Feature section

THK Seismic Isolation Systems

Providing the optimal system to protect valuable property

As Japan marks the twentieth year since the Great Hanshin-Awaji Earthquake, amid lingering apprehension about the ability to withstand such vast destruction, there is renewed interest in earthquake preparedness. In the interest of safeguarding lives and valuable property as well as to ensure business continuity, increasing attention is being paid to seismic isolation systems that protect office buildings, hospitals, dormitories, government buildings, public facilities, and private homes, as well as to seismic isolation devices that provide local protection for server computer, artwork, and measuring instruments and other high-precision devices. THK, determined to offer the most suitable and reliable product for each situation, is proud to help provide protection from menacing earthquakes. Below we offer a look at these types of THK products and their uses.

Seismic isolation and vibration control for buildings

- **Seismic isolation**
  - RDT viscous damping system
  - CLB linear guide system

  - Deployed in combination with roller bearings, this device absorbs seismic energy.
  - This system supports the building and dissipates seismic vibrations from any direction.

Vibration control

- **RDT viscous damping system used for vibration control**

  - This device, which can be installed on the inside or outside of a building, absorbs seismic energy and suppresses building vibrations.

Seismic isolation for devices

- **TSG seismic isolation modules**
  - The modules can be freely combined to accommodate a diverse range of loads and can also be used to isolate the floor itself.

- **TSD seismic isolation table**
  - The seismic isolation table can simply be placed on the floor and requires no special installation.
Attracted by reliable performance backed up by actual testing

Information technology has spread throughout the society we live in. In recent years the medical industry has rapidly incorporated electronic information systems. We now have electronic health records and other kinds of medical information systems that contain all sorts of information, from CT and MRI images and treatment plans for incoming patients to explanatory documents and consent forms for surgeries, and the enormous volumes of data collected are stored on server computers. If the servers were destroyed in a big earthquake or some other disaster, it’s no exaggeration to say that virtually all medical activity would come to a halt. Not only that, the data in an electronic health record is important private information belonging to the patient, and we have a responsibility to properly protect it. Another point is that test results and images have to be provided to enable a patient to give informed consent for an operation, and if something were to go wrong the hospital could be ordered by a court to produce them. As a medical institution providing healthcare for this area, we have to do whatever is needed to protect our servers, for our patients’ sake and to ensure sound management of the hospital’s own operations.

Here in Nishinomiya we still have painful memories of the Great Hanshin-Awaji Earthquake, which occurred two years ago. Given the fact that a series of major earthquakes have followed, including the Chuetsu earthquake and the Great East Japan Earthquake, we really have to come to terms with the fact that major earthquakes are unavoidable.

We selected THK’s seismic isolation system to protect our servers because they showed us the results of tests, performed using the same seismic waves as those recorded during the Great East Japan Earthquake, in which server computers were clearly protected. It took very little time from the signing of the contract to delivery, and the installation was done quite skillfully. Everything went smoothly, from the protective measures taken at the time of delivery and the pre-installation preparations to the installation work itself and the cleanup. We really appreciated the fact the work was done so well in the limited time available.

I used to jump every time the ground shook a little and ask everyone how big the tremor was. Now that I’ve seen the data proving that THK’s seismic isolation system can protect against a quake as powerful as the Great East Japan Earthquake, I feel relieved.
Kyoudou Densan Center
Hachinohe, Aomori Prefecture

Strong protection, simple setup

Our company develops logistics systems and manages operations for hardware stores and supermarkets. In logistics systems, rapid response is extremely important. When products are sorted, for instance, split-second timing is required. Cloud-computing is all the rage nowadays, but it’s very hard to achieve a rapid response with cloud-computing alone. Server computers, the mainstay of our business, are therefore absolutely crucial.

During the 1994 offshore Sanriku earthquake, a major seismic event, our servers survived but had to endure considerable displacement, and we were worried about LAN cables being severed and power cords being unplugged. That earthquake motivated us to start considering seismic isolation, and when we upgraded our servers we decided to incorporate it—not the THK seismic isolation system, another company’s products.

After the Great East Japan Earthquake struck we brought in backup servers, and this time we decided to use THK’s seismic isolation devices. At that time we had an employee who was familiar with THK and sang their praises, assuring us that their products were unquestionably reliable. He had attended an exhibition where he observed the THK device in action and saw for himself that it was effective even against severe temblors of the type that occurred during the Great East Japan Earthquake. There was nothing but a bowl on first seismic isolation device we used, which didn’t look as though it would stand up to strong shaking. In addition, THK’s device came in a variety of sizes and could be freely combined. The fact that we could easily set it up ourselves was a big reason for adopting the THK system.

