

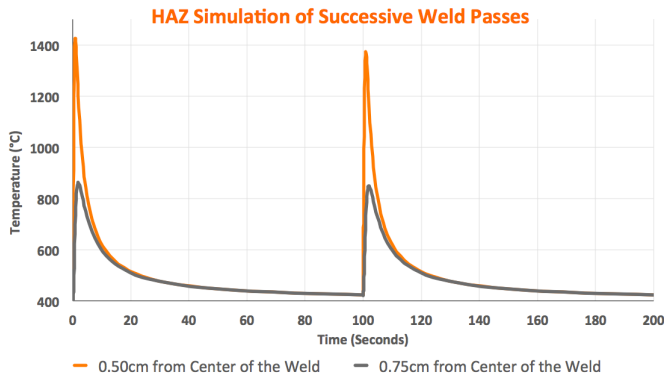
Introducing the All New Gleeble Welding Simulator

Built on over 58 years of experience designing and manufacturing welding simulators, the *Gleeble Welding Simulator* provides a **complete platform for a wide range of welding simulations** and testing capabilities including weld HAZ simulation, crack susceptibility, nil-strength determination and much more.

This new system is tailored to provide a compact, low cost solution while retaining world-class capabilities that have made Gleeble systems the industry standard.

Features Include:

- High-speed, direct resistance heating up to 10,000°C/second
- Controlled cooling or accelerated cooling with optional quench (air/gas/water/mist)
- Simulation of multiple welding techniques and materials
- Ability to test in vacuum, air or inert gas
- User friendly and easy to use controls and software
- Quiet operation, easy installation and small laboratory footprint



↑ *Weld HAZ simulations can reproduce thermal gradients and characteristics at any location in a weld. The graph shows the thermal profile of two locations during a multi-pass weld.*

What is Physical Simulation?

Physical simulation is the exact reproduction of the thermal and mechanical processes in the laboratory that a material is subjected to during the manufacturing process or end use.

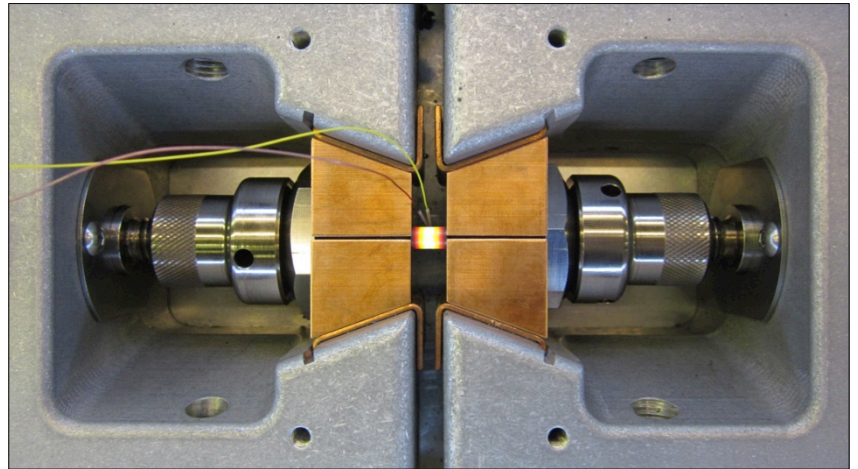
Benefits of physical simulation include:

- **Improved production processes**
- **Reduced scrap and increased profitability**
- **Reduced product development time and cost**
- **Increased manufacturing output and efficiency**
- **Improved product quality**



Material Testing Simulations:

- Weld HAZ Simulation
- Nil-Strength Testing
- Charpy Specimen Heat Treatment
- Hot Ductility and Tensile Testing
- Melting and Solidification
- Study of Local Brittle Zones
- Embrittlement and Crack Susceptibility
- **Strain Induced Crack Opening (SICO)**
- Post-Weld Heat Treating



