



SHAPING THE FUTURE OF FRICTION STIR
WELDING WITH INNOVATION AND EXPERTISE.



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FSW is now accessible
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Our references, quality standard, global presence and sales partners

1 | EXECUTIVE SUMMARY

FSW IS NOW ACCESSIBLE



OUR MISSION

WE MAKE FSW ACCESSIBLE

Stirweld leads in **Friction Stir Welding (FSW)**, aiming to integrate this innovative technology into your workflows smoothly. We offer advanced, cost-effective solutions, broadening FSW use beyond high-value sectors since 1995. Our team is dedicated to democratizing FSW, pushing industries forward with adaptable, cutting-edge solutions.



KEY BENEFITS

WHY CHOOSE STIRWELD FOR YOUR FSW EQUIPMENTS?



Cost efficiency solutions

Stirweld FSW equipments are much more cost-effective than dedicated FSW machines or robots, adaptable to existing machining centers without needing full purchases.



Quick setup

Setups are effortless! Within two days, you'll master operations for a quick production start. With inventories on hand, delivery is guaranteed within a month.



Continuous support

Our commitment surpasses the sale, offering ongoing support from FSW experts for head integration, ensuring exceptional service and assistance.

2 | FSW PROCESS

UNLOCKING FRICTION STIR WELDING



4 STEPS FOR HIGH-QUALITY WELDS

Friction Stir Welding is a unique and intricate process that demands precision at every step. By understanding each phase of the procedure, one can ensure the highest quality of welds, which are both robust and immaculate.

- 01 | Parts are clamped.
- 02 | The tool plunges into the material.
- 03 | The tool moves along the weld seams & stirs the parts.
- 04 | The tool rises vertically leaving a hole.

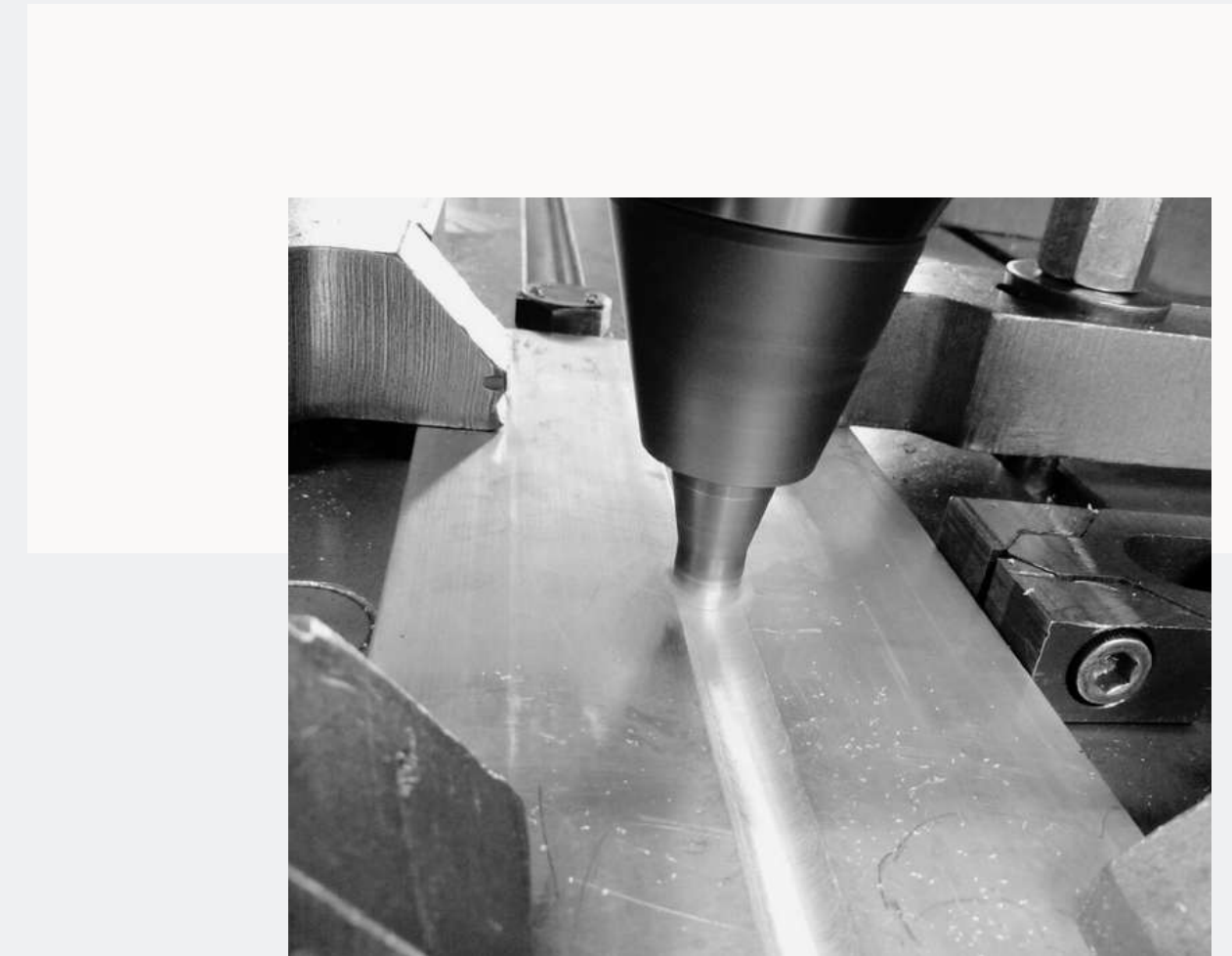


FSW PROCESS

KEY BENEFITS OF FSW

Highly Advanced and Trusted: With a TRL of 9, FSW is a proven method for joining materials like aluminum and copper, preserving their mechanical integrity.

Versatility in Aluminium Welding: It uniquely welds high-strength aluminum series (2000, 6000, 7000) and enables mixed material joins, including copper and steel.



Eco-Friendly Welding Solution: FSW leads in sustainability by eliminating the need for pre-weld cleaning, wire feeding, and shielding gases, making the process emission and fume-free.

Innovative Cold Welding Technique: FSW redefines cold welding, using mechanical deformation without melting, reducing porosity risks.

3 | FSW APPLICATIONS

WHAT INDUSTRIAL APPLICATIONS
BENEFIT FROM FSW?



FSW APPLICATIONS



Large cold plate



Standard



Copper



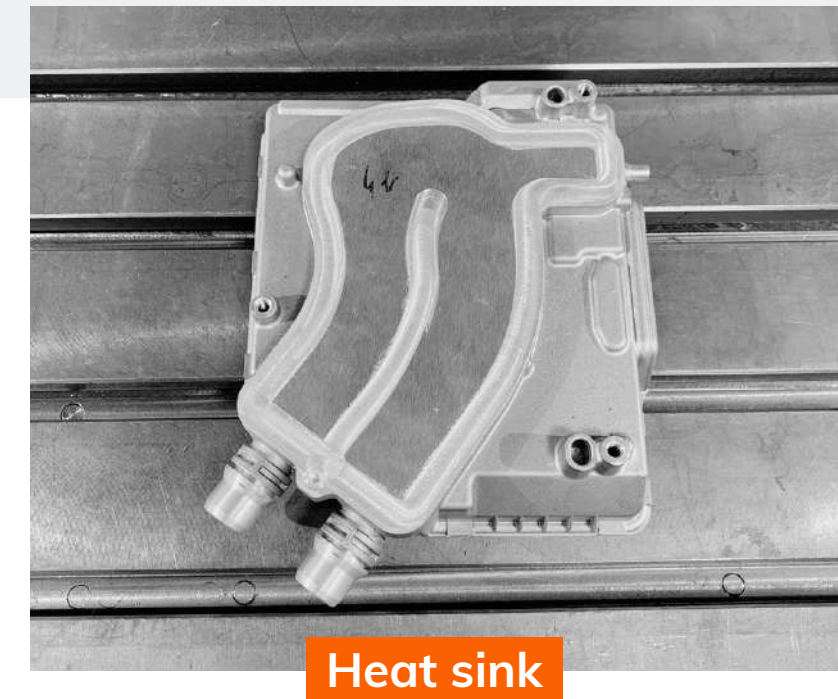
Thin cold plate

LIQUID COLD PLATE

- **No risk of leak:** Solid-state FSW process eradicates porosity, ensuring a leak-proof seal in both aluminium and copper.
- **2x thermal boost:** Enables use of high-conductivity materials like AA1050 and copper doubling thermal efficiency.
- **Cost divided by 10:** Up to 10x less costly than traditional methods like copper tubing, brazing or conventional welding.
- **Higher resistance:** Achieves mechanical strengths of up to 4300 psi (300 bar) without the need for post-heat treatment.

