Project Number: CRAFT-1999-70658

Friction Surfacing for Multi-Sectorial Applications

(FRICSURF)

SME PARTNERS:
Circle Technical Services Ltd (Project Co-ordinator)
Frictec Ltd
Nordseetaucher GmbH
SMT Tricept AB

RTD PERFORMERS:
GKSS Forschungszentrum
Cranfield University
University of Sheffield

PUBLISHABLE SUMMARY

Period for this project

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PUBLISHABLE SUMMARY

This project has developed technology of Friction Surfacing for a wide range of industrial applications. With Friction Surfacing a cylindrical rod of coating metal is rotated at high speed and a compressive force applied between the rod end and the surface of the substrate to be coated. Heat and pressure cause the metals at the bar and substrate interface to flow expelling impurities and forming a metallic bond as the bar is moved across the surface (Figure 1). This results in a regular and flat layer of the bar material being deposited on and fully bonded to the substrate.

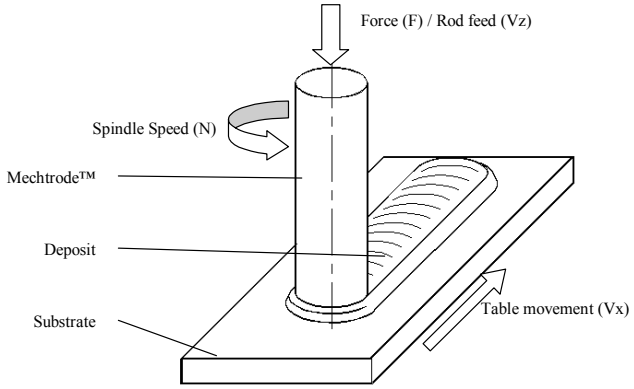

Figure 1 the principle of the Friction Surfacing process (Frictec Ltd)

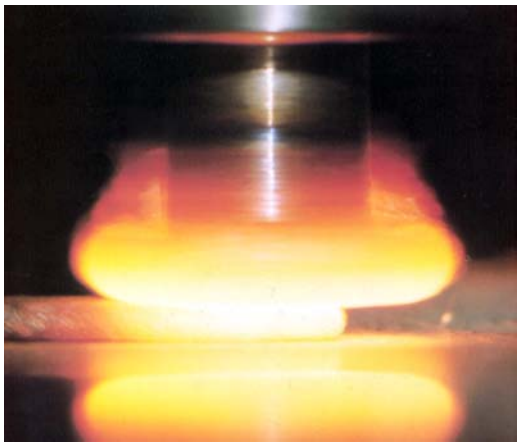

Figure 2 – Friction Surfacing. In this photograph the substrate is being moved to the left as a layer of surfacing metal is deposited (Frictec Ltd).

This is a solid phase process where relatively low maximum temperatures are reached and consequently it has important advantages over other surfacing methods which are performed at higher temperature such as Weld Overlay (electric arc welding), Plasma arc Spraying, Flame Spraying and Laser methods. Friction Surfacing has the potential to be used on a very wide range of materials and applications. For example wear resistant metals containing hard carbide particles can be deposited without the carbide particles being lost by solution in the metal matrix due to high temperature. Corrosion resistant cladding can be performed on steel without the formation of brittle inter-metallic compounds and cladding of steel can be performed underwater without the risk of hydrogen cracking. The process is generally not sensitive to environmental conditions (Friction Surfacing could be done in rain and wind in the open air and even underwater) and, unlike the other processes mentioned above, produces no toxic fumes, gases or environmental contaminants.

The consortium for this project consisted of four SMEs from manufacturing, automation, the offshore and underwater construction industries.

The industrial objectives of the project were the development of micro friction surfacing procedures, the optimisation of the process, the development of procedures for depositing corrosion resistant surfaces, the development of equipment and procedures for underwater friction surfacing (Figure 3)and the development of robotic friction surfacing procedures (Figure 4). Results achieved are encouraging and the project partners feel that they have reached the overall objectives. The work done on the project is of direct commercial importance to the SME partners and suitable for commercial exploitation..

