ENGINEERING
Special Steel Structure
DEVELOPMENT
Super Long-span Technology

Our steel structure technology, which realizes super long-span and super high-rise structures, is based on our world-class raw material technology fostered by our steelmaking business and is supported by our ability to develop unique products, such as NS trusses and Unbonded Braces. This ability is revealed to the world by our many construction achievements both in Japan and overseas.
“Special steel structure technology” is used to construct beautiful and dynamic large spaces, such as soccer stadiums and other types of athletic event space.

We carry out everything from structural design to fabrication and construction work, utilizing the Nippon Steel & Sumitomo Metal Group’s unique technology making and using steel.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Main Application</th>
<th>Location</th>
<th>Design</th>
<th>Construction</th>
<th>Completion Year</th>
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<tbody>
<tr>
<td>Saitama Super Arena</td>
<td>Multi-purpose</td>
<td>Saitama City, Saitama</td>
<td>MAS2000 joint design room</td>
<td>Taisei Corporation</td>
<td>2000</td>
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<tr>
<td>Toyota Stadium</td>
<td>Multi-purpose</td>
<td>Toyota City, Aichi</td>
<td>Kisho Kurokawa Architect &amp; Associates</td>
<td>Taisei Corporation</td>
<td>2001</td>
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<tr>
<td>Tokyo Stadium</td>
<td>Multi-purpose</td>
<td>Chofu City, Tokyo</td>
<td>Nihon Sekkei, Inc.</td>
<td>Kajima Corporation</td>
<td>2001</td>
</tr>
<tr>
<td>Sendai Airport Terminal</td>
<td>Airport</td>
<td>Natori City, Miyagi</td>
<td>Nikken Sekkei Ltd.</td>
<td>Kumagai Gumi JV</td>
<td>1994</td>
</tr>
<tr>
<td>Sendai Airport Terminal</td>
<td>Airport</td>
<td>Izumisano City, Osaka</td>
<td>Kansai International Airport Passenger Terminal Building Detailed design and Nikken Sekkei Ltd. JV</td>
<td>Obayashi Corporation JV (north section) and Takenaka Corporation JV (south section)</td>
<td>1994</td>
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<tr>
<td>Kokura Racecourse Paddock</td>
<td>Racecourse</td>
<td>Kitakyushu City, Fukuoka</td>
<td>Tohata Architects &amp; Engineers</td>
<td>Taisei Corporation</td>
<td>1999</td>
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</table>
**Tension Structures**

The tension structure realizes a lightweight, long-span roof frame, and a glazing system allows for a transparent façade. Tension members that meet various design requirements from large to small capacity, along with unified design joints, are available.

**Shinsaibashi Head Office Building**
- Main application: Office
- Location: Minato Ward, Tokyo
- Design: Beitz & Associates
- Completion: 1990

**Kunchi General Purpose Gymnasium Oka Arena**
- Main application: Gymnasium
- Location: Kashiwa City, Chiba Prefecture
- Design: Kashiwa Architects & Engineers, Inc.
- Completion: 2003

**Shinsaibashi Social Gymnasium**
- Main application: Gymnasium
- Location: Kashiwa City
- Design: ACJ
- Construction: Miyao Construction JV
- Completion: 2003

**NS Trusses**

The wide space created through use of a steel pipe space truss has brought into existence a variety of architectural expressions in sports/cultural facilities and so on. Our system trusses, which include the simple and low-cost W truss, in addition to the NS truss, which has produced many achievements due to its excellent structural form, are designed in the pursuit of various possibilities.

**Fukuoka Airport International Passenger Terminal**
- Main application: Airport
- Location: Hakata Ward, Fukuoka City
- Design: HOK, Azusa Sekkei Co., Ltd., MHS Planners, Architects & Engineers, and Mishima Sekkei, Jr.
- Construction: Taisei Corporation JV
- Completion: 1999

**Shimatomachi Social Gymnasium**
- Main application: Gymnasium
- Location: Nagano Prefecture
- Design: ACA
- Construction: Miyao Construction JV
- Completion: 2003
Building and Tower Engineering

Our excellent structural design and construction technology realize super high-rise building that are full of functional beauty. Our spirit of innovation—which can be seen in our many achievements in Japan and overseas—is highly appraised.

