



Reporting on Actions **Interest Group** **Surface Engineering Treatments**

2006-2008 Actions

- The IG managed to increase its active member base to 21 members from 17 in 2006.
- Proposed 1 EU proposal (HERA FP7 1st call).
- Members of the IG participated/ing in 2 FP6/FP7 Projects (DATON, COMPACT).
- Members of the IG participate in the FP7/3call proposal (LASPAA)
- The IG Proposed 1 new EU proposal FP7/3rd call (CERTAIN)
- Published 31 papers in Journals and Conferences.
- Individual members Completed 3 Industrial Projects.

Basic Description of Projects of Individual Participation of IG Members

- Increase the Fatigue Damage Tolerance of Integral Structures (**FP6 DATON**) via Ultrasonic Impact Treatment.
- Computational Modelling of Shot Peening (**FP6 COMPACT**)
- Examination of Ultrasonic Impact Treatment on High Temperature SCC of Stainless Steel Welds for Rolls-Royce Marine.
- Examination of Ultrasonic Impact Treatment on High Temperature Corrosion for US-Navy and BAE Systems.
- Use of Supersonic Particle Deposition for the development of Metal-Metal and Metal-Composite Sandwich panels.
- Use of High Velocity Oxygen Fuel coatings for Protection of Fuel Tanks and landing gear castings.
- Development of Supersonic Particle Deposition Robot for the repair of oil pipes.
- Use of Supersonic Particle Deposition for Increasing the Structural Integrity of Integral Structures.
- Use of Supersonic Particle Deposition for crack damage repair instead of composite patches.
- Real-Time Neutron Diffraction of Relaxation of Residual Stresses from FSW under Variable Amplitude Loading.

Future Projects

In order for the IG to fulfil its mission and have the necessary funding for scientific collaboration, exchange of ideas, etc it is necessary to increase its financial base. On that the IG leads participation into

- Optimisation of Surface Engineering Treatments to increase the Damage Tolerance of the Integral Structures (FP7, CERTAIN),
- Exploits the potential of engaging Human Mobility Calls.

CERTAIN

Optimisation of Surface Engineering Treatments to increase the Damage Tolerance of the Integral Structures (CERTAIN)

Scope

- Redistribution of Residual stresses with loading sequence, frequency, cracking.
- Identify the role of crack tip plasticity to Residual stresses redistribution and local relaxation.
- Identify the effect of Residual stresses to crack tunnelling effect.

Result

- Use the above to optimise the surface engineering treatments in terms of residual stress, cold work, SPD thickness.
- Identify potential of crack deflection using Supersonic Particle Deposition.

New Technologies included in the IG

- **Water-Jet Peening**

Similar to shot peening but with significantly higher and deeper residual stresses.

- **Thick Metallic Coatings**

Coating able to withstand corrosion and being scratch resistant

- **Ballistic Particle Manufacturing**

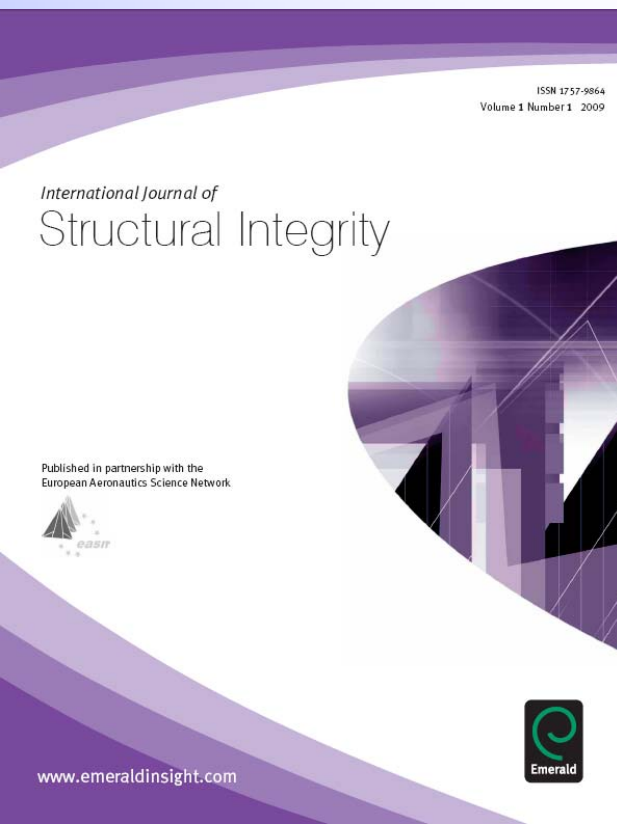
A fast and cost effective way of developing 3D structures, i.e. Ti stiffeners on skin sheet.

- **Nano-Particle Manufacturing (Laser Pyrolysis Process)**

A novel technology able to create metal/polymer matrix composites of high quality. The nano-particle manufacturing can also create 3D reinforcing stencils, cells, crosses, etc able to significantly increase the loading bearing capacity of composites.

Successful Initiative

- Undertook the Editorial Responsibilities of the International Journal of Structural Integrity



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