In mid-February there was a level-four earthquake off the coast of northeastern Japan that registered 6.9 at its epicenter, but it caused no problems for us whatsoever. I’ve never experienced an earthquake more powerful than that one, but I’m not worried at all. In mid-May, after a strong early-morning earthquake, we got a call from THK asking if we had experienced any problems with our servers. I appreciated that. We have no plans to install more servers any time soon, but when the time comes I’ll get in touch with THK, because I know we can count on them.
The Numazu Plant, a key production facility that also plays a major role in the development of software for Fujitsu’s large-scale computers and server products, has a computer center where development data and other information is stored. Precious intellectual assets belonging to the Fujitsu group are there, including some from overseas. We have to maintain conditions there to ensure secure, reliable, and stable daily operations.

The Suruga Bay area, where the Numazu Plant is located, is part of the region that has been at risk from a major Tokai earthquake or Tonankai earthquake since long before the Great East Japan Earthquake. Based on the realization that it would be extremely difficult to recover if our development assets and data were lost, we installed seismic isolation systems at group companies in 2008 to help ensure business continuity and a higher level of reliability.

The Cloud Services Department has customer service engineers available at all times at the center to rapidly respond to the various needs that arise. One of them told us about THK’s unprecedented seismic isolation technology. This happened at a time when the topic of business continuity was getting a lot of attention, and we were also engaged in facility planning, so we invited people from THK to come to the plant and explain their products.

The presentation was very convincing. They didn’t put the focus on paperwork. After a brief introduction they asked about our situation, and after watching a video they determined the actual motion that would occur, using a miniature model made of clear plastic. We could see that our existing equipment would not be adequate if an unexpectedly intense inland earthquake were to strike. We were convinced because we could see it and even feel it, which doesn’t happen very often.

At the time it didn’t feel at all as though THK was trying to sell us something, although we still deal with the same people. They simply explained the technology that THK used for seismic isolation, with no mention of any rival products. They just said that if we accepted their proposal they would take care of us. We had high hopes for their system and really wanted to try it.

Of course, after that our bosses had to be convinced. We explained that THK’s system would perform better and be more reliable that our existing seismic isolation arrangement. The miniature model that THK had loaned us was very persuasive.

If our servers were damaged or destroyed in a disaster it would still be possible to restore conditions using backup computers, but in the worst case, if our development data were lost, all such efforts would be in vain. For the sake of business continuity we have a comprehensive system in place, including backup computers at separate locations. Even so, by installing THK’s seismic isolation devices, I would like to think we have taken sufficient action to safeguard a very important facility.
THK’s water-powered generating system

Carving out a new future with technology and imagination

Light, heat, and motion, from flowing water

THK entered the field of wind-powered generation in 2009 when it launched an internal project aimed at developing key components for wind turbines. Exploring new uses for the technology developed in that initiative, THK has now applied it to water-powered generation. Following an initial test in Taiwan in 2012, THK tested its new system at the Kanagawa Prefecture Sagami River Left Bank Land Improvement District in 2014, continuing its campaign to help unleash the vast potential of renewable energy.

THK technology stands out

The use of irrigation canals for water-powered generation is relatively new. There are strict limitations on the extent to which irrigation canals can be modified, since any obstruction of the water flow would have a major negative impact on the crop being watered. For conventional water-powered generation, falling water must be devised, which enables large volumes of power to be generated but requires major construction work that often costs at least ten times as much as the generating equipment itself.

THK’s system, which generates electricity by means of a water wheel alone, costs relatively little and neither damages nor obstructs irrigation canals. Since it doesn’t require damming the flow to create falling water, there’s little likelihood of flooding, and refuse and other floating matter can easily be cleared to permit stable operation.

Imaginative technology contributes to revitalization

With a water-powered generating system that does not rely on falling water, power is generated most efficiently in a stable environment: a constant volume of water flowing at a constant speed. That’s why THK decided to focus on irrigation canals.

Farming is dependent on rain. Droughts and poor harvests take their toll, and the incomes of people who work in agriculture are dependent on climatic conditions. THK is both pursuing growth in the field of renewable energy and trying to help people involved in agriculture achieve more stable incomes, thereby contributing to the “regional revitalization” movement. With the cooperation of the Kanagawa Prefecture Sagami River Left Bank Land Improvement District, a two-month experiment was carried out in 2014 to verify the functions of THK’s water-powered generating system and reveal any challenges posed by agricultural irrigation canals in Japan. The results demonstrated that no modifications to existing irrigation canals are required, that the system will not obstruct water flow, and that irrigation canals in Japan are capable of generating a stable supply of electric power.

