

“I SHALL RISE AGAIN” ROBOTIC SURVEY, REPAIR & AGILE MANUFACTURE

Conventional welding requires highly skilled workers, is dangerous and low productivity



Repair of ship hull damage requires very expensive manual divers or dry docking



Will introduce high productivity Friction Stir Welding of steel to European shipyards.



Friction Stir Welding is mechanised, low-distortion, safer welding solution; applicable to (modular) fabrication and underwater repair



RESURGAM (robotic survey, repair & agile manufacture) proposes to leverage recent ground-breaking developments in Friction Stir Welding (FSW). Launched on February 1st 2021, this multi-disciplinary consortium representing European shipbuilding and maintenance stakeholders ([ACLUNAGA](#), [NED-Project](#), [AISTER](#), [GISBIR](#), [EWF](#)), research organisations with specialist expertise in the relevant fields ([TWI](#), [University of Limerick](#), [University of Lancaster](#) [Joining 4 Innovation Centre \(J4IC\)](#), [TU Delft](#)) and specialist industrial SMEs able to provide rapid development of prototype hardware ([Forth Engineering](#), [STIRWELD](#), [ESI](#), [E6](#))

For 36 months, across 9 countries (Belgium; Netherlands; United Kingdom; Ireland; Turkey; Cyprus; Spain; France and Poland) the project will be able to increase competitiveness and growth within the European market, particularly in international sectors, reinforcing and growing European employment and the necessary skills development for the successful uptake of innovative production processes and technologies. Many of the challenges faced by small- and medium-sized EU shipyards can be addressed by improving their productivity when fabricating new, high-technology vessels, increasing their access to the specialist repair and maintenance market.

A recent breakthrough in the tooling material research available for FSW now shows potential to enable this process for welding of steel structures with consistency. Traditionally, it has only been possible to use FSW in aluminium, so the advances in the field represent a huge opportunity to improve the productivity of European shipyards.

RESURGAM will combine FSW with the new tool material to deliver:

- The introduction of low cost friction stir welding systems for steel that can be retrofitted to their existing Computer Numerical Control (CNC) machines;



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101007005.

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- The introduction of AI-enabled, robotic FSW systems capable of making underwater weld repairs.

These fabrication and repair capabilities, backed by the secure, digital Industry 4.0 infrastructure and techniques already widely used in the automotive and aerospace industries, will facilitate the rapid, coordinated but modular manufacture of ships and watercraft throughout Europe.

Practically, this will allow damaged ships anywhere in the world to benefit from the option of being repaired in-situ, without the need to travel to the nearest dry dock. Ship owners will be able to choose the most suitable yards to conduct their repairs rather than the nearest, and the repairs may be undertaken by yards with no dry dock of their own, thus significantly increasing the number of yards available to undertake such work. The new and improved process will be implemented by European shipyards and naval architects in Europe.

The positive economic impact of RESURGAM will generate gains in the modular construction of new ships, in modular ship maintenance, and in ship operation delivered by modular outfitting. Economic benefits will allow use of in-water/underwater maintenance to the wider European ship maintenance sector, maximising EU added value by appropriate means of minimising knowledge and technology leakage.

The use of FSW for under water and under oil welding of steel will allow us to:

- Deliver a prototype of underwater FSW (U-FSW) head capable of robotic deployment;
- Deliver an AI-enabled robotic UFSW system capable of performing inspection and underwater FSW in confined spaces;
- Deliver in yard FSW fabrication capabilities for modular build, modifications and retrofitting;
- Enable better connectivity and collaboration between European value chain stakeholders to drive modular and flexible manufacturing of ships and/or rapid repair, modification and maintenance of ships in water;
- Ensure improvements for AI-enabled robotic system, modular build capabilities and supporting digital infrastructure;
- Develop tailored business models to support the sustainability and commercialisation of RESURGAM outputs.

For more information you can visit us at <https://www.resurgamproject.eu/>.



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