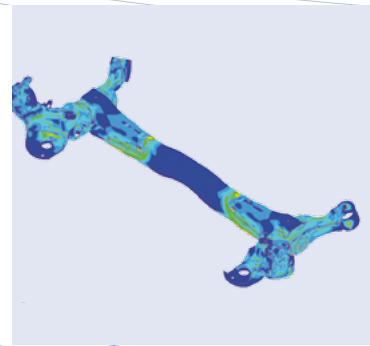
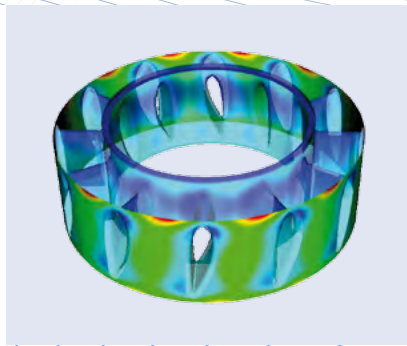
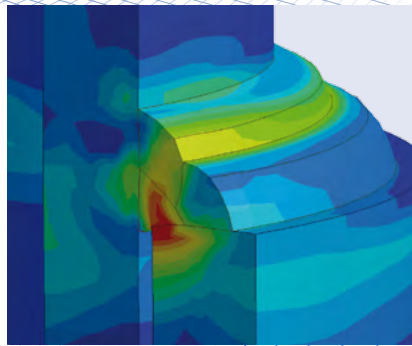


# Welding Simulation Suite

From Fast Distortion Engineering & Fabrication Planning  
to Weld Repair & Root Cause Analysis



# ESI's Welding Simulation Suite

A single virtual welding manufacturing software for all your needs

## IF YOU ...

- Want to virtually manufacture each welded design before it is fabricated or repaired.
- Work with structural steel, complex material, or dissimilar metals.
- Require your welded designs to meet tolerance requirements, at minimum cost and within minimum time - without going into all the details of complex physics.
- Need to optimize the distortion of a welded assembly, taking into account all process details.
- Need to ensure that the microstructure after welding meets your requirements.
- Need to determine residual stresses as basis for a high cycle low amplitude fatigue analysis, and to discover problem zones in the design.
- Want to understand the stress and fracture mechanics of the cladding, heat treatment, and welding process of large welded assemblies with dissimilar metals caused by the fabrication or repair process.

## WITH THE WELDING SIMULATION SUITE

*"Rolls-Royce found WELD PLANNER impressive due to the time taken to perform the analysis, the quality of results produced and the flexibility it offered in the early design cycle."*

Scott Wood, CEng MIMechE – Mechanical Engineer - Advanced Engineering, Transmissions, Structures & Drives, Rolls-Royce

*"The very good interaction between our units and the ESI engineers and managers needs to be sustained as it gives to AREVA more flexibility and improves the quality of the numerical tools we develop together".*

Philippe Gilles, International Expert in structures and materials, AREVA

## WELD PLAN

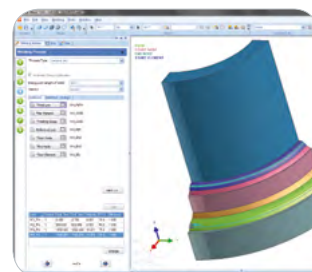
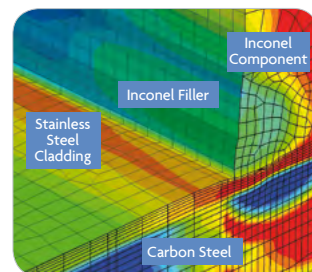
Virtual Welding Engineering begins with a Weld Plan. When numerous components, weld processes, weld passes, clamps and materials are involved, it is valuable to preserve an overview and be able to communicate the details of the virtual welding manufacturing process with your team and your customers. ESI's Welding Simulation Suite provides you with a solution for virtual welding manufacturing planning that allows smart communication and coordination.

## CAD AND FEM MODELING

A state-of-the-art meshing tool is integrated in Visual-Environment, the Welding Simulation Suite's platform. It includes powerful tools dedicated to weld modeling.

## MATERIAL DATA

Material behavior is complex, in particular when thermal and metallurgical properties are involved. A material data manager based on Microsoft Excel® helps you view, manipulate and generate properties with great flexibility. Existing databases cover most frequently used materials in the automotive, aerospace, chemical, energy & nuclear and heavy industries, and can be used as a ground for new material databases. All the physics of material is incorporated in the material database – there is no need to deal with material property details when setting up a simulation.