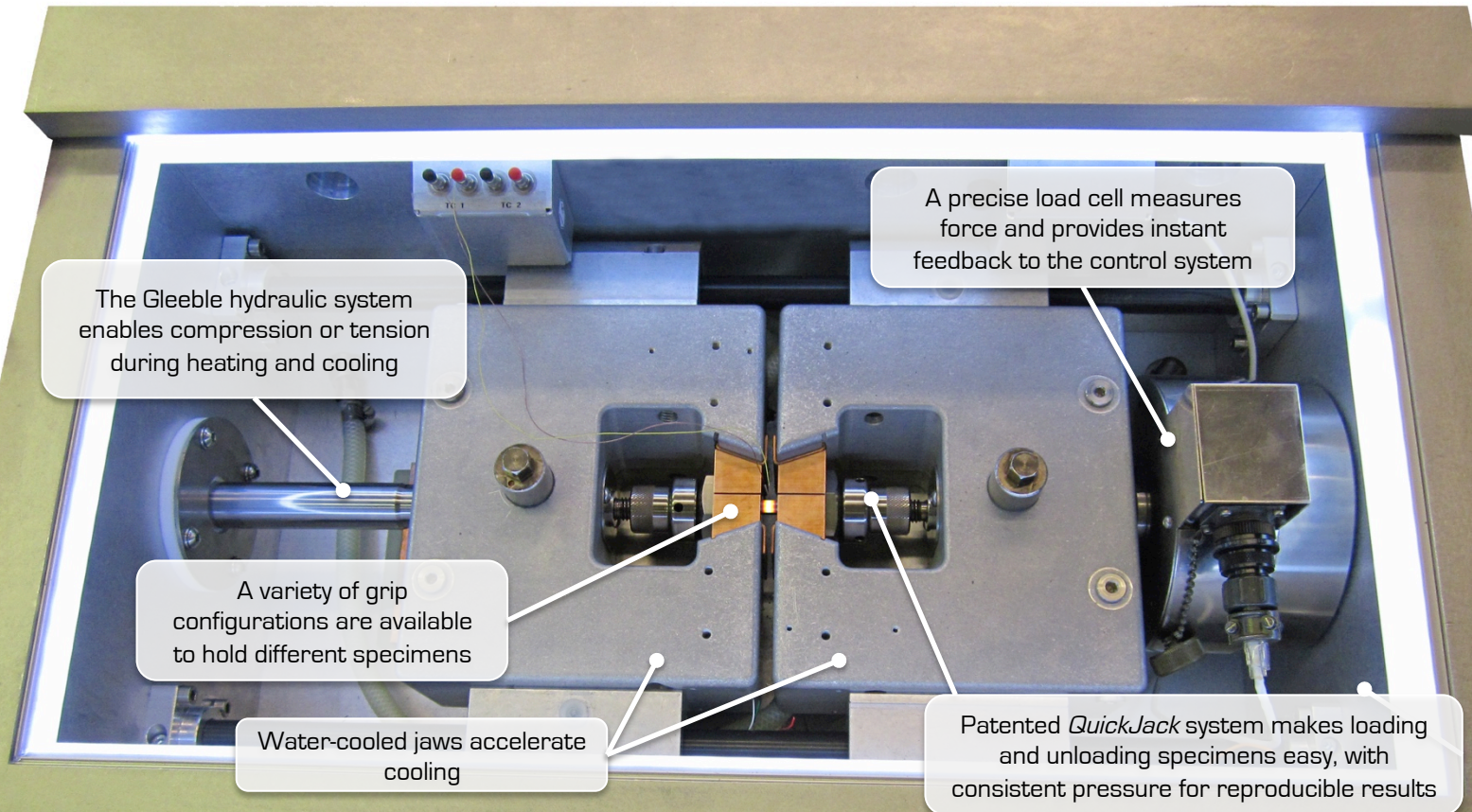
Above: Water-cooled jaws contribute to very fast cooling rates and enable researchers to simulate steep thermal gradients found in welding applications.

Additional grip models are available to support uniform hot zone and other requirements.

Process Simulations:

- GMAW - Gas Metal Arc Welding
- TGAW - Tungsten Gas Arc Welding
- SAW - Submerged Arc Welding
- ESW - Electroslag Welding
- Welding of Ferrous and Non-Ferrous Materials
- Diffusion Bonding
- Laser Welding
- Upset Welding

Below: The vacuum tank of the Gleeble Welding Simulator contains a water-cooled jaw carrier which delivers electric current to copper grips, enabling very fast heating and cooling of the specimen.



