

Friction welding is the key technology in developing and manufacturing flexible medical instruments

TWI, as a member of the European funded FP7 project team for CleanTools, is delighted to announce the development of a novel **rotary friction welding** methodology to join nitinol, a metal alloy of nickel and titanium, to stainless steel using a **biocompatible interlayer**. This pioneering technology will dramatically improve the manufacture and usability of **medical devices** that have previously needed mechanical joints or coupling.

This innovative project has enabled the development of rotary friction welding parameters that provide tripartite joints, ideally suited for use in medical instruments such as **intramedullary reamers**. Traditional methods have used double wound shafts and mechanical joints which have been difficult and expensive to clean and sterilise. However, the use of shape-memory alloy nitinol for the shaft provides sufficient elasticity to allow the rotating tool to be used in curved bone. It produces crevice free, highly reliable, bi-metallic surgical instruments, instantly removing the need for mechanical joints in this type of medical device. This means cleaning, disinfecting and sterilising is easier, more efficient and more reliable, which in turn reduces the risk of cross infection between patients. Approximately 7000 cases of MRSA infections were reported in UK hospitals during 2007 and similar issues are prevalent across Europe. Such infections are of particular concern in post-surgery patients.

Rotary friction welding is a solid phase process, where no melting takes place. The simplest mechanical arrangement for continuous-drive rotary friction welding involves two cylindrical bars held in axial alignment. One of the bars is rotated while the other is advanced into contact under a pre-selected axial pressure (see illustration). Rotation continues for a specific time, sufficient for achieving the temperature at which metal in the joint zone is in the plastic state. Having achieved this condition, the rotating bar is stopped while the pressure is either maintained or increased to consolidate the joint.



The project consortium is confident that this novel welding methodology will be brought to market quickly and successfully, and is currently assessing potential partners for the commercialisation of the technology. For more information please visit the project website www.cleantools.de

Useful links

[Rotary friction welding for medical application](#)

<http://www.twi-global.com/technical-knowledge/knowledge-summaries/rotary-friction-welding/>