DIE CAST PARTS

- **100% waterproof:** 15 years of leak-free guarantee.
- **Cost reduction up to 3:** Replacement of screwing and sealing.
- **Higher resistance:** The mechanical strength is twice higher than screwing.



FSW APPLICATIONS



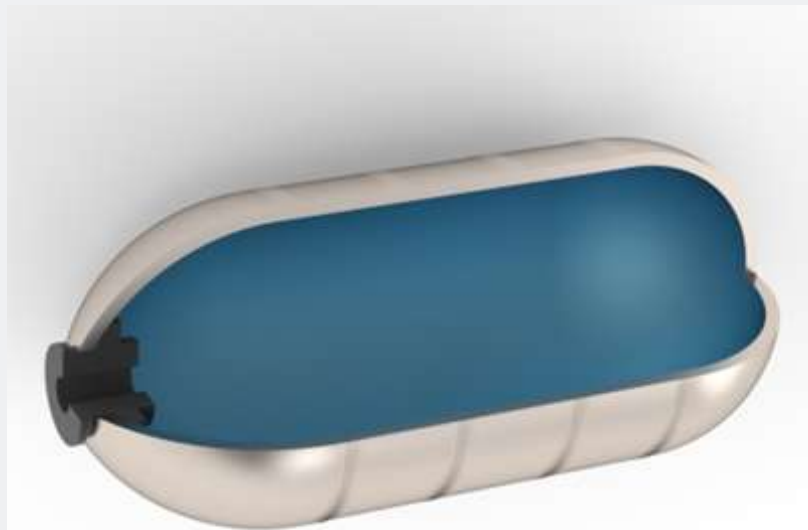
Under Ø 300 mm



Under Ø 300 mm



Space launchers



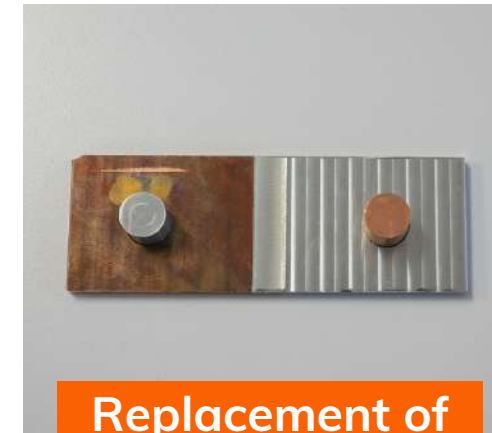
Exceeding Ø 300 mm

ALUMINIUM TANK

- **No risk of leak:** Ranging from vacuum to any liquid, as FSW is a solid-state welding process, thus eliminating porosity.
- **Cost divided by 2:** Up to 2 times less expensive than arc welding or laser welding.
- **Weight reduction up to 2:** High strength aluminium (2000 or 7000 series), easily welded with FSW, replaces stainless steel.
- **Higher resistance:** Capable of withstanding up to 280 bar (4000 psi) without requiring post-heat treatment.

BUS BAR

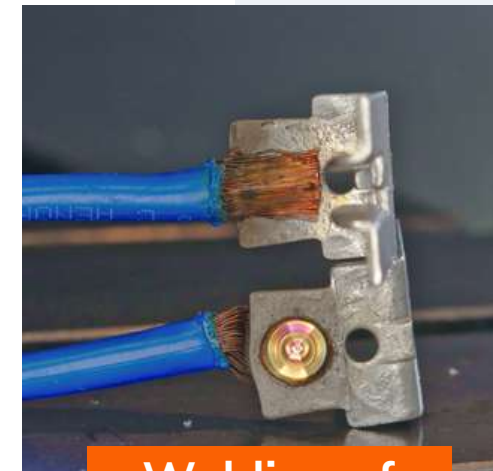
- **No risk of unscrewing:** fatigue resistance doubled vs. screwing.
- **Cost divided by 3:** 3x cost reduction vs. conventional screwing.
- **Solution for copper shortage:** Enables copper-aluminium welding.
- **Perfect conductivity:** 2x conductivity vs. screw connections.



Replacement of
copper by
aluminium



Replacement of copper
by aluminium



Welding of
copper
components



Welding of brass
components

STIFFENED PANELS

- **Longer panels:** With FSW, aluminium profiles, typically under 400mm, can be butt welded to overcome this limitation.
- **Permanent joining:** This irreversible method requires no drilling or addition of external elements, offering excellent corrosion resistance.
- **Lighter & enhanced rigidity:** Profile optimization with FSW eliminates unnecessary shapes, resulting in more rigid and lighter panels.
- **Cost-effective production:** When compared to riveting, MIG or laser welding, FSW offers a more economical solution.



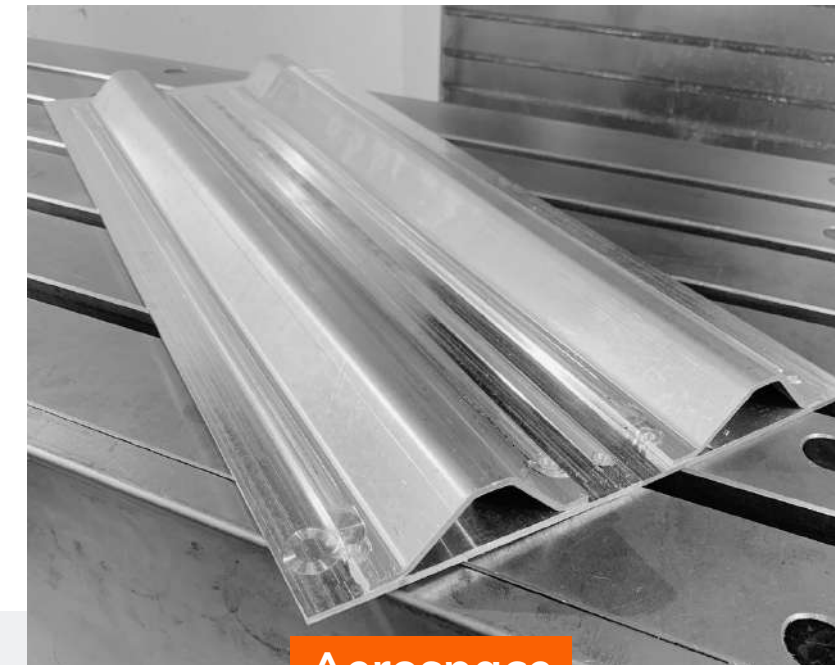
Automotive



Shipbuilding



Railway



Aerospace

FSW APPLICATIONS



Vacuum flanges



Vacuum chamber



Vacuum flanges



Vacuum chamber

VACUUM APPLICATIONS

- **Leak-proof reliability:** Achieve 100% leak-proof joints with solid-state welding, ensuring long-term durability.
- **Cost-efficient solution:** Save up to 10 times on costs compared to copper tubing, brazing, or traditional welding methods.
- **Non-magnetic & low nuclear activation:** Made entirely from aluminum, offering non-magnetic properties and minimal nuclear activation.

