Materials Testing & Inspection

100th Anniversary of the Manufacturing of Shimadzu Testing Machines

Shimadzu Corporation
Nishinokyo Kuwabara-cho, Nakagyo-ku,
Kyoto 604-8511, Japan
http://www.shimadzu.com/an/test/
Innovation and Collaboration

Supporting manufacturing in the future, utilizing 100 years of experience and knowledge

Shimadzu began manufacturing testing equipment in 1917. Throughout this 100-year history, we have been at the forefront of providing precision, quality solutions for the most challenging R&D and QA/QC requirements. Our steadfast customer-focused commitment and unwavering dedication to technical excellence are both hallmarks of our history and the principles that guide us into the future.
Analysts want to know the mechanical properties of any number of items used in a variety of fields, at scales ranging from the micro to the macro. At Shimadzu, continuously responding to these needs is our mission.

Application Fields

- **Food**
- **Medical Products**
- **Infrastructure**
- **Electronic**
- **Machinery, Automotive**

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**30MN/30m**

This machine measures actual structures. It checks partial or overall weight, loading, and loads from earthquakes, wind, or snow, as well as strength characteristics and other properties. This type of machine tests the safety and endurance of structures, a process even more vital now with the increasing size of buildings and civil engineering projects.

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**55mN/30µm**

This machine tests the bond strength of bonding wires in integrated circuits. Rather than hanging the bonding wire from a hook, bonding wire with a diameter of 30 µm can be gripped and pulled, so the strength values at the chip end and lead end can be evaluated. The bonding wire is gripped and pulled using a micro chuck engineered especially for minute samples.
To Better Understand Materials

Bending Tests for Plastics

These tests evaluate the bending elastic modulus and bending strength of plastics. With the aim of improving the accuracy of designs, ever more accurate measurements are needed. Utilizing a bending displacement gauge, the bending elastic modulus can be measured with even greater accuracy.

CFRP Impact Tensile Strength Tests and Fracture Behavior Observations

With the aim of making practical use of CFRP, evaluations and tests of composite materials are implemented from a variety of perspectives. In this context, observing the process by which CFRP fractures is important in terms of improving the strength of components, and for quality control.

Fully Automatic Tensile Testing Machines for Iron and Steel Materials

The evaluation of mechanical characteristics is indispensable for quality control of iron and steel materials. To ensure the on-time shipment of multiple kinds of materials produced simultaneously, a system is required to enable the rapid testing of a large number of samples at any time. Using automatic machinery makes it possible to automate the entire process, including sample measurement, test preparation, testing, data acquisition, and the disposal of samples, thus enhancing production efficiency. It also can reduce differences between operators, which improves the quality of results.

Materials Changing the Manufacturing Process

Understanding materials is the starting point for all types of manufacturing. New test methods are developed daily in an effort to better understand the mechanical characteristics of materials. At Shimadzu, we will continue to create testing machines to meet the cutting-edge needs of materials researchers worldwide.

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Safe and Comfortable Vehicles

Vehicles manufactured with high safety standards provide peace of mind when traveling. Ensuring these standards requires knowing the strength and endurance of the materials, parts, and products used during the manufacturing process. Shimadzu supports this process from behind the scenes with an array of technologically advanced testing machines.

Travel Simulators, Developed in Response to the Demands of Automobile Manufacturers

In 1967, we created our first travel simulator, which was developed in response to the demands of automobile manufacturers. Based on information on the unevenness of roads recorded when travelling on bad roads, four platforms are raised and lowered hydraulically in order to apply the same shocks to a vehicle as when travelling on a road. Acceleration tests that recreate travelling data in quick succession can also be performed, thereby contributing to high-efficiency durability improvement tests.

Evaluating the Damping Characteristics of Shock Absorbers

The damping force is measured as test frequency is varied. Shock absorber performance can be confirmed by measuring the relationship between velocity and damping force or the response to a Lissajous or other waveform.
**Infrastructure Protecting Human Lives**

The development of safe, sound infrastructure is of paramount importance in order to mitigate damage from earthquakes and other disasters. For this reason, methods used to increase the strength of materials continue to be developed.

