

The 7th International Conference on Structural Integrity (ICSI2027)

Madeira, Portugal, 29 August–2 September 2027 (<https://www.icsi.pt/>)

Symposium Title: **Laser Shock Peening for Structural Integrity:
From Residual Stress Engineering to Industrial Applications**

Symposium Chairs:

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Symposium Description:

Fatigue damage is one of the primary mechanisms governing the service life and structural integrity of metallic structures and components subjected to cyclic loading. Laser shock peening (LSP) is a powerful technique of engineering beneficial compressive residual stress fields and improving resistance to fatigue crack initiation and propagation. In addition to extending the lifespan of components, laser peen forming (LPF) enables controlled deformation and distortion correction in complex, high-value structures. However, despite significant progress, the broader industrial adoption of LSP requires reliable links between processing conditions, residual stress distributions and structural performance. This must be supported by predictive models, validated measurements and process monitoring, as well as economically viable implementation. This focused session will explore the connection between advances in LSP research and potential industrial challenges and application opportunities. It will feature several complementary scientific and industrial presentations, followed by a discussion of remaining technological barriers and future research needs.

Indicative Topics

- LSP process physics, numerical simulation, residual stress tailoring and measurement;
- Fatigue and fracture performance, damage tolerance and lifetime assessment of treated structures;
- LPF, distortion correction, repair and treatment of welded or additively manufactured components;
- Industrial applications, robotic integration, in-process monitoring, quality assurance and scale-up.