Visual-Weld: Simplicity is the key

## PROCESS SETUP

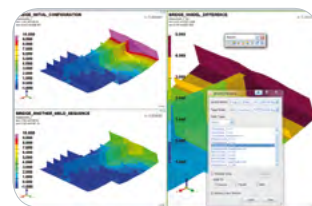
State-of-the-art graphic user interface allows you to set up a virtual welding fabrication process in the least possible time, requiring no more than welding engineering knowledge.

## SOLUTION

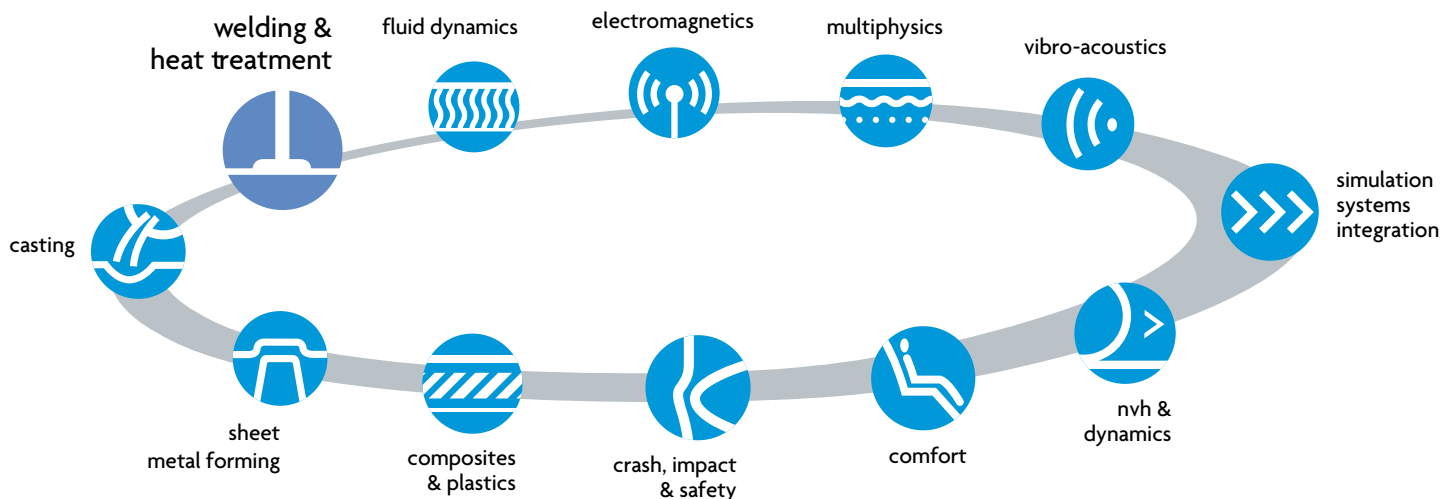
For fast distortion engineering, ESI's Virtual Performance Solution solver is used – an innovative tool offering unmatched DMP performance for large welded assemblies. For simulations involving complex material physics, the SYSWELD solver is used. It is the most precise multi-physics solver for welding and heat treatment processes on the market. Despite the complexity, the solution is completely automated. Thanks to advanced simulation engineering methods, complex problems such as large pressure vessel fabrication involving hundreds of meters of welds, dissimilar materials and various process steps like cladding, heat treatment and welding, can be solved in a reasonable time frame, without neglecting any material physics or fabrication details.

## VISUALIZATION OF COMPUTED RESULTS

A state-of-the-art post-processing tool is integrated in Visual-Environment. It provides deep insight about welding fabrication effects. Several computed results can be reviewed simultaneously in multiple synchronized windows, guiding you through the evolution of the manufacturing process. A powerful result comparison tool allows to compare and display the differences between variants or process steps, no matter which result quantity is concerned.