FSW APPLICATIONS



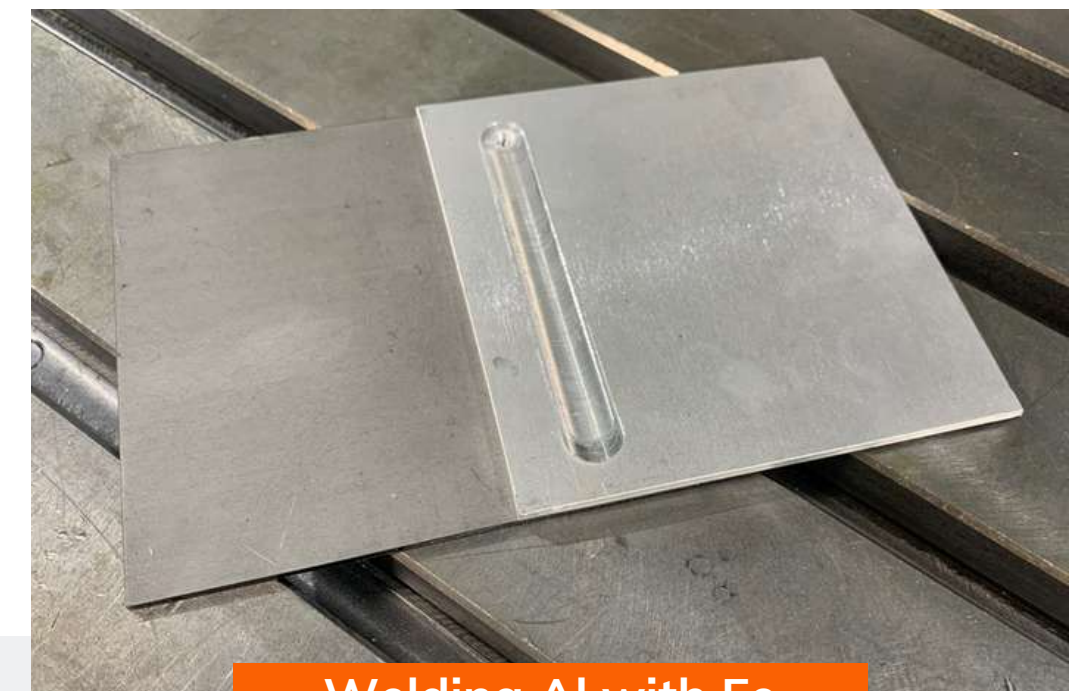
AM parts



Tailor Welded Blank



Mounting bracket



Welding Al with Fe

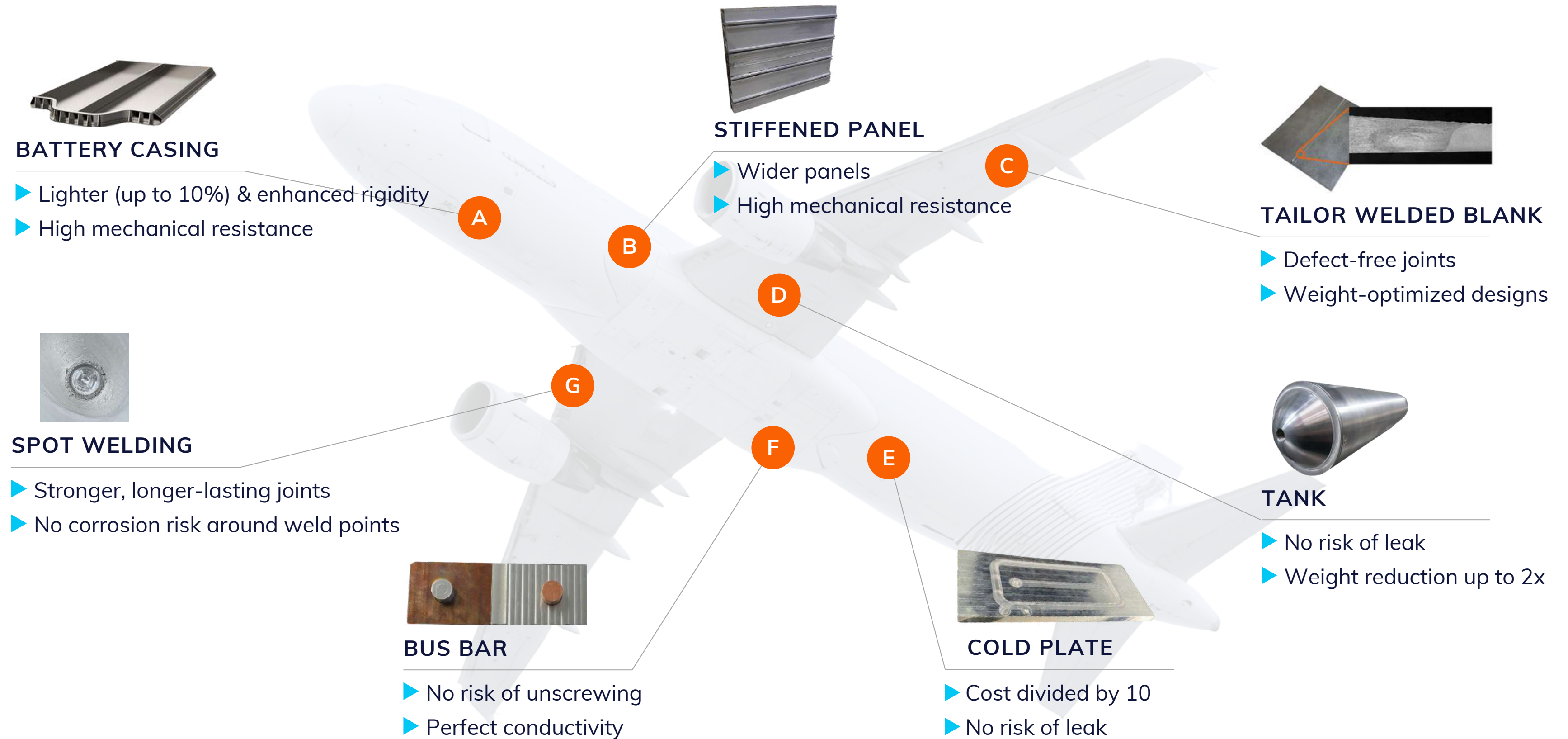
OTHER APPLICATIONS

4 | FSW IN THE INDUSTRY

WHAT DIFFERENT PARTS CAN BE
WELDED BY INDUSTRY?



