

Industrial Member Report Summary – Key Findings for Industry

Assessment of Cold Spray Systems for the Deposition of Nickel Alloy 718 Coatings

TWI Core Research Programme

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Industrial need

There is considerable industrial interest in the use of cold spray technology for the coating and repair of Al, Mg and Ti alloy airframe and engine components, Ti alloy medical devices, Ni alloy gas turbine components and the use of metal-matrix composite (MMC) coatings for electronic devices. Some materials have thus far proven difficult to deposit and further improvements to coating density, coating adhesion and deposition efficiency are required. The work reported benchmarks new cold spray systems with that operated at TWI since 2007 and describes the effects of process gas type, temperature and pressure on the properties of cold spray deposited nickel alloy 718.

Key Findings

- The new generation of cold spray systems can produce superior nickel alloy 718 coatings due to their ability to operate at higher process gas temperatures and pressures.
- Increasing cold spray process gas pressure leads to coatings with lower levels of porosity and greater adhesion.
- Increasing cold spray process gas temperature also leads to coatings with lower levels of porosity and greater adhesion but with the potential risk of oxidation of the feedstock during spraying.
- The use of helium as a process gas leads to denser, more adherent and stronger coatings than those produced when nitrogen is used as the process gas. This advantage must however be weighed against its much greater cost.

How to benefit from this work:

- As an Industrial Member of TWI, you have free access to the [full report](#)
- If you are not an Industrial Member of TWI, find out how your company could benefit from Membership www.twi-global.com/membership
- Read more [TWI Surface Engineering and Advanced Coatings](#)
- Find out about a related Group Sponsored or Collaborative project that is developing the technology further [EU-funded CORSAIR Cold Spray Project](#)
- Contact dave.harvey@twi.co.uk to learn more



Impact Innovations 5/11 cold spray system (TWI Large Scale Spraying Facility, Cambridge)



Kinetiks® 4000 cold spray system (TWI Large Scale Spraying Facility, Cambridge)