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GLEEBLE 3800-GTC

Thermal-Mechanical Physical Simulation System

Physical Simulation is a valuable tool used to study metallurgical processes, develop new materials and replicate real world conditions in the laboratory.

Lower Costs - Reduce product development, processing & energy costs
Optimize Manufacturing Processes - Develop new procedures & troubleshoot existing processes
Optimize Materials - Develop new materials and applications
Increase Production - Reduce scrap and maximize output and efficiency
Faster Product Development - Reduce time to market and R&D expense
Improved Product Quality - Improve product consistency and quality

GLEEBLE 3800-GTC

The Gleeble 3800-GTC System offers the versatility and performance needed for today's demanding research applications. Each system includes the all-new Gleeble Touch Control (GTC) console, Windows workstation, load unit with test chamber, and a hydraulic power supply.

The Gleeble 3800-GTC is the most powerful standard system offered by Dynamic Systems Inc. and is capable of exerting as much as 20 tons of static force, heating specimens at a rate exceeding 10,000°C/sec and achieving stroke rates up to 2,000mm/sec. The system's flexibility allows for a wide variety of testing and simulation options, however its impressive capabilities make it particularly well suited for hot rolling and multi-hit forging simulations.

Designed to offer capabilities for hot deformation simulations on large specimens, the Gleeble 3800-GTC is equipped with a heavy-duty mechanical system and high-speed servo valves for quick response. Through its powerful physical simulation capabilities, the Gleeble 3800-GTC delivers the technical leverage that competitive organizations need to cut costs, shorten time to market, and open the door to new ideas.

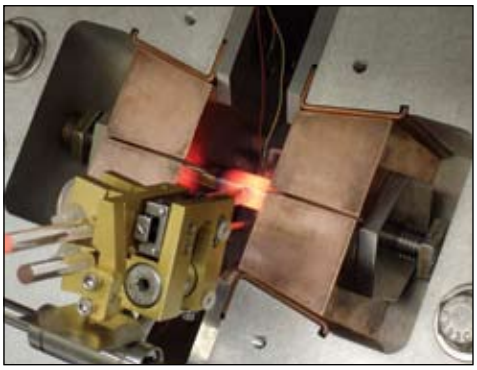
The Gleeble 3800-GTC features an integrated touch-screen display with a Windows®-based computer, along with an array of powerful processors to provide an extremely user-friendly interface for preparing simulation programs, providing digital closed-loop control of the thermal and mechanical systems and collecting test data and subsequently analyzing the results.

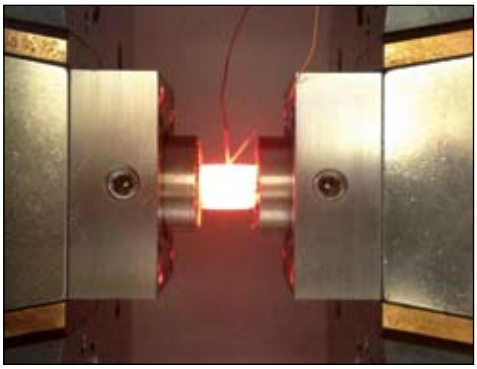
Every Gleeble 3800-GTC is equipped to use Mobile Conversion Units (MCUs) which allow the Gleeble to be changed easily from one test configuration to another. The result is a system unequaled for physical simulation capabilities.

The Thermal System

The direct resistance heating system of the Gleeble 3800-GTC can heat specimens at rates of more than 10,000°C/sec, or can hold steady-state equilibrium temperatures within ±1°C. Thermocouples or an optional infrared pyrometer provide signals for accurate feedback control of specimen temperature.

Water-cooled jaw carriers hold the specimen, making the Gleeble 3800-GTC capable of high cooling rates. The maximum cooling rate is determined by the size, shape, temperature, and composition of the sample. The thermal system provides smooth control of cooling from equilibrium to the maximum rate for any given specimen. An optional quench system can produce cooling rates in excess of 10,000°C/sec at the specimen surface.