Comparison of Clamping Variants – Bridge Segment



## SELECTED CUSTOMER REFERENCES

AERO WIN TECHNOLOGY CORP., AIMEN, ARCELOR ARSA, AREVA NP, AUDI AG, AUTOMOTIVE SYSTEM GR., AWENGINEERING CO., BABCOCK & WILCOX CANADA, BARC - BHABHA ATOMIC RESEARCH CENTRE, BOSCH REXROTH AG, CEA LIST SACLAY, CHENDU AIRCRAFT INDUSTRY CO., CHENGDU SPACEON TECHNOLOGY DEVELOPMENT CO., DAIMLER AG, DENKIKOGYO CO., DOOSAN HEAVY, GE GLOBAL R & D CENTER, GE INDIA TECHNOLOGY CENTER, HITACHI, LTD., HONDA ENGINEERING CO., HYUNDAI HEAVY INDUSTRY, ITP - INDUSTRIA DE TURBO PROPULSORES, S.A., JAPAN ATOMIC ENERGY AGENCY, JFE STEEL CORPORATION, KAWASAKI HEAVY INDUSTRIES, KOMATSU LTD., LOS ALAMOS NATIONAL LABORATORY, MITSUBISHI ALUMINIUM CO., MURORAN RESEARCH LABORATORY, NISSAN MOTOR CO., PETROBRAS - PETROLEO BRASILEIRO SA, POSCO, PRESS KOGYO CO., PSA PEUGEOT-CITROEN, ROLLS-ROYCE PLC, SCHAEFFLER KG, SERCO ASSURANCE, SHENYANG AIRCRAFT INDUSTRY, SHENYANG LIMING AERO-ENGINE GROUP CORPORATION LTD., SIEMENS PG, SIEMENS TRANSPORTATION SYSTEMS, SKF SVERIGE AB (SKF GROUP), SKODA AUTO, SVENSK VERKTYGSTEKNIK AB, TATA STEEL EUROPE, THE JAPAN STEEL WORKS, THYSSENKRUPP, TOSHIBA CORPORATION POWER SYSTEMS & SERVICES COMPANY, VITKOVICE HEAVY MACHINERY A.S. AND POWER A.S., VOLKSWAGEN AG, XI'AN AEROSPACE ENGINE FACTORY, ZF FRIEDRICHSHAFEN AG.

For more information on ESI's Welding Simulation Suite, please visit:

[www.esi-group.com/welding](http://www.esi-group.com/welding)

or contact your local distributor

**ESI Group  
Headquarters**

100-102 Avenue de Suffren  
75015 Paris  
France  
T. +33 (0)1 53 65 14 14  
F. +33 (0)1 53 65 14 12

**EUROPE**

**BENELUX  
& SCANDINAVIA**

**ESI Group Netherlands**  
Radex Innovation Centre  
room 4.57  
Rotterdamseweg 183 C  
2629 HD Delft  
The Netherlands  
T. +31 (0)15 2682501  
F. +31 (0)15 2682514

**CZECH REPUBLIC  
& EASTERN  
EUROPE**

**MECAS ESI**  
Brojova 2113/16  
326 00 Pilsen  
Czech Republic  
T. +420 377 432 931  
F. +420 377 432 930

**FRANCE**

**ESI France  
Headquarters**  
Parc d'Affaires Silic  
99, rue des Solets - BP 80112  
94513 Rungis Cedex - France  
T. +33 (0)1 49 78 28 00  
F. +33 (0)1 46 87 72 02

**ESI France**  
Le Récamier  
70, rue Robert  
69458 Lyon Cedex 06  
France  
T. +33 (0)4 78 14 12 00  
F. +33 (0)4 78 14 12 01

**SPAIN**

**ESI Group Hispania  
Headquarters**  
Parque Empresarial Arroyo  
de la Vega  
C/ Francisca Delgado, 11.  
Planta 3ª - 28108 Alcobendas  
Madrid - Spain  
T. +34 91 484 02 56  
F. +34 91 484 02 55

**ESI Group Hispania, S.L.**  
C/ Balmes, 188  
Oficinas B188  
08006 - Barcelona  
Spain  
T. +34 93 152 10 25  
F. +34 93 218 01 01

**GERMANY**

**ESI GmbH  
Headquarters**  
Siemensstr. 12  
63263 Neu-Isenburg  
Germany  
T. +49 6102 2067 - 0  
F. +49 6102 2067 - 111

**ESI GmbH**  
Einsteinstr. 24 - Haus 4  
85609 München-Dornach  
Germany  
T. +49 89 45 10 888 0  
F. +49 89 45 10 888 18

**ESI GmbH**  
Kruppstr. 82-100 / ETEC  
V5-105  
45145 Essen  
Germany  
T. +49 (0)201 125 072 0  
F. +49 (0)201 125 072 24