B-Con Plaza
- Main application: Monument tower
- Location: Beppu City, Oita Prefecture
- Design: Arata Isozaki & Associates' studio
- Construction: Taisei Corporation JV
- Completion: 1996
- Height: 124m

Fukuoka Tower
- Main application: Monument tower
- Location: Fukuoka City, Fukuoka Prefecture
- Design: Nikken Sekkei Ltd.
- Construction: Taisei Corporation JV
- Completion: 1989
- Height: 234m

Docomo Tower
- Main application: Radio transmission tower
- Location: Osaka City, Osaka Prefecture
- Design: NTT Facilities, Inc.
- Construction: Obayashi Corporation JV
- Completion: 2004
- Height: 200m

New Bank of China
- Main application: Offices
- Location: Hong Kong
- Design: I.M. Pei & Partners (U.S.A.)
- Construction: Kumagai Gumi Co., Ltd.
- Completion: 1988
- Number of Floors: 70

Shun Hing Square Di Wang
- Main application: Offices
- Location: Shenzhen City, China
- Design: American Design Associates Ltd.
- Construction: Kumagai Gumi Co., Ltd.
- Completion: 1995
- Number of Floors: 68

Taipei International Financial Center
- Main application: Offices, commercial facilities
- Location: Taipei City
- Design: C.Y.LEE & Partners Architects Planners
- Construction: Kumagai Gumi Co., Ltd.
- Completion: 2004
- Number of Floors: 101 (508m)
Hybrid Structures (wood + steel)

Large space is brought into existence using “wooden hybrid trusses”, which consist of wooden members and steel plates/tension rods. Hybrid structures are attracting attention as a new technology that can impart warmth and serenity to large-scale structures.

Example of a hybrid structure

We propose various structures, such as a sandwich configuration, in which wooden and steel members are combined with each other.
We demonstrate our maximum performance by combining the know-how obtained using the latest technologies for analyses, including large-scale three-dimensional structural analysis, geometrical non-linear analysis of tension structures, dynamic non-linear analysis for high-rise buildings, FEM analysis of joints using cast steel or extremely thick members, and analysis performed during construction in which complex erection processes are simulated, along with other technology related to steel materials, supported by our many achievements regarding the construction of steel structures.

1. Leading structural analysis technology
We demonstrate our maximum performance by combining the know-how obtained using the latest technologies for analyses, including large-scale three-dimensional structural analysis, geometrical non-linear analysis of tension structures, dynamic non-linear analysis for high-rise buildings, FEM analysis of joints using cast steel or extremely thick members, and analysis performed during construction in which complex erection processes are simulated, along with other technology related to steel materials, supported by our many achievements regarding the construction of steel structures.

"3-dimensional structural analysis" simulates a large space using a computer.
"FEM analysis" simulates the strength of a joint.

2. Sophisticated fabrication technology and rigorous production control
For complex three-dimensional structures as well, we employ three-dimensional CAD and propose the optimum details, backed by our steel structure technology. By combining the most up-to-date welding robots and skilled workers with our highly accurate assembly technology, we offer reasonably priced, high-quality products that unfailingly meet the sophisticated needs of the designer.

3. On-site Construction
We propose minimum cost and a high-quality on-site construction plan, which organically combines on-site assembly work with large heavy machinery, and so on. We measure the three-dimensional displacement and strain of the steel members being assembled in real time, and carry out on-site construction work under stringent safety control, while providing adequate care to the soundness of the structures.
Vibration-control and Seismic Isolation Devices

Vibration-control and seismic isolation devices are indispensable for the design of large special structures, considering the structural performance under earthquakes and wind loads. We offer various devices with our flexible design and manufacturing technology.

Unbonded Braces

Our Unbonded Braces is a high-performance structural element for earthquake resistance at an economical price.

Visco-elastic vibration-control damper

Visco-elastic damper is optimal for enhancing occupant comfort, and also works as a damper under strong wind or an earthquake load.

Low yield point steel panels

The energy of an earthquake is absorbed by walls or posts made from Low yield point steel plates.

Seismic isolation U-shaped steel damper

"Steel damper" and "lead damper", "Steel damper combined with natural rubber bearing" and "Steel damper separately allocated type" We provide dampers to meet a variety of design requirements.

NS eco-pile

The "NS eco-pile" is a next-generation piling method that solves issues related to conventional piling methods, such as industrial waste including muddy water and surplus soil, noise, and vibration. It realizes high bearing capacity, high earthquake resistance, low cost, and a short construction period.

Research and Development

We are ceaselessly aiming to develop new steel structure technology that can meet the demands of the next generation.

Engineering R&D Institute

At the Engineering R&D Institute, which is located within the Nippon Steel & Sumitomo Metal General Technical Development Bureau in Futtsu City, we are relentlessly developing new technology.