

elementsixTM

DE BEERS GROUP

Friction stir welding (FSW) tool solutions for steel

Competitive advantage through innovation

Why Element Six

- **In-house end-to-end manufacturing capability** and a global operational footprint ensure we can effectively service customers worldwide
- **Unrivalled innovation and application knowledge** - a leading team of engineers and scientists enable Element Six (E6) to provide customer-specific friction stir welding (FSW) tool solutions
- **E6 collaborates** with a wide range of leading FSW machine providers and other end-users to ensure that we can offer competitive solutions tailored to customer requirements
- E6 polycrystalline cubic boron nitride (PCBN) tool solutions for steel have proven to be **price competitive** compared to arc welding processes



E6 FSW PCBN tools available from 0.5 mm to 15 mm in diameter

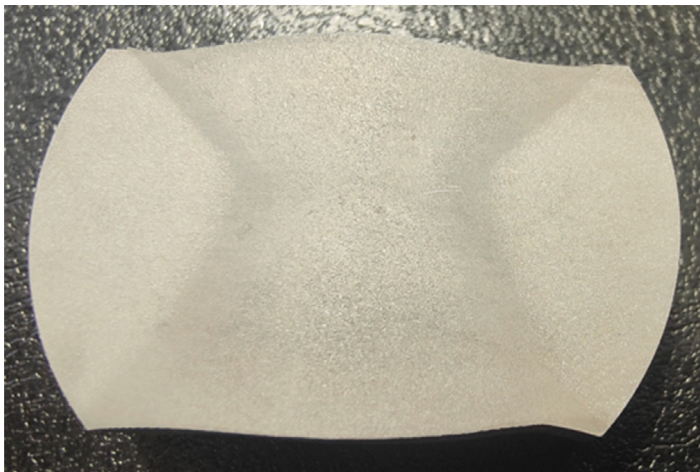
E6 is a world leading supplier of superhard tooling solutions, including a range for the FSW of steel. Our FSW PCBN tools have been developed and field validated in conjunction with The Welding Institute (TWI) and other leading FSW machine providers to ensure that we can offer a complete package of solutions, tailored to a diverse range of customer requirements.

Using E6's cutting-edge technology at our Global Innovation Centre in Oxfordshire, UK, our team of scientists and engineers have developed a range of PCBN tool solutions for FSW.

E6 FSW PCBN tools have demonstrated successful FSW performance under various conditions, including underwater as well as in circumferential welding. The wide range of steels and superalloys tested includes:

- Structural steels: DH36 and S355
- Stainless steels: 304 and 316L
- High strength steels: X65, X80, S460, S700, S890 and S960
- Ultra high strength steels (UHSS): 1180 MPa and 1480 MPa
- Inconel: 625 and 718

We have also demonstrated aluminium to steel dissimilar joining.



E6 FSW PCBN tools were utilised to successfully weld on 25 mm steel with simultaneous doublesided FSW

FSW provides the following competitive advantages:

- Improved weld quality and productivity
- Safer work area for improved health and safety in operations
- More environmentally sustainable welding process
- Excellent fatigue resistance and fatigue life
- Effective solution to join dissimilar materials
- Custom engineered to order tool designs



Element Six is a global leader in the development and production of synthetic diamond and tungsten carbide solutions. For over 75 years, our innovation expertise has enabled a wide range of industries, from aerospace and mining, to semiconductors and sensing. Part of the De Beers Group, our primary manufacturing sites are located in the US, UK, Ireland, Germany and South Africa. Our sites in Ireland, Germany and South Africa are ISO 50001 certified. All sites are ISO 14001 certified.

Through the De Beers Group, Element Six is a member of the UN Global Compact (UNGC). The UNGC drives business awareness and action towards the UN Sustainable Development Goals (SDGs), focussing on 10 principles around human rights, labour, environment and anti-corruption. Element Six works within the De Beers Group Building Forever commitment and Science Based Target Initiative (STBi), which is also based on the UNGC principles.

We incorporate and take responsibility for these principles through the Element Six Code of Conduct, Our Values, Responsibilities and Policies.

At Element Six, we have active communities working towards sustainability from a variety of angles, such as environmental impact, inclusion, diversity and community outreach, both internally and externally.

Contact us

E fsw@e6.com

e6.com | e6cvd.com