FSW IN THE AERONAUTIC INDUSTRY



FSW IN THE SPACE INDUSTRY



STIFFENED PANEL

- ▶ Wider panels
- ▶ High mechanical resistance



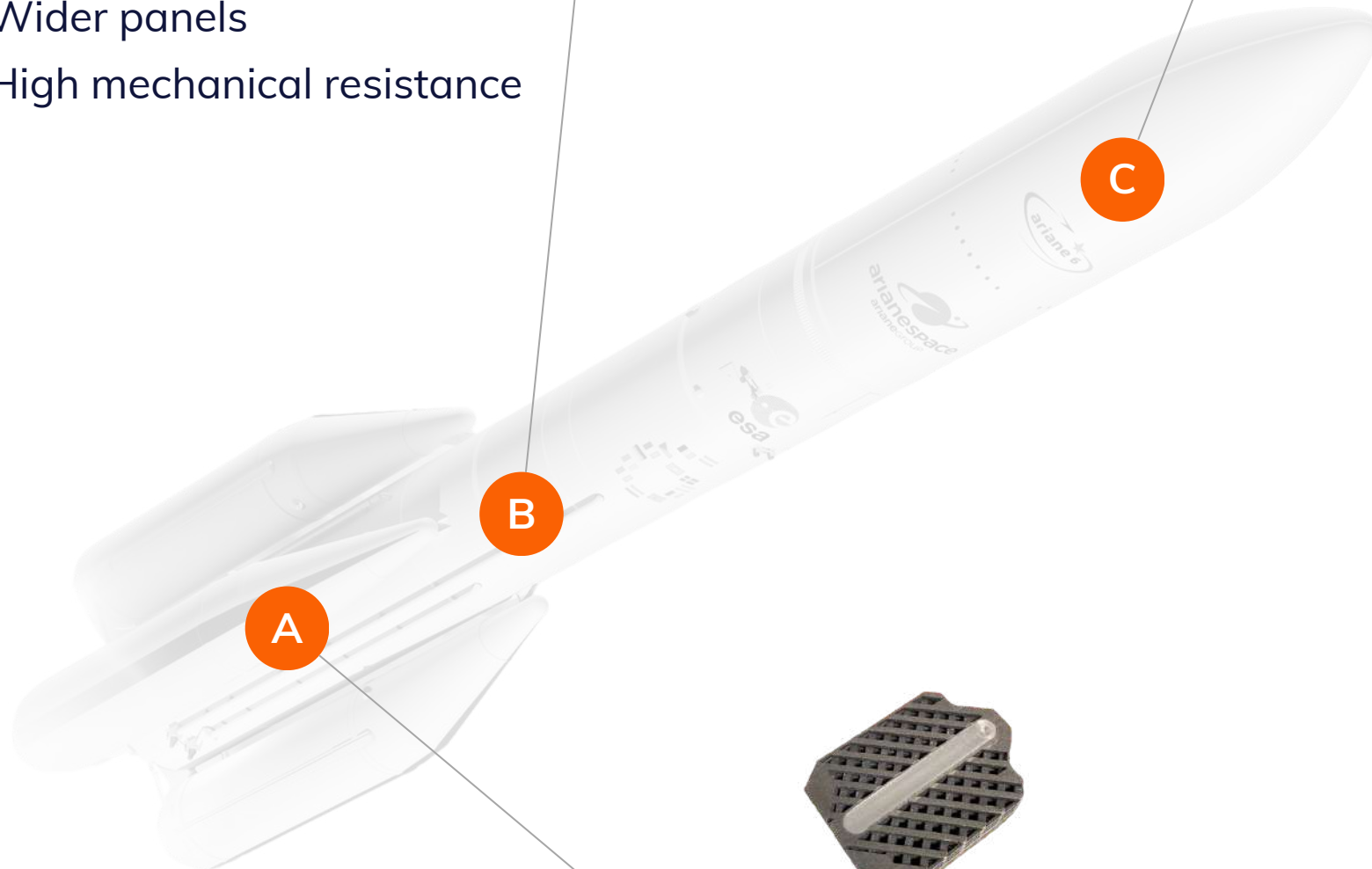
TANK

- ▶ No risk of leak
- ▶ Weight reduction up to 2x



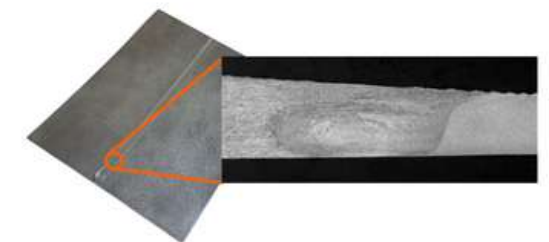
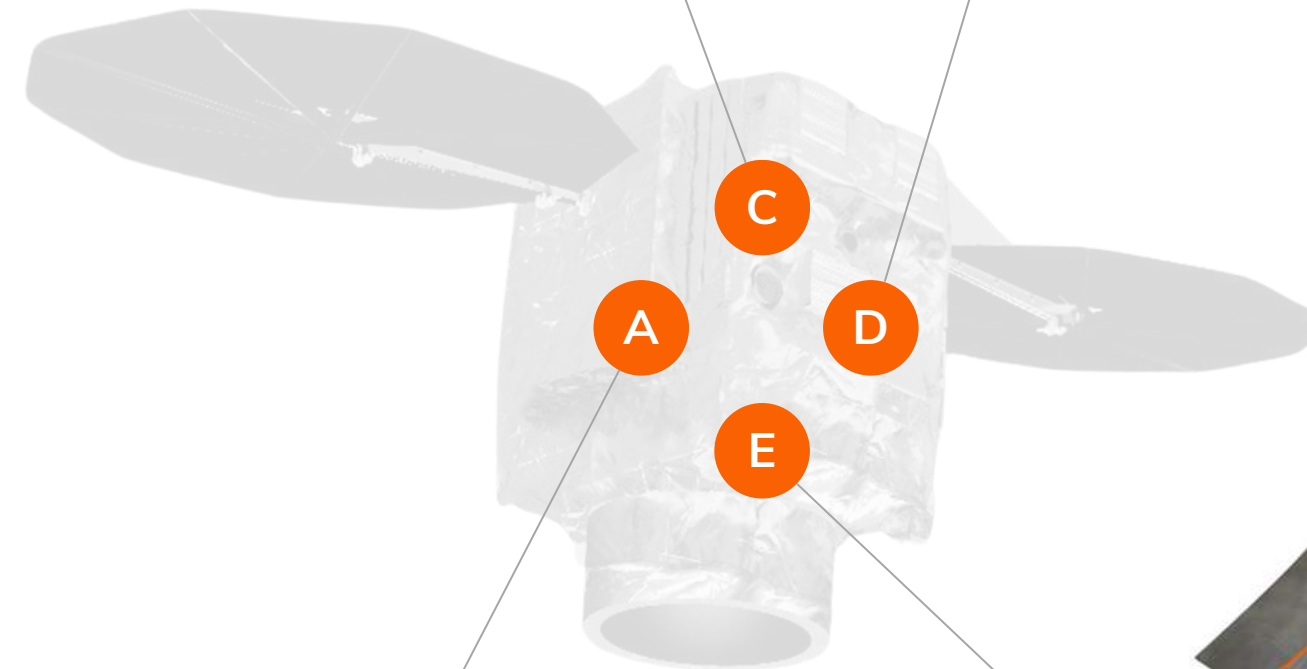
COLD PLATE

- ▶ Cost divided by 10
- ▶ No risk of leak



WELDING OF ADDITIVE MANUFACTURING

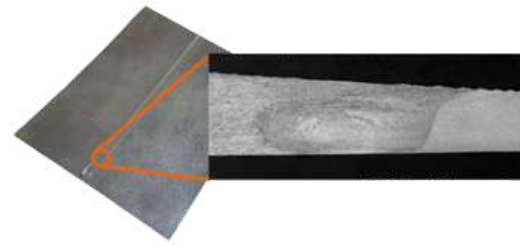
- ▶ Mechanical strength equivalent to base metal
- ▶ 100% leak-proof