The Mechanical System

The Gleeble 3800-GTC mechanical system is a complete, fully integrated system capable of exerting as much as 20 tons of static force in compression and 10 tons of force in tension. Stroke displacement rates can be programmed to be as fast as 2,000mm/sec. A closed-loop hydraulic servo system provides precise control of all mechanical variables. Linear Variable Differential Transformers (LVDTs) provide feedback to ensure accurate execution and repeatability of the mechanical test program. The mechanical system features control feedback mode transition capabilities that allow the operator to program changes from one control mode to another during a given test. This capability provides the versatility that is necessary to simulate many thermal-mechanical processes. The program can switch between control variables at any time and as often as required during the test. Control modes that are available include stroke displacement, force, crosswise extensometry, lengthwise extensometry, true stress, true strain, engineering stress, and engineering strain.

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The Digital Control System

The heart of the Gleeble 3800-GTC is the **all-new Gleeble Touch Control (GTC) system** which provides a user-friendly interface enabling Gleeble operators to program and control the system. It provides all the signals necessary to control thermal and mechanical test variables simultaneously through the digital closed-loop thermal and mechanical servo systems. The Gleeble 3800-GTC can be operated totally by computer, totally by manual control, or by any combination of computer and manual control to provide maximum versatility in materials testing.

The Gleeble 3800-GTC has a full set of software tools available. The operator can create tests on the workstation through a number of programming options, including QuikSim II™ software, a spreadsheet-like, fill-in-the-blanks software that describes each action in a test sequence. Other options for creating more elaborate tests include Deformation Control Software and Gleeble Script Language. In designing the operator interface for the Gleeble 3800-GTC, DSI engineers recognized that highly flexible control is essential for machine performance. As a result, the 3800-GTC provides the operator total flexibility in control of the system.

Key Performance Specifications:

Force	Maximum Compressive Force	20 Metric Tons
	Maximum Tensile Force	10 Metric Tons
Stroke	Maximum Stroke Distance	125mm
	Maximum Stroke Rate	2000mm/sec
	Minimum Stroke Rate	.001mm/sec

Temperature Control	Maximum Temperature	3,000°C*
	Maximum Heating Rate	10,000°C/sec
	Maximum Quenching Rate	10,000°C/sec
	Maximum Specimen Size	20mm dia

*Optional equipment required.

Add Capabilities with Mobile Conversion Units (MCUs):

Gleeble 3800-GTC systems are equipped to use Mobile Conversion Units (MCUs) which include a test chamber with grips or anvils and are mounted on wheels so that one MCU may be rolled away from the Gleeble and another MCU configuration rolled on. Each MCU offers unique testing and simulation capabilities and can be added to the Gleeble 3800-GTC. MCUs include:

General Purpose MCU:

Standard with all Gleeble 3800-GTC systems, the General Purpose MCU the most flexible MCU with both tension and compression capabilities and a wide range of grip types and materials to test many different types of samples.

Hydrawedge®:

The ultimate tool for optimizing hot rolling and forging processes, the Hydrawedge MCU is ideal for researchers who wish to optimize multiple-hit, high speed deformations. With independent control of strain and strain rate and a mechanical stop to eliminate deformation overshoot, the Hydrawedge II has become an invaluable component in laboratories at the world's leading metals producers and forging specialists.

Hot Torsion:

The Hot Torsion Mobile Conversion Unit (MCU) adds world-class hot torsion testing capability to Gleeble® 3500-GTC and 3800-GTC Systems. The system is capable of applying torque up to 100 Nm (50 Nm standard configuration) and test specimens can be heated or quenched at any time during the test, providing researchers with flexibility for developing tests and simulations with maximum impact.

MAXStrain®:

The MAXStrain multi-axis hot deformation system is a unique research tool that can subject materials to virtually unlimited strain under precise control of strain, strain rate, and temperature. Specimens are heated and rotated 90 degrees between multiple, successive compressions resulting in very high strain levels and producing a sample of ultrafine-grain or nanoscale material that is large enough for subsequent properties testing.

Additional Equipment:

DSI offers numerous additional options for the Gleeble platform. Optional equipment, fixtures and customizations include a variety of strip annealing simulation tools, the Ultra-High Temp MCU capable of conducting simulations up to 3,000°C and the Laser-Ultrasonic Sensor for In-Situ Metallurgy Microstructure Studies (LUMet).