**ESI GmbH**  
Jurastr. 8,  
70565 Stuttgart  
Germany  
T. +49 (0) 711 27 303 0  
F. +49 (0) 711 27 303 110

**ITALY**

**ESI Italia**  
Via San Donato 191  
40127 Bologna  
Italy  
T. +39 0516335577  
T. +39 0516335578  
F. +39 0516335601

**SWEDEN**

**Efield ESI**  
Sjöängsvägen 15  
SE-192 72 Sollentuna  
Sweden  
T. +46 8 410 03 511  
M. +46 70 999 18 71

**SWITZERLAND**

**Calcom ESI**  
Parc Scientifique EPFL /  
PSE-A  
CH-1015 Lausanne  
Switzerland  
T. +41 21 693 2918  
F. +41 21 693 4740

**UNITED KINGDOM**

**ESI UK**  
16 Morston Court,  
Kingswood Lakeside,  
Cannock, WS11 8JB  
United Kingdom  
T. +44 (0) 1543397900  
F. +44 (0) 1543504898

**ASIA**

**CHINA**

**ESI China**  
Unit 1006-1008,  
Metropolis Tower  
No. 2 Haidiandongsanjie,  
Haidian District,  
Beijing, 100080 - China  
T. +86 (10)-65544907/8/9  
F. +86 (10)-65544911

**INDIA**

**ESI India  
Headquarters**  
No. 24-25, Ground floor  
27th Cross Banashankri  
2nd stage  
Bangalore 560 070  
India  
T. +91 80 4017 4747  
F. +91 80 4017 4705

**ESI MW India**  
502, Pentagon 2,  
Magarpatta City  
Pune - 411 013  
Maharashtra  
India  
T. +91-20-26898  
172/173/175/229  
F. +91-20-26898 239

**JAPAN**

**ESI Japan  
Headquarters**  
15F and 16F Shinjuku Green  
Tower Bldg, 6-14-1,  
Nishi-Shinjuku  
Shinjuku-ku, Tokyo 160-0023  
Japan  
T. +81 3 6381 8490 / 8494  
F. +81 3 6381 8488 / 8489

**ESI Japan  
Kansai Branch Office**  
Nishi-Nihon Sales office  
5F Advance Esaka Bldg.  
8-10 Toyotsu-cho  
Suita-shi,  
Osaka 564-0051  
Japan  
T. +81 6 6330 2720  
F. +81 6 6330 2740

**ESI Japan  
Chubu Branch Office**  
9F Daisan Horuuchi Bldg.  
4-6-23, Meieki  
Nakamura-ku, Nagoya-shi,  
Aichi 450-0002  
Japan  
T. +81 52 589 7100  
F. +81 52 589 7001

**RUSSIA**

**ESI Russia**  
Vainera str. 51b, 3<sup>rd</sup> floor  
620014, Yekaterinburg  
Russian Federation  
C. +7 919 361 14 80  
T./F. +7 343 311 02 33

**AMERICAS**

**USA**

**ESI North America  
Headquarters**  
32605 W 12 Mile Road,  
Suite 350,  
Farmington Hills,  
MI 48334-3379  
USA  
T. +1 (248) 381-8040  
F. +1 (248) 381-8998

**ESI North America**  
12555 High Bluff Drive  
Suite 250  
San Diego, CA 92130  
USA  
T. +1 (858) 350 0057  
F. +1 (858) 350 8328

**ESI North America**  
2880 Zanker Road  
Suite 105  
San Jose, CA 95134  
USA  
T. +1 (408) 824 1212  
F. +1 (408) 824 1216

**ESI North America**  
6767 Old Madison Pike  
Suite 600  
Huntsville, AL 35806  
USA  
T. +1 (256) 713-4700  
F. +1 (256) 713-4799

**SOUTH AMERICA**

**ESI South America**  
Av. Pedroso de Morais,  
1619 cj.312  
São Paulo  
SP CEP 05419-001  
Brazil  
T./F. +55 (011) 3031-6221



info@esi-group.com



**ABOUT ESI GROUP**

ESI is a pioneer and world-leading provider in Virtual Prototyping that takes into account the physics of materials. ESI boasts a unique know-how in Virtual Product Engineering, based on an integrated suite of coherent, industry-oriented applications. Addressing manufacturing industries, Virtual Product Engineering aims to replace physical prototypes by realistically simulating a product's behavior during testing, to fine-tune fabrication and assembly processes in accordance with desired product performance, and to evaluate the impact of product use under normal or accidental conditions. ESI's solutions fit into a single collaborative and open environment for End-to-End Virtual Prototyping. These solutions are delivered using the latest technologies, including immersive Virtual Reality, to bring products to life in 3D; helping customers make the right decisions throughout product development. The company employs about 950 high-level specialists worldwide covering more than 30 countries. ESI Group is listed in compartment C of NYSE Euronext Paris.