Shimadzu offers a variety of large testing machines for measuring the strength of bridges, tunnels, roads, houses, office buildings, and other structures, ensuring infrastructure is engineered to the highest standards.

**10 MN Structural Member Testing Machine**

This structural member testing machine, which has a 10-m bed length and weighs 30 tons, is one of the largest testing machines that can be assembled at the Murasakino Works. It is used for strength tests of bridge components.

**Seismic Isolation Rubber Characteristics Evaluation**

This testing machine is for seismic isolation rubber, which is incorporated into the foundations of buildings and bridges. It can perform tests related to the restoring force characteristics, rigidity, and other basic characteristics, primarily of laminated seismic isolation rubber. Jacks are incorporated for sample movement; this ensures that during vertical loading, the center of the sample always matches the load axis. As a result, no bending load is applied to the sample, enabling high-accuracy testing.
To Support a Long Operating Life

Electronics Supporting a Comfortable Lifestyle

Product designers continually test devices, such as cell phones, under harsh conditions to ensure finished products have longevity. As a result, electronic components are small but resistant to failure, and large generator plants can continue to produce power reliably for dozens of years. Shimadzu supports this technological progress by providing designers and engineers with the testing machines needed to estimate the operating life of various products.

Tensile Evaluations of Power Transmission Brackets
This testing machine performs tensile tests of structural members and power line insulators for high voltage transmission. A primary feature is the large width of the in-frame testing space.

Cyclic Bending Tests for Mounted Circuit Boards
This test jig is for cyclic bending tests of printed circuit boards. Properties such as resistance fluctuations due to the application of cycle loads can be evaluated. Repeated expansion and contraction from the heat of solder can be reproduced and tested.
**Safe and Delicious Food Products**

The texture of foods, including such characteristics as chewiness and ease of swallowing, is one aspect in how consumers measure the deliciousness of food.

Providing testing machines that can quantity texture characteristics is just one way that Shimadzu ensures the good taste of food for everyone from infants to the elderly.

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**Viscoelasticity Evaluations of Gelatin**

Gelatin testing (JIS K6503), jelly strength evaluation testing in accordance with the Japanese Pharmacopoeia, and viscosity testing for a variety of jelly-like samples can be performed. The tests evaluate the jelly strength of orally administered jelly preparations in relation to how easy they are to swallow, as well as the texture of fruit jelly and other gelatins. Hardness, ease of mastication and other indices specific to texture evaluations are utilized.

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**Sausage Shear Evaluations**

This jig can perform cutting and shear tests with a blade. In addition to a V-shaped cut for Warner-Bratzler tests, other blades with a variety of tip shapes can be used for shear evaluations of meat, sausage, cheese, vegetables, and snack bars.

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**Potato Chip Breakage Test**

This jig is for performing penetration tests of snack foods and potato chips. Measuring the test force at the time of breakage provides values that can be used as indices of brittleness and crispness.
To Improve Quality and Reliability of Medical Products

Measuring the strength of materials and components, ranging from packaging to artificial bones and medical equipment, is essential to delivering medicine and providing healthier lives. Testing machines are indispensable tools in this effort, and Shimadzu’s systems provide the precision performance to meet both R&D and QA requirements.

Implant Fatigue Evaluations
Fatigue and endurance tests are performed by fastening a sample at 30 degrees, and then loading it with a vertical test force from an upper actuator. The purpose of this test is to simulate a functional load on the implant itself, presupposing an extreme case.

Tablet Push-Out Evaluations
The force when tablets or capsules are pushed out of a press-through package (PTP) is evaluated. A variety of PTP shapes can be accommodated by replacing the adapter.

Evaluation of Syringe Extrusion Force
It is possible to evaluate the force required when extruding a medicinal liquid from a syringe needle.