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Popular Gleeble Applications

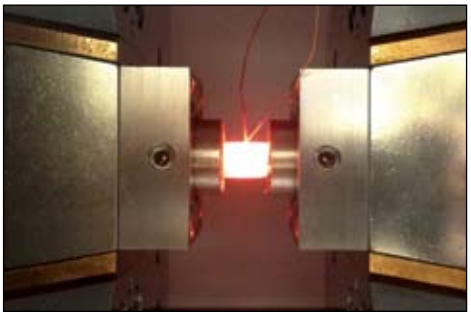
Materials Testing

- Hot/warm tensile testing on a wide variety of specimen geometries
- Hot/warm compression testing
  - Uniaxial compression
  - Plane strain compression
  - Strain Induced Crack Opening (SICO)
- Stress vs. Strain curves
- Melting and solidification
- Nil-strength testing
- Hot ductility testing
- Thermal cycling/heat treatment
- Dilatometry/phase transformation
  - During heating or cooling
  - Continuous or non-continuous
  - Isothermal
  - Post deformation
- Stress relaxation studies
- Creep/stress rupture
- Fatigue
  - Thermal fatigue
  - Thermal/mechanical fatigue

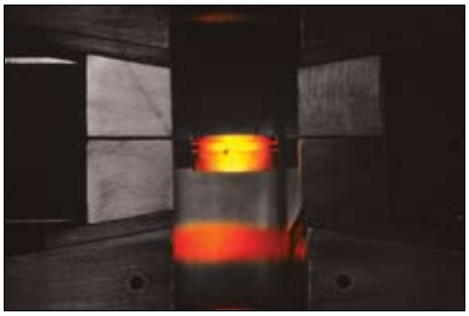
Process Simulation

- Continuous casting
- Mushy zone processing
- Hot rolling
- Forging
- Extrusion
- Weld HAZ cycles
- Upset butt welding
- Diffusion bonding
- Continuous strip annealing
- Heat treating
- Quenching
- Powder metallurgy/sintering
- Self-Heating Synthesis (SHS)
- Brazing
- Liquid metal embrittlement

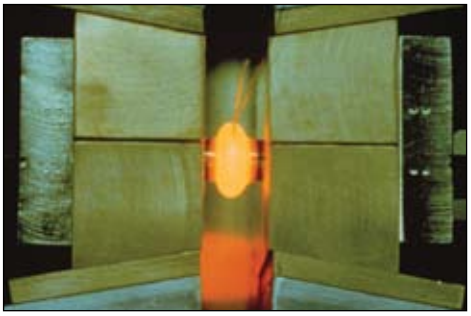
Thermal Cycles and Heat Treatments: Many different grips are available to support uniform temperature zones and a variety of specimen configurations. Other grips can be used to provide thermal gradients in the specimen for weld HAZ and process simulation.



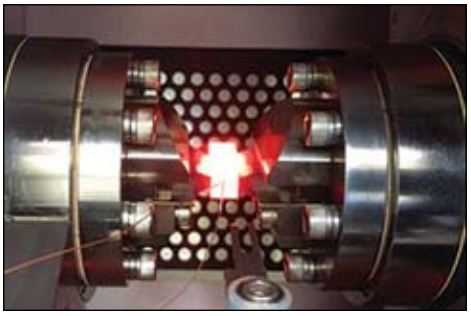
ISO-T Flow Stress Compression Testing: ISO-T flow stress compression anvils provide a uniform temperature distribution throughout the compression specimen during single and multiple-hit deformation tests.



Melting and Solidification: Melting and controlled solidification can be performed in-situ. Thermal and mechanical testing of the as-cast structure can then be performed to identify cast structure properties and ductility dip regions.



Strain Induced Crack Opening (SICO) Procedure: The SICO procedure is a quick and cost-effective method for thermomechanical process optimization in forging and forming operations.



