penetration.

The project work program has been divided into 5 Work Packages (WP):

- Work Package 1: Design of new tubular structures starting from the benchmark case studies and derive test specimens.
- Work Package 2: Numerical studies.
- Work Package 3: Experimental investigations.
- Work Package 4: Studies needed to introduce research results to the market.
- Work Package 5: Project management.

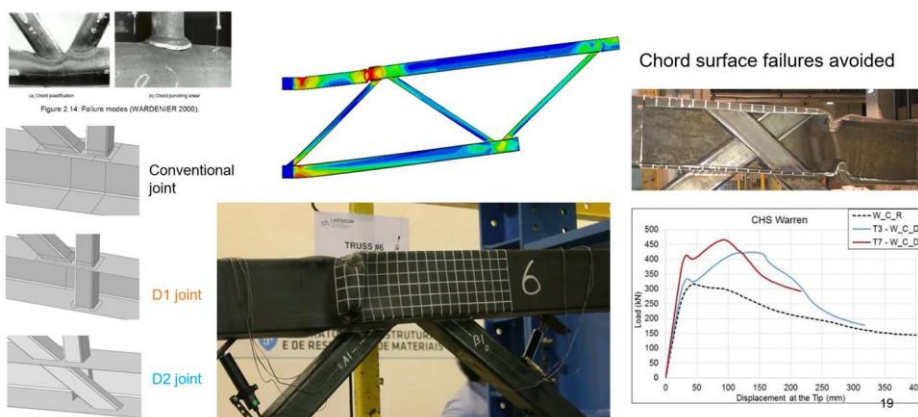


Figure 1. Experimental and numerical validation of the new laser cut joints.



### Project Reference

RFCS-2020-101034038

### Leading Institution

PoliMI – Polytechnic University of Milan (Italy)

### Partners

IST – Instituto Superior Técnico (Portugal), UNIPI – Università di Pisa (Italy), INSA Rennes – Institut National des Sciences Appliquées de Rennes (France), RWTH Aachen – Rheinisch-Westfaelische Technische Hochschule Aachen (Germany), UHASSELT – Universiteit Hasselt (Belgium), CTICM – Centre Technique Industriel de la Construction Metallique (France), GRID ICE – GRID International Consulting Engineers SA (Portugal), BEG – Bureau D'etudes Greisch Societe Interprofessionnelle d'Ingenieurs Et d'Architectes SA (France), GuS – Gregull Und Spang Ingenieurgesellschaft Fur Stahlbau Mbh (Germany), ADIGESYS SPA (Italy), MOVISID SPA (Italy), BRIAND CM – Briand Constuctions Metalliques (France), VAD GMBH – Vallourec Deutschland GmbH (Germany), AMTP Lexy – Arcelormittal Tubular Products Lexy (France)

### CERIS Principal Investigator

Luís Calado  
([luis.calado@tecnico.ulisboa.pt](mailto:luis.calado@tecnico.ulisboa.pt))

### CERIS Research Team

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### Funding

EU Research Fund for Coal and Steel (RFCS)

### Period

2021-2025

### Total

1 764 644.58€

### CERIS

69 152.64€

### Project Website

[www.lastts.eu](http://www.lastts.eu)