Mechanical Specifications: The Gleeble Welding Simulator offers a high speed mechanical system with unmatched performance in its class. The innovative hydraulic system results in a servo system capable of 200 millimeters per second stroke rate with precise control and measurement accuracy.

Mechanical System	Horizontal frame, closed-loop hydraulic control
Maximum Static Force	30 kN (~3000 kgf, ~3 Tons)
Maximum Stroke Rate	200 mm/second in tension or compression (with no load)
Minimum Stroke Rate	0.01 mm/second in tension or compression

Thermal Specifications: The Gleeble Welding Simulator offers a high speed thermal system with heating rates up to 10,000°C/second. The ability to reproduce a wide variety of thermal profiles and gradients that materials undergo in actual processes is critical to the success of physical simulation. The Gleeble Welding Simulator accomplishes this by offering both high heating rates and high cooling rates with a variety of specimen types and materials.

Heating System	<ul style="list-style-type: none"> • Direct resistance with closed-loop control
Temperature Controller	<ul style="list-style-type: none"> • Digital closed-loop control using 18 bit analog-to-digital converter and 32 bit control processor • Controller response rate: 10,000°C/second • Resolution: One degree [C or F] • Up to 8 Thermocouple channels (2 channels supplied standard)
Temperature Range	<ul style="list-style-type: none"> • Room Temperature to 1700°C (Based on choice of thermocouples)
Maximum Heating Rate	<ul style="list-style-type: none"> • Heating rates up to 10,000°C/second (6 mm diameter specimen) • Heating rates are dependent on sample size and material conductivity
Controlled Cooling Rates	<ul style="list-style-type: none"> • Controlled cooling rates of up to 200°C/second from 800°C to 500°C for a 10 mm plain carbon steel bar with 10 mm free span reduced to 6 mm diameter for 6 mm long at midspan
Maximum Quench Rates	<ul style="list-style-type: none"> • More than 10,000°C/second at 550°C at the specimen surface for 1 mm thick x 10 mm wide sheet of plain carbon steel with 25 mm free span

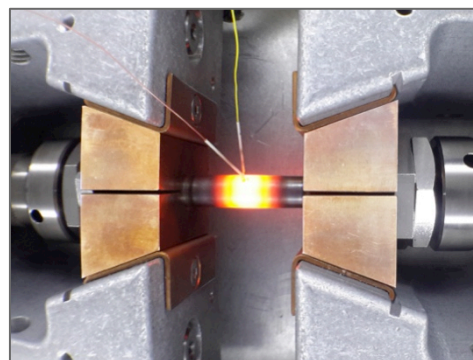
Available Options:

- Vacuum systems – Both roughing pump and diffusion pump options are available
- Water chillers or heat exchangers are available

Available Thermocouple Types:

Type K
Type S
Type R
Type B
Type E

Right: Direct resistance heating provides rapid and precise temperature control, creating the desired thermal profile for welding simulations.



Gleeble Systems are supported by DSI's global network of sales, service and metallurgical professionals.

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Founded in 1957, Dynamic Systems Inc. pioneered physical simulation of dynamic thermal and mechanical processes and continues to provide researchers with invaluable tools for developing and studying new materials, exploring new production techniques, optimizing existing processes, and simulating the conditions a material will face in the real world.

Need more capabilities? Meet the rest of the Gleeble family...

The Gleeble Welding Simulator has been designed specifically to support a wide range of welding research. For other applications, DSI offers equipment which can be configured based on customer's testing requirements. These systems, including the Gleeble 3500 and Gleeble 3800, feature heavy-duty mechanical systems and high-speed servo valves for very fast response and stroke rates (up to 2000 mm/second).



GLEEBLE 3500
10 Ton Maximum Force



GLEEBLE 3800
20 Ton Maximum Force

See DSI's full family of simulation equipment and supported applications at www.GLEEBLE.com.

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