TAILOR WELDED BLANK

- ▶ Defect-free joints
- ▶ Weight-optimized designs

FSW IN THE AUTOMOTIVE INDUSTRY



TAILOR WELDED BLANK

- ▶ Defect-free joints for stamping after welding
- ▶ Weight-optimized designs



COLD PLATE FOR INVERTERS, BATTERY PACK AND ON-BOARD CHARGER

- ▶ Cost divided by 2
- ▶ No risk of leak



SPOT WELDING

- ▶ Stronger, longer-lasting joints
- ▶ No corrosion risk around weld points



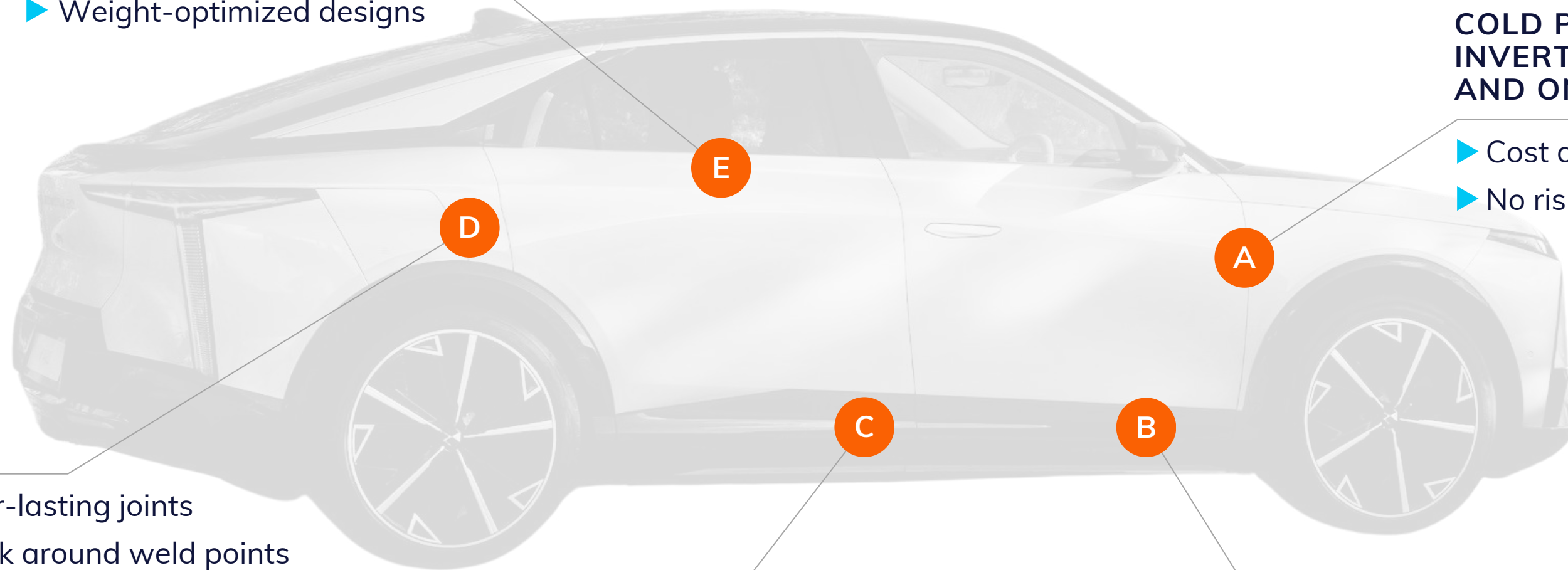
BATTERY TRAY

- ▶ Lighter (up to 10%) & enhanced quality
- ▶ High mechanical resistance mainly for crash test