To Deliver Stable Medical Treatment
Supporting a Safe Society for 100 Years

We will continue to aim for the highest quality, with a sense of gratitude to our customers, who take this journey with us.
A 100 Year History of Shimadzu Testing Machines

**Main Discoveries in Physics**

- Discovery of a semiconductor that glows blue when excited via a current
- Discovery of a new type of pulsar
- Discovery of a new particle (3j)
- Discovery of the quantum Hall effect
- Discovery of a pulsar
- Discovery of third generation quarks
- Discovery of 3H superfluidity
- Discovery of 3K cosmic background radiation

**Main Product**

- **1917**
  - Started manufacturing the first fatigue testing machine (BEV), and delivered it to an automobile manufacturer.
  - Delivered a 1200-t large chain tensile testing machine to a chain manufacturer.

- **1918**
  - Manufactured metal testing machines.

- **1919**
  - Manufactured metal testing machines.

- **1920**
  - Produced a new type of hardness testers.

- **1921**
  - Manufactured Ono rotary bending fatigue testing machines with a new construction.
  - Delivered an ultra-large Ono fatigue testing machine.
  - Delivered a 200-t 3-axis testing machine to a university civil engineering department.

- **1922**
  - Developed the Vickers hardness tester.

- **1923**
  - Started the manufacture and sale of a variety of material testing machines.
  - Completed a wing for the assembly of structural member testing machines.

- **1924**
  - Released the S series AUTOGRAPH.
  - Manufactured the REH-400, a 400-t large universal testing machine, to a government research organization.

- **1925**
  - Delivered an REH electron tube universal testing machine.

- **1926**
  - Developed rubber hardness testers, later adopted in the AS standards.

- **1927**
  - Released the Amsler universal testing machine.

- **1928**
  - Delivered a 500-t wire rope tensile testing machine.

- **1929**
  - Developed the Mooney viscometer.

- **1930**
  - Released a Custom cloth abrasion testing machine.
  - Developed the micro Vickers hardness tester.

- **1931**
  - Manufactured metal testing machines.
  - Developed a large rotary bending testing machine (7.8 t).

- **1932**
  - Commercialized the micro Vickers hardness tester.

- **1933**
  - Delivered a rotary bending fatigue testing machine for cranks and shafts to a steel manufacturer.

- **1934**
  - Released the RHE universal testing machine.

- **1935**
  - Manufactured the first AUTOGRAPH precision universal testing machine.

- **1936**
  - Delivered it to a synthetic fiber manufacturer.

- **1937**
  - Released the RET torsion testing machine.

- **1938**
  - Released an RHE universal testing machine to a government research organization.

- **1939**
  - Received a Good Business Award for the development of the RHE universal testing machine.

- **1940**
  - Manufactured the RHE-1 400-t large universal testing machine, and delivered it to a steel research institute.

- **1941**
  - Released the RHE universal testing machine.

- **1942**
  - Released the 600-t universal testing machine.

- **1943**
  - Released the 800-t universal testing machine.

- **1944**
  - Released the 1000-t universal testing machine.

- **1945**
  - Released the 1500-t universal testing machine.

- **1946**
  - Released the 2500-t universal testing machine.

- **1947**
  - Released the 3000-tf structural member testing machine to Nihon University.

- **1948**
  - Delivered the first high-speed tensile testing machine to a steel manufacturer.

- **1949**
  - Delivered an automatic tensile testing system to an automobile manufacturer.

- **1950**
  - Delivered a fully automatic universal testing system to a steel manufacturer.

- **1951**
  - Delivered the 3000-tf structural member testing machine to Nihon University.

- **1952**
  - Delivered an automatic tensile testing system to a steel manufacturer.

- **1953**
  - Delivered the 400-t servo universal testing machine.

- **1954**
  - Delivered an automatic tensile testing system to a steel manufacturer.

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- **1966**
  - Delivered an automatic tensile testing system to a steel manufacturer.