System in place: August 21 to October 3, 2014
System in operation: August 26 to September 24, 2014
Location: Near Inuya 2-chome, Zama, Kanagawa Prefecture

<table>
<thead>
<tr>
<th>Water intake area (m²)</th>
<th>0.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade length (m)</td>
<td>0.5</td>
</tr>
<tr>
<td>Blade rotation diameter (m)</td>
<td>0.6</td>
</tr>
<tr>
<td>Flow rate (m/s)</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Output (kW)</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>0.24</td>
</tr>
<tr>
<td>Monthly output (kWh/mo.) during 720 hours of operation</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>173</td>
</tr>
</tbody>
</table>

Trial unit specifications

<table>
<thead>
<tr>
<th>Average output: 19.7 kW</th>
</tr>
</thead>
</table>

Testing a water-powered generator.
As someone who works with irrigation, I’ve always thought people should be more aware of the importance of irrigation canals, and not just because they carry water, which is a source of life. I’m glad to have had the chance to help explore their potential through THK’s project, because I think it will help the public better understand the ways in which canals can help improve living conditions.

When I got my first look at THK’s water-powered generator, I saw right away that it wouldn’t damage the canal or anything else, since the water wheel is the only thing that goes into the water. I knew this would be a valuable experiment. Ordinarily, hydroelectric projects require major construction work, so the simple design of THK’s system was very appealing.

I work in agriculture, so I have a basic interest in protecting the environment. For the sake of the future, I feel we should be working hard to utilize renewable energy as a countermeasure against global warming, even if it’s a little costly at present. Unlike solar and wind power, water-powered generation can be available 24 hours a day, provided you have a steady flow, so it has great potential as a source of renewable energy. If we put it to practical use, it could be used to run the systems that control automatic sluice gates, which we already have, so the power generated wouldn’t necessarily just be sold off but could actually serve as an energy source on its own.

Agriculture and industry are two separate fields, of course, but both are devoted to producing things, so in that sense they’re similar. I hope THK will put its industrial insights to good use in relation to agriculture and come up with some imaginative new ideas and technology. I really hope the system that was tested in 2015 will be perfected and put on the market. I’d like to see THK continue to develop ways to take advantage of the latent benefits of irrigation canals, and I hope people will learn about its efforts so far.
Attitudes and conditions conducive to common-sense energy conservation.

### Objective of energy-saving efforts

- **A 2.4% energy savings on weekdays and a bigger reduction in power usage on weekends.**

### Reducing environmental impact and raising employee awareness

THK RHYTHM’s energy-conservation efforts, which include the use of easy-to-remember slogans, help ensure that employees faithfully turn off lights and machines when they are not needed. This has been accomplished not through verbal orders but by relocating power switches and incorporating measures that enable employees to see exactly how much power is being used at any given time, which helps reduce waste throughout the plant.

#### Raising awareness

1. Turn off power to equipment when not in use.
2. Turn off air compressors when not in use.
3. Turn off lights when not in use.

#### Measures taken to reduce wasted energy

- **For employees and equipment.**
  - Relocated switches make it easier to turn off power to machinery.
  - LED lights on the production line are equipped with motion sensors.
  - Switches that should remain on are clearly marked with signs.
  - Employees can see how much air and power are being used.

#### Results

- A 2.4% energy savings on weekdays and a bigger reduction in power usage on weekends.

< Objective of energy-saving efforts >

Attitudes and conditions conducive to common-sense energy conservation.
Since 1998, as part of efforts by Japan’s Ministry of the Environment to encourage countermeasures against global warming, the Minister of the Environment has presented annual commendations to honor individuals and organizations for notable achievements in the campaign to confront global warming. Having been nominated last year by the city of Hamamatsu, THK RHYTHM became the recipient of such a commendation for practical measures and consciousness-raising activities in 2014.

THK RHYTHM, which has conducted a variety of energy-conservation initiatives at its production facilities, won praise for introducing high-efficiency equipment and being a green energy producer, as well as for activities designed to keep the community informed about environmental efforts.

We consider a commendation for energy conservation to be a very high honor. It will motivate the employees at the HAMAMATSU Plant to work even harder in the future. This is an affirmation of our positive efforts to reduce the plant’s environmental impact, and it should be beneficial for public relations, too. We’re going to continue our efforts and set our sights on another award.

| October 2014 | Presentation on rationalizing energy usage, attended by about 50 people representing businesses in the Hamamatsu area and western Shizuoka Prefecture. |
| December 2014 | Seminar on combating global warming, attended by about 50 people representing businesses in Hamamatsu and western Shizuoka Prefecture. |
| January 2015 | Conducted a tour of its energy-saving production facilities for six visitors from the Univance Corporation. |
| March 2015 | Conducted a presentation on energy-conservation efforts at a METI briefing on revised energy-conservation laws, attended by about 500 people representing firms in the Kanto district. |

In their own words: Honored to be recognized

Masayoshi Murakami (Manager, Manufacturing engineering section, THK RHYTHM HAMAMATSU Plant)

We consider a commendation for energy conservation to be a very high honor. It will motivate the employees at the HAMAMATSU Plant to work even harder in the future. This is an affirmation of our positive efforts to reduce the plant’s environmental impact, and it should be beneficial for public relations, too. We’re going to continue our efforts and set our sights on another award.