BUS BAR

- ▶ No risk of unscrewing
- ▶ Perfect conductivity

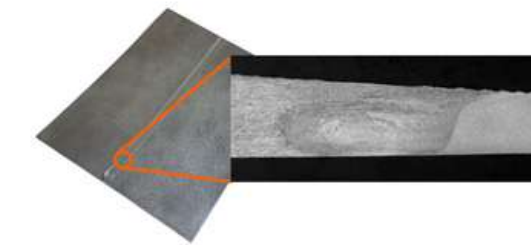


FSW IN THE RAILWAY INDUSTRY



SPOT WELDING

- ▶ Stronger, longer-lasting joints
- ▶ No corrosion risk around weld points



TAILOR WELDED BLANK

- ▶ Defect-free joints
- ▶ Weight-optimized designs



BATTERY CASING

- ▶ Lighter (up to 10%) & enhanced rigidity
- ▶ High mechanical resistance



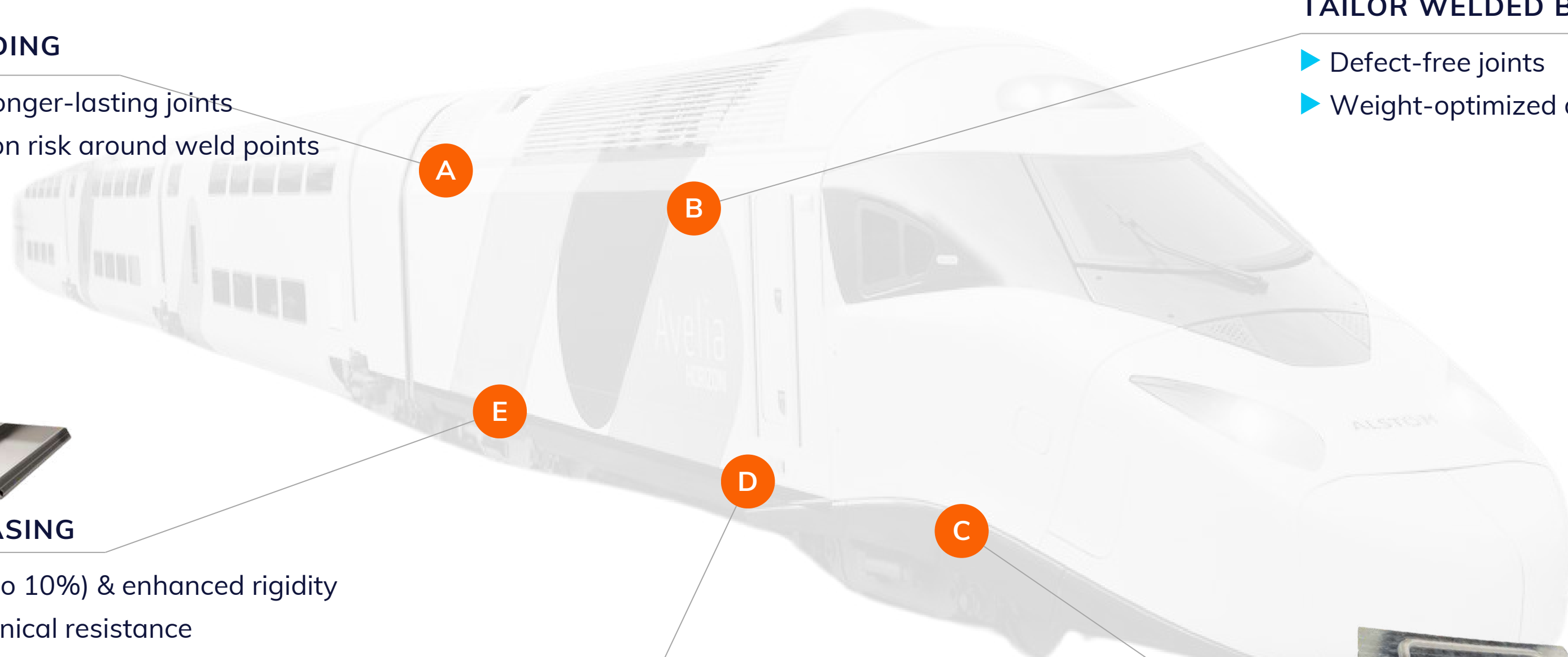
BUS BAR

- ▶ No risk of unscrewing
- ▶ Perfect conductivity



COLD PLATE

- ▶ Cost divided by 10
- ▶ No risk of leak

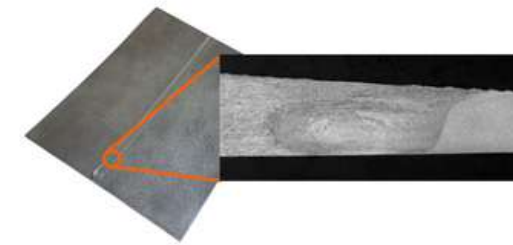


FSW IN THE SHIPBUILDING INDUSTRY



SPOT WELDING

- ▶ Stronger, longer-lasting joints
- ▶ No corrosion risk around weld points



TAILOR WELDED BLANK

- ▶ Defect-free joints
- ▶ Weight-optimized designs



STIFFENED PANEL

- ▶ Wider panels
- ▶ High mechanical resistance



BATTERY CASING

- ▶ Lighter (up to 10%) & enhanced rigidity
- ▶ High mechanical resistance



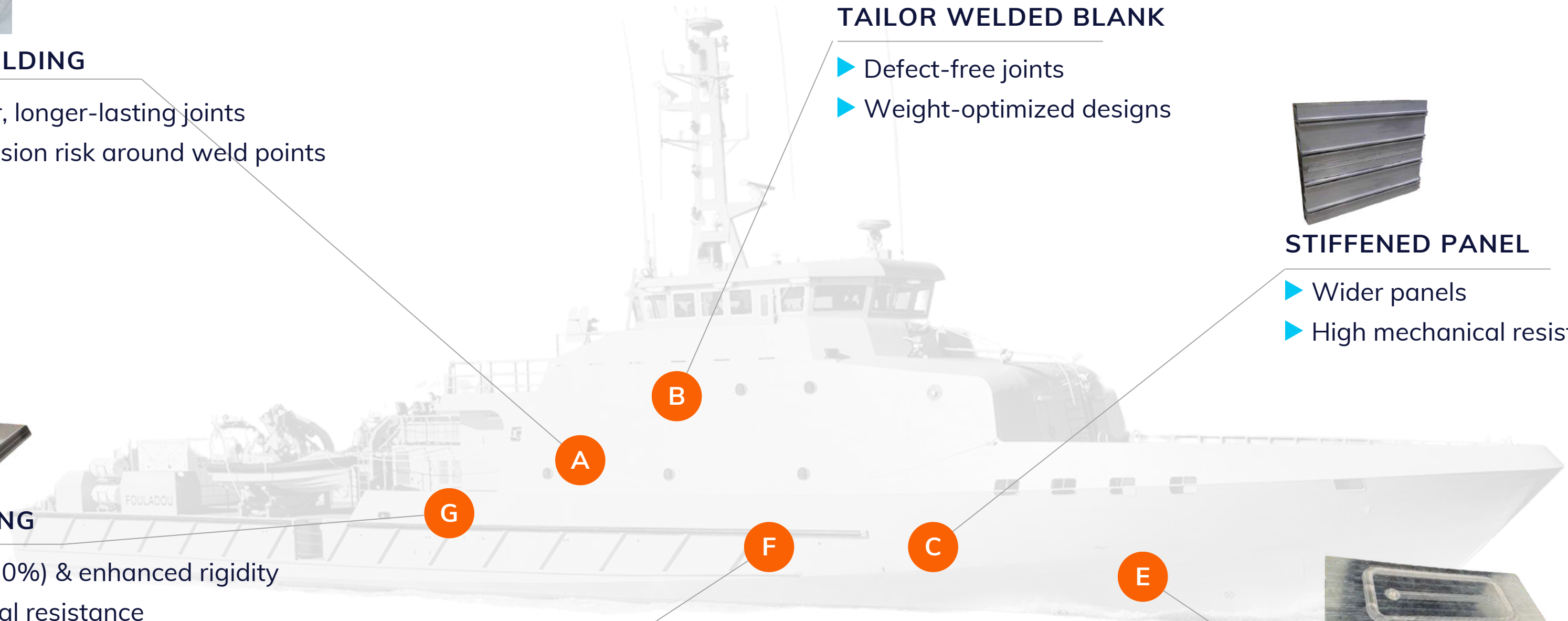
BUS BAR

- ▶ No risk of unscrewing
- ▶ Perfect conductivity



COLD PLATE

- ▶ Cost divided by 10
- ▶ No risk of leak



5 | STIRWELD FSW EQUIPMENT

THE LEAST EXPENSIVE & MOST
VERSATILE FSW SOLUTION ON THE
MARKET



FROM HIGH-COST MACHINES TO SCALABLE INNOVATION.

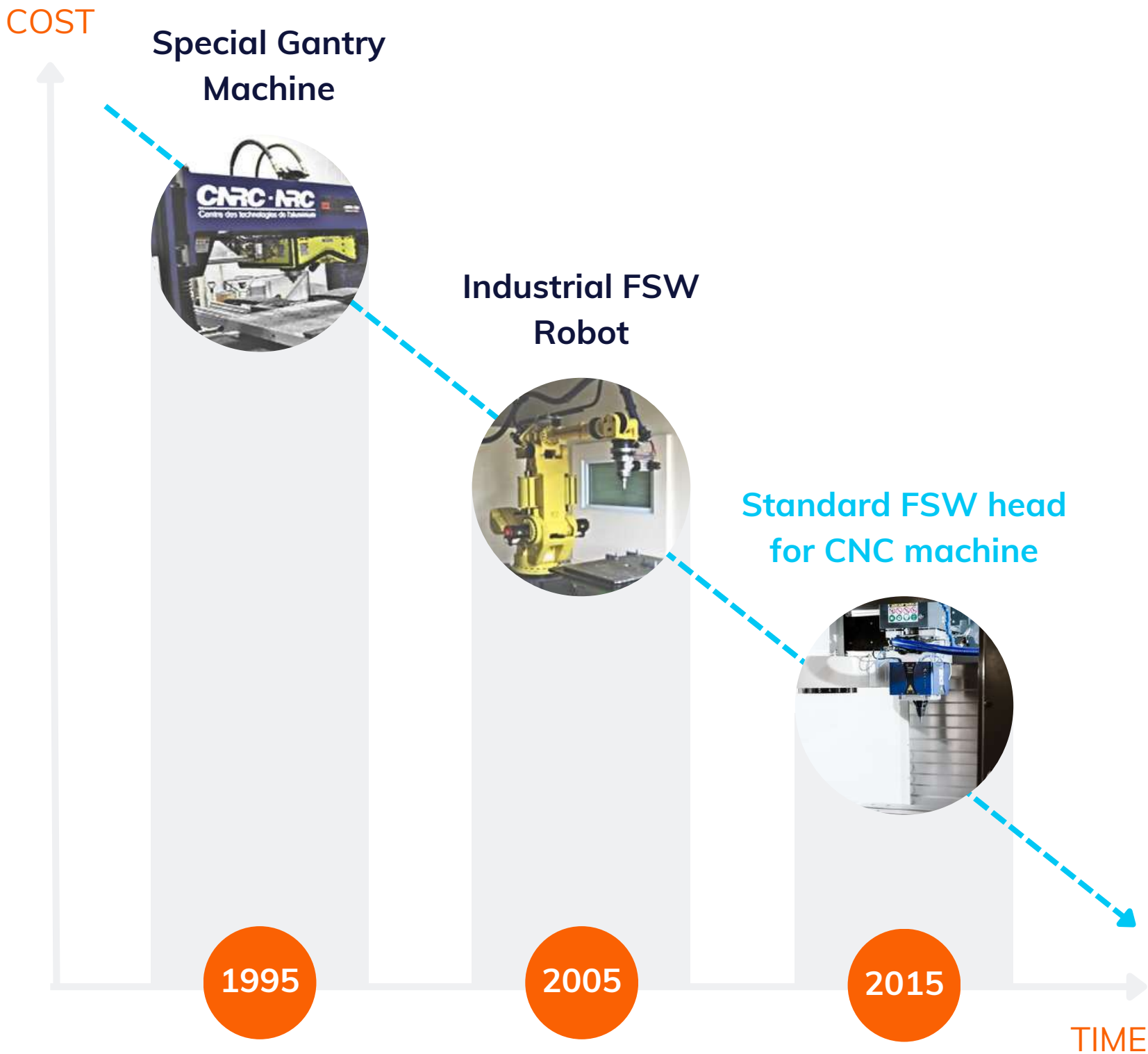
FSW is now accessible.

The Stirweld FSW head turns any CNC machine into a friction stir welding cell:

- ▶ Reducing equipment costs by up to 80% compared to traditional solutions.
- ▶ Allowing a flexible use of machines, then better filling of production facilities.

Already 72 FSW heads installations worldwide (R&D and serial production).

	Special gantry	Industrial robot	FSW head
Cost	€€€€€	€€€€	€
Footprint	XXL	XL	Existing CNC machine
Delivery time	≈ 12 months	≈ 6 months	3 months
Flexibility	Low	Medium	High





STANDARD FSW HEAD FOR CNC MACHINE



Force control: ensures consistent tool penetration for high-quality welds, mitigating defects like flash and wormholes as per ISO 25239 standards.



Force recording: the control adaptator tracks welding force, enabling repeatability and real-time quality oversight.



Tool cooling: water and air work in tandem to provide continuous cooling, ensuring constant weld quality and enhancing the FSW head durability.



FSW forces & vibrations protection: a specialized coupling designed by Stirweld engineers protects against machine vibrations during welding operations.



FSW SPINDLE FOR ROBOT



No hydraulic power: operates without hydraulic power, making it more cost-effective and maintenance-free, relying solely on electrical and pneumatic power.