- **1967**
  - Released the UHM and UEM universal testing machine.

- **1968**
  - Released the UEM-5 series AUTOGRAPH.

- **1969**
  - Released the DCS series AUTOGRAPH.

- **1970**
  - Released the DCS-6 series AUTOGRAPH.

- **1971**
  - Released the DCS-7 series AUTOGRAPH.

- **1972**
  - Released the EHF-5000 flow tester.

- **1973**
  - Released the DCS-8 series AUTOGRAPH.

- **1974**
  - Released the DCS-9 series AUTOGRAPH.

- **1975**
  - Released the DCS-10 series AUTOGRAPH.

- **1976**
  - Released the DCS-11 series AUTOGRAPH.

- **1977**
  - Released the DCS-12 series AUTOGRAPH.

- **1978**
  - Released the DCS-13 series AUTOGRAPH.

- **1979**
  - Released the DCS-14 series AUTOGRAPH.

- **1980**
  - Released the DCS-15 series AUTOGRAPH.

- **1981**
  - Released the DCS-16 series AUTOGRAPH.

- **1982**
  - Released the DCS-17 series AUTOGRAPH.

- **1983**
  - Released the DCS-18 series AUTOGRAPH.

- **1984**
  - Released the DCS-19 series AUTOGRAPH.

- **1985**
  - Released the DCS-20 series AUTOGRAPH.

- **1986**
  - Released the DCS-21 series AUTOGRAPH.

- **1987**
  - Released the DCS-22 series AUTOGRAPH.

- **1988**
  - Released the DCS-23 series AUTOGRAPH.

- **1989**
  - Released the DCS-24 series AUTOGRAPH.

- **1990**
  - Released the DCS-25 series AUTOGRAPH.

- **1991**
  - Released the DCS-26 series AUTOGRAPH.

- **1992**
  - Released the DCS-27 series AUTOGRAPH.

- **1993**
  - Released the DCS-28 series AUTOGRAPH.

- **1994**
  - Released the DCS-29 series AUTOGRAPH.

- **1995**
  - Released the DCS-30 series AUTOGRAPH.

- **1996**
  - Released the DCS-31 series AUTOGRAPH.

- **1997**
  - Released the DCS-32 series AUTOGRAPH.

- **1998**
  - Released the DCS-33 series AUTOGRAPH.

- **1999**
  - Released the DCS-34 series AUTOGRAPH.

- **2000**
  - Released the DCS-35 series AUTOGRAPH.

- **2001**
  - Released the DCS-36 series AUTOGRAPH.

- **2002**
  - Released the DCS-37 series AUTOGRAPH.

- **2003**
  - Released the DCS-38 series AUTOGRAPH.

- **2004**
  - Released the DCS-39 series AUTOGRAPH.

- **2005**
  - Released the DCS-40 series AUTOGRAPH.

- **2006**
  - Released the DCS-41 series AUTOGRAPH.

- **2007**
  - Released the DCS-42 series AUTOGRAPH.

- **2008**
  - Released the DCS-43 series AUTOGRAPH.

- **2009**
  - Released the DCS-44 series AUTOGRAPH.

- **2010**
  - Released the DCS-45 series AUTOGRAPH.

- **2011**
  - Released the DCS-46 series AUTOGRAPH.

- **2012**
  - Released the DCS-47 series AUTOGRAPH.

- **2013**
  - Released the DCS-48 series AUTOGRAPH.

- **2014**
  - Released the DCS-49 series AUTOGRAPH.

- **2015**
  - Released the DCS-50 series AUTOGRAPH.

- **2016**
  - Released the DCS-51 series AUTOGRAPH.

- **2017**
  - Released the DCS-52 series AUTOGRAPH.

- **2018**
  - Released the DCS-53 series AUTOGRAPH.

- **2019**
  - Released the DCS-54 series AUTOGRAPH.

- **2020**
  - Released the DCS-55 series AUTOGRAPH.