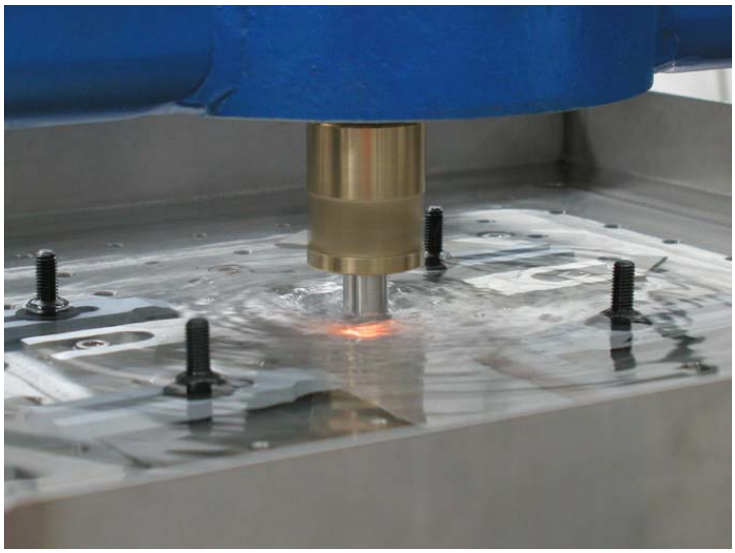

Figure 4 – Underwater friction surfacing using the Circle Technical Services HMS 3000 in a Portal frame.

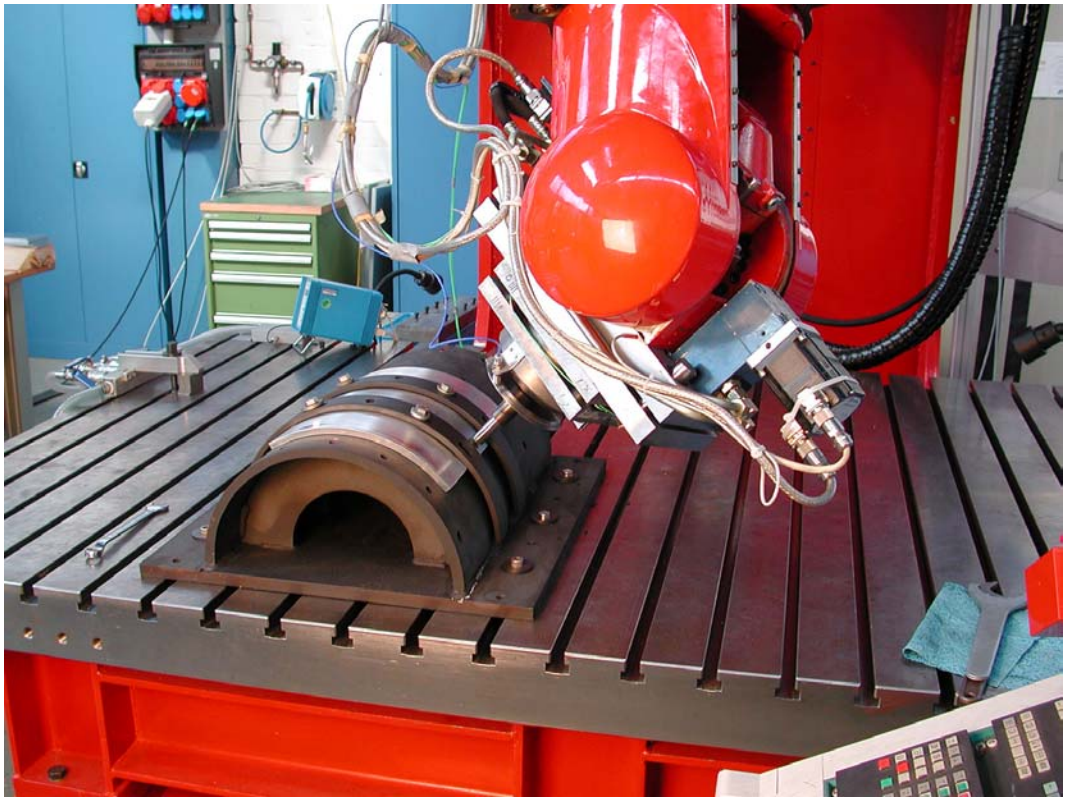

Figure 4 - Friction Surfacing with an SMT Tricept TR 805 Robot (GKSS Forschungszentrum)