Adaptability: designed for exceptional versatility, it is suitable for all robot integrators and aligns seamlessly with every high payload robot model on the market.



Hybrid FSW spindle: merge welding and milling tasks effortlessly at one station, equipped with an innovative automatic tool changer.



Automatic tool change: experience the convenience of automatic tool changing and hands-free management of FSW tool lifespan.



SMART FSW HEAD



Low cost investment: the investment cost for the Smart FSW head is lower when compared to specialized machines or robotic workstations.



Adaptability: even without standard machining centers, the FSW head is designed to be compatible with all CNC machines.



Easy to use and to install: you only need two days of training to become proficient with the Smart FSW Stirweld head.

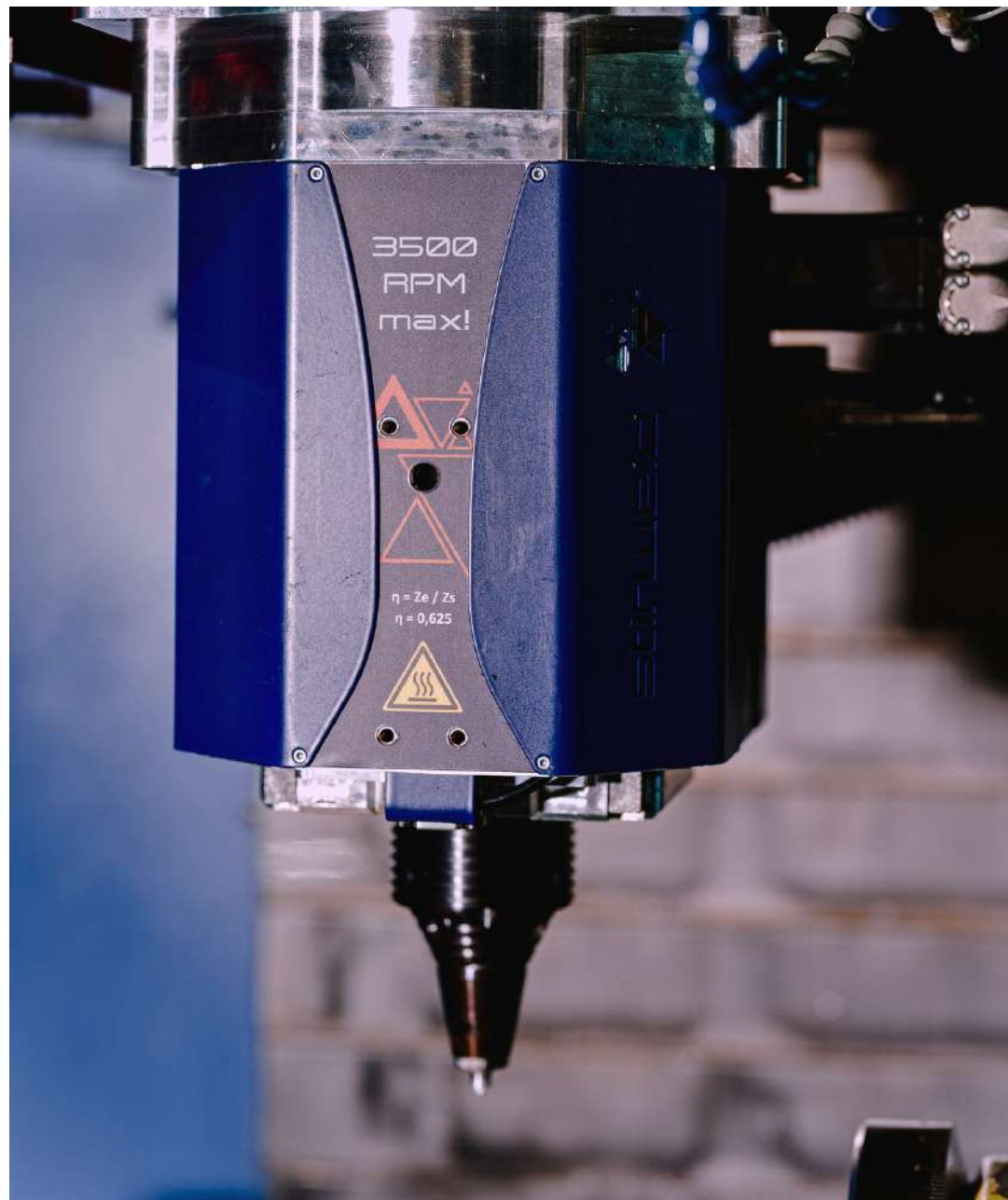


Quick delivery time: our inventory is stocked with heads, allowing us to deliver your equipment in under one month.



Advanced HMI: real-time quality control enables the optimization of welding parameters, tailored to fit your specific application needs.

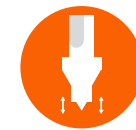




RETRACTABLE PIN FSW HEAD FOR CNC



Force control: with an 18 kN payload and +/- 5 N accuracy, this head offers superior weld quality through forging force monitoring and precise FSW parameter tweaks.



Pin length control: adjust pin lengths from 0-10 mm with a precision of +/- 0.01 mm. It offers unmatched precision in welding with a vertical force of up to 18 kN and retractable speeds of 0-3 mm/s.



Head temperature: prioritizing safety, the head features an emergency stop and dual temperature readings for consistent temperature regulation.



Head usage: An integrated recording system monitors welding time and usage, pivotal for maintenance and consistent performance.



Click here!

STIRWELD FSW
EQUIPMENT

FSW TOOL & TOOL HOLDER



Unmatched in Quality and Performance: What Sets the FSW Tools from Stirweld Apart?

Dive into the excellence of FSW tools from Stirweld. Affordable, top-quality and endorsed by industry giants like Ariane. Experience intuitive features such as the Whistle Notch system and unparalleled traceability. Plus, with our extensive stock of the most common tools, order today and **they could be at your factory within 48 hours**. Choose Stirweld for a seamless experience, prompt delivery and dedicated support.

 [Download our catalogue](#)

6 | STIRWELD FSW SERVICES

EXPERIENCE STIRWELD ADVANTAGE:
UNMATCHED FSW EXPERTISE



FSW PROTOTYPING

FSW revolutionizes welding, and at Stirweld, we excel in it. We guide you from concept to initial production, ensuring precision, efficiency, and quality with FSW. Explore our four-stage FSW prototyping service:

- 01** | FSW feasibility study and design recommendations.
- 02** | Design and manufacturing of FSW prototype clamping jig.
- 03** | Determination of your FSW parameters by our experts (WPS/PQR).
- 04** | FSW of your prototype.

→ [Know more](#)



STIRWELD FSW
SERVICES

OUR OTHER SERVICES

www.stirweld.com



FSW DESIGN ASSISTANCE

Stirweld specializes in FSW design support, offering a tailored, step-by-step approach from confidentiality agreements to design optimization. We ensure FSW compatibility, production efficiency, and quality. Discover how our key steps can elevate your projects with FSW.

[→ Know more](#)



FSW CLAMPING SYSTEM

Stirweld FSW clamping system excels in versatility and precision with three types: standard, simple, and complex jigs, each in manual and automatic versions, designed to meet specific part requirements and welding paths.

[→ Know more](#)



FSW TRAINING SESSIONS

Our two-day Friction Stir Welding training program offers multiple modules that teach you how to increase your sales using FSW. Learn to design your parts for FSW compatibility and to identify the optimal welding parameters to streamline the process.

[→ Know more](#)

7 | WHO ARE WE?

OUR REFERENCES, QUALITY
STANDARD, GLOBAL PRESENCE AND
SALES PARTNER



WHO ARE WE?

OUR REFERENCES

RENEWABLE ENERGY



METAL WORKING



AUTOMOTIVE



AERONAUTICS



SPACE



INSTITUTE AND UNIVERSITY



WHO ARE WE?

OUR QUALITY STANDARDS



ISO 9001 Standard

The ISO 9001 standard guarantees the proper implementation of our company's quality management system.