- **2021**
  - Released the DCS-56 series AUTOGRAPH.

- **2022**
  - Released the DCS-57 series AUTOGRAPH.

- **2023**
  - Released the DCS-58 series AUTOGRAPH.

- **2024**
  - Released the DCS-59 series AUTOGRAPH.

- **2025**
  - Released the DCS-60 series AUTOGRAPH.
<table>
<thead>
<tr>
<th>Year</th>
<th>Main Product</th>
<th>Main Discoveries in Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>Released the AG-E series AUTOGRAPH</td>
<td>Released the EMT series electromagnetic fatigue and endurance testing machine.</td>
</tr>
<tr>
<td></td>
<td>Released the CCH/CCM compression testing machine</td>
<td>Released the USF-2000 ultrasonic fatigue testing system.</td>
</tr>
<tr>
<td>1990</td>
<td>Released the HTH horizontal hydraulic testing machine</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
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<tr>
<td></td>
<td>Released the AGS-D series AUTOGRAPH</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
</tr>
<tr>
<td>1991</td>
<td>Released the AGS-D series AUTOGRAPH</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
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<tr>
<td></td>
<td>Released the X10 X-ray fluoroscopic AUTOGRAPH</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
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<tr>
<td></td>
<td>Released the COH compression testing machine</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
</tr>
<tr>
<td>1992</td>
<td>Released the CCH2 Super Impact testing machine</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
</tr>
<tr>
<td></td>
<td>Released the SDMD balancing and measurement device</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
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<tr>
<td></td>
<td>Delivered the AUTOGRAPH automatic machine with hardness tester to a steel manufacturer</td>
<td>Released the AGS-X series AUTOGRAPH.</td>
</tr>
<tr>
<td>1993</td>
<td>Released the 4800 controller for Servopulser</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>Released the HVI-20 semi-Vickers hardness tester</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<td></td>
<td>Released the SALD-3000 particle size analyzer</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td>1994</td>
<td>Released the SHIKUBU software for controlling AUTOGRAPH</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>Released the SMV-202 Mooney viscometer</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<td>1995</td>
<td>Released the AGS-G series AUTOGRAPH</td>
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<td>Released the SHIKUBU testing software</td>
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<td></td>
<td>Released the MMT microservo</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>Released the CFT-500D flow tester</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td>1996</td>
<td>Released the EZ Test compact table-top tester</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>At about this time, orders for the biaxial fatigue testing machine for seismic isolation rubber became active.</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
</tr>
<tr>
<td>1997</td>
<td>Released the AGS-H series AUTOGRAPH</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>Released the SALD-200V particle size analyzer</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>Released the HMV-1/2 micro Vickers hardness tester</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td>1998</td>
<td>Released the 4826 controller for Servopulser</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>Released the SALD-2100 particle size analyzer</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<td>Released the TriStar 3000</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td>1999</td>
<td>Released the EZ series AUTOGRAPH</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<tr>
<td></td>
<td>Released the DUH-WZ01 ultra micro hardness tester</td>
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<tr>
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<td>Released the SALD-300V particle size analyzer</td>
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<td></td>
<td>Released the UH-1 universal testing machine.</td>
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<td>Released the TRAPEZIUM III testing machine software.</td>
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<tr>
<td></td>
<td>Released the SALD-7000 particle size analyzer</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<td></td>
<td>Released the AutoPore 9501 series</td>
<td>Released the EZ-L/S series compact table-top tester.</td>
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<td></td>
<td>Released the ENT-110 endurance testing machine</td>
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<td>Released the DBM-G balancing and measurement device</td>
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<td>2000</td>
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<td>Released the 4890M controller for Servopulser</td>
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<td></td>
<td>Released the ENF-LS table-top Servopulser</td>
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<td>Released the CONCRETO2000 fully automatic concrete compression testing machine.</td>
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<td>Released the 4890M controller for Servopulser</td>
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<tr>
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