Hot/Warm Deformation: Shown above is a plane strain compression test. In single or multiple-hit compression tests, strain and strain rate are controlled separately yet synchronously using the optional Hydrawedge, simulating hot rolling or multi-hit hot forging.

Strip Annealing Process Simulation: Both batch and continuous annealing processes can be simulated using a strip annealing jaw system.

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ALL NEW!

Gleeble Touch Control

GLEEBLE TOUCH CONTROL

The Next Generation of Gleeble Systems Control

Gleeble Systems come equipped with control and data analysis software, including the All New **G**leeble **T**ouch **C**ontrol (GTC) System, which controls thermal and mechanical functions. QuikSim®2 software is a user-friendly interface enabling Gleeble operators to program and control the system as well as collect test data. Additionally, robust data analysis software is included, **making it easier than ever to generate and analyze data.**

All-New Touch Screen Display

- Intuitive and easy to use
- Large screen and simple icons
- Clear presentation of key data

Quick Function Panel

- Power Switch
- Reset Switch
- Emergency Stop

Gleeble systems come standard with a workstation that includes a desk with work surfaces that feature superior resistance to scratches and stains, a well-equipped desktop computer, printer, monitor, keyboard and mouse.

Wireless communication with work station reduces wire clutter

Lower Panel

- Large touch reactive control knobs make system adjustment easier and more accurate
- Ergonomically designed for added user comfort
- Standard buttons include: Run, Stop, Mechanical, Door Lock

GTC utilizes modules to maximize compatibility with external measurement systems & accessories

Features Include:

- Simultaneous thermal and mechanical control
- Manual and/or computer control
- Smooth transitions in mechanical control mode
- Measurement units easily configured by user
- High-speed data acquisition
- Test progress readout via Virtual Panel Meters (VPMs)
- Capable of system variable adjustments while a test is running

QuikSim®2 Software

- User friendly interface for programming and controlling the Gleeble System
- Independent workstation with full windows multitasking during testing
- Highly flexible
- Fast set-up times allow users to run more tests in less time
- Password protection
- Arbitrary waveform generation
- Three programming methods available:
  - Table form (fill in the blanks)
  - Optional Deformation Control Software for sequential multi-hit deformantion
  - Gleeble Script Language (GSL) for maximum versatility

Data Processing

- Powerful and flexible data processing
- Publication quality data plots and graphs
- User created templates save considerable time when completing repetitive tasks
- Built-in mathematical functions
- Automatic data file loading, “Copy & Paste” or link data to other applications

About Dynamic Systems Inc.

In 2017, Dynamic Systems Inc. celebrates 60 years of excellence in delivering valuable tools to the materials research and production community. Located in New York's Tech Valley, DSI has grown from humble beginnings to become an international organization with employees and partners around the globe. Gleeble systems have become the world-standard for thermal-mechanical physical simulation systems.

DSI's first system, christened the "Gleeble" by one of its creators, was originally developed to simulate the heat-affected zone of arc welding. A pneumatic system was soon added to the Gleeble, giving it limited mechanical capabilities. In 1979, the Gleeble became the first machine ever to combine full resistance heating thermal capabilities and hydraulic servo-mechanical testing performance in a single system. In the early 1980's, the machine was re-engineered to incorporate computers for controlling tests and collecting data. Since then, DSI has introduced an advanced series of systems, which combine dynamic thermal and mechanical testing utilizing sophisticated computers for control and data acquisition.

As a result of this innovative technology, it is possible for materials to be tested in the same dynamic way that they are fabricated and used. This capability is producing new insights into materials science and new breakthroughs in productivity.

Our team is excited to celebrate our 60th anniversary and is proud to carry on the tradition of innovation and excellence that has been key to our customers and our own success. We look forward to supporting our customers and the rest of the materials research community for the next 60 years.

Gleeble Systems are Supported by DSI's Global Network of Sales, Support and Metallurgical Professionals

More Information

For ordering information, please contact us at **info@Gleeble.com** or **(518) 283-5350**

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Visit us online at **www.Gleeble.com**

Specifications are subject to change without notice. Pictures and diagrams in all brochures and documents show latest models as of time of publication. Actual appearance may vary slightly.

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