ISO 25239: FSW

Stirweld rigorously follows the guidelines set out in ISO 25239 – Friction Stir Welding: design of weld joints, qualification of welding operators, specification and qualification of welding procedures, quality and inspection requirements.



TWI industrial member

Stirweld is an industrial member of TWI, a leading independent research & technology organization and the inventor of FSW.



American welding society D17.3

Requirements for friction stir welding of aluminium aerospace hardware (design of welded joints, qualification of procedures & operators, fabrication & inspection).

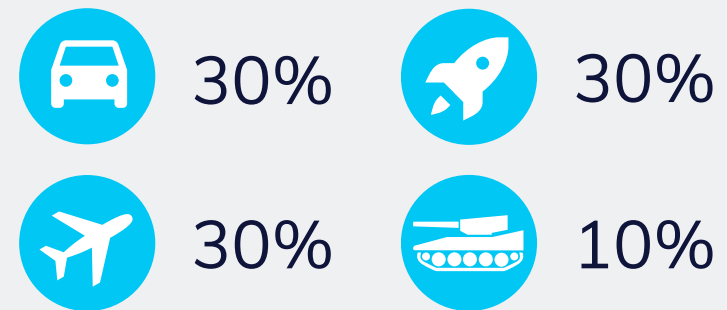


Approved Exporter

Stirweld is certified as approved exporter, which ensures the efficiency and safety of each shipment around the world. Our export areas are: North America, South America, Europe, Asia, Middle East, Africa.

WHO ARE WE?

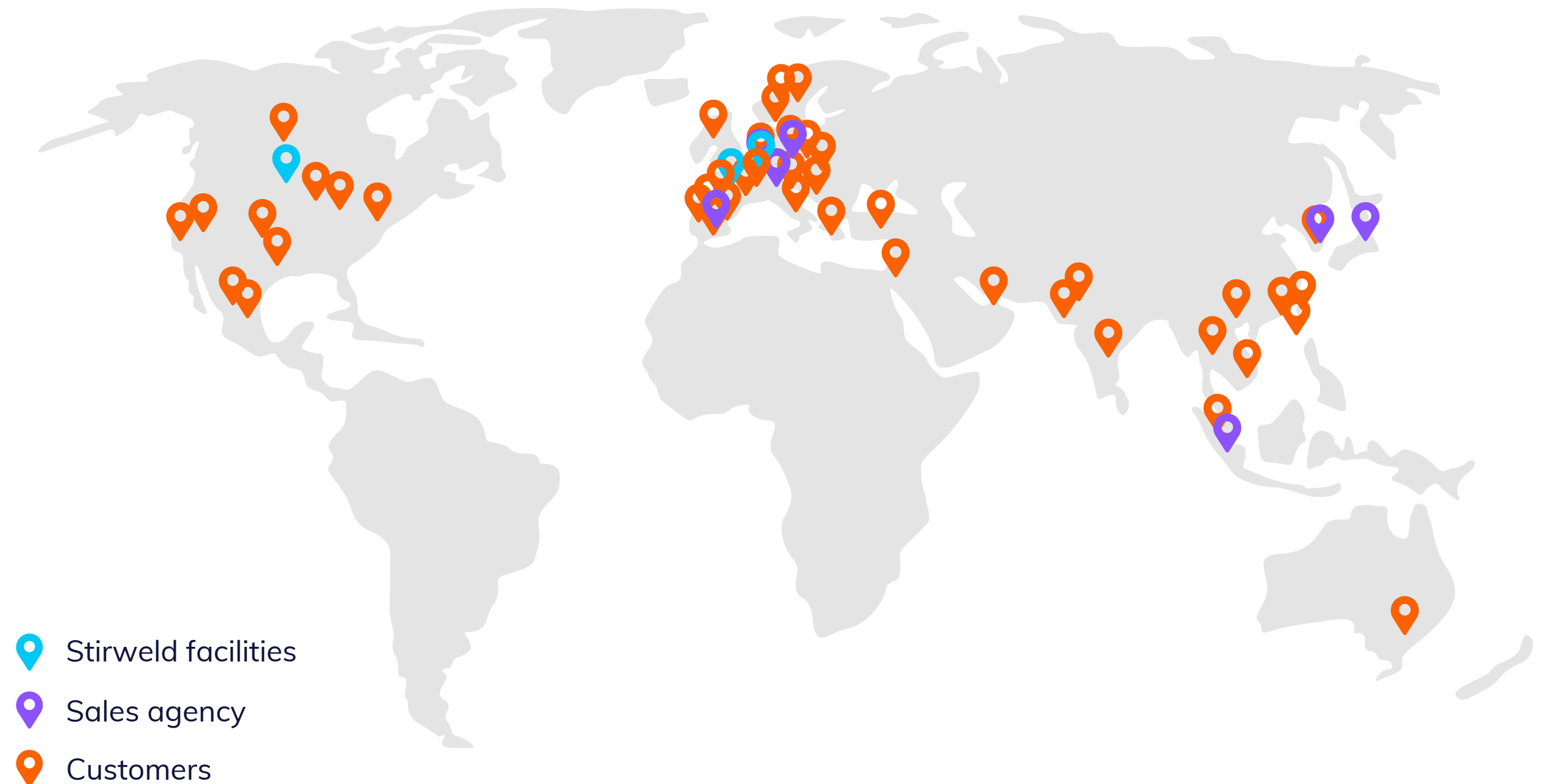
OUR GLOBAL PRESENCE



74 FSW heads installed worldwide

39 team members

1 000 000
welded parts by our customers





WHO ARE WE?

OUR FACILITIES



4K Rue du Lieutenant Colonel Dubois
35000 Rennes
FRANCE



2791 Research Drive, Rochester Hills
MI 48309
USA



Röhrer Weg 8
71032 Böblingen
GERMANY



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WHO ARE WE?

HOW TO SUCCESSFULLY IMPLEMENT FSW IN YOUR COMPANY?

www.stirweld.com



ENGINEERING OF YOUR PART

- We carry out a free part analysis.
- We calculate your TCO - Total Cost of Ownership.
- We build prototypes in small or large batch (pilot line).
- We secure the compatibility of your CNC machine.



COMMISSIONING AND TRAINING

- We install and we train your team: CNC operators, welders, designers quality controllers, sales team.
- We supply all the necessary documents (standards & procedures) to start your production immediately.



AFTER SALES SUPPORT - HOTLINE

We can support you on any topic:

- Welding parameters,
- Welding defects,
- Quality control,
- Spare parts and training.

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WHO ARE WE?

STIRWELD JOURNEY

2013

INCEPTION OF THE PROJECT

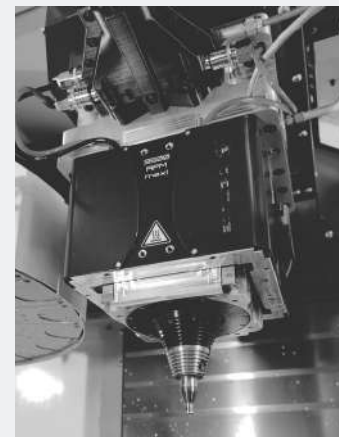
Facing the high costs of FSW machines, our CEO Laurent Dubourg sought a more affordable solution: 'Why not adapt FSW for CNC?'



2017

STIRWELD BIRTH

Tier 1 supplier for the Ariane 6 program.



2022

STIRWELD LANDS IN USA

Stirweld has expanded internationally, 32 heads globally, 25-strong team, a US subsidiary, Stirweld Inc., Detroit, MI.



2024

FUND RAISING

6 million euros raised for the development of four new subsidiaries and the doubling of our workforce by 2026.

2015

FIRST DEVELOPMENT

First FSW head for CNC.



2020

FUNDRAISING OF 2 MILLIONS €



2023

NEW FACILITIES

New space to accommodate its 26 employees, 2 machines and assembly shop.



2025

OPENING OF OUR 2ND SUBSIDIARY

Stirweld continues its expansion with the creation of a subsidiary in Germany.





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