

Hitachi launches R&D on silicon quantum computers in collaboration with Intel K.K. and AIST to accelerate the shift from academic demonstration to industrial application

Selected for NEDO's Program "Accelerating the Development and Demonstration of Next-Generation Quantum Computers to Solve Social Challenges"

Tokyo, July 22, 2026 – Hitachi, Ltd. (TSE: 6501, “Hitachi”) today announced that it has been selected as the prospective implementing organization for New Energy and Industrial Technology Development Organization (“NEDO”) “Post-5G Information and Communication System Infrastructure Enhancement R&D Project” theme titled “Accelerating the Development and Demonstration of Next-Generation Quantum Computers to Solve Social Challenges.”

This project was jointly proposed by Hitachi and Intel K.K., the Japanese subsidiary of Intel Corporation (“Intel”), and builds on the comprehensive strategic collaboration previously announced by Hitachi and Intel.*¹ Following its selection, Hitachi will advance the project through joint research with the National Institute of Advanced Industrial Science and Technology (“AIST”). The project period is scheduled to run until March 2029.

Hitachi is working to establish foundational technologies for the design, manufacturing, and integration of qubit chips based on semiconductor mass-production processes. To realize practical quantum computing, Hitachi is accelerating research and development of large-scale, highly reliable silicon quantum computers with a view toward mass production, while building next-generation computing infrastructure to help address social challenges. Through these efforts, Hitachi aims to create new solutions and bring them into practical use in society.

*¹ [Hitachi and Intel Announce Strategic Collaboration to Accelerate AX \(AI Transformation\) in Key Industrial Sectors: June 5, 2026](#)

Background

Expectations for quantum computers are rising as a means of addressing social challenges that are difficult to solve with conventional computers. To demonstrate clear value in real-world applications, it is necessary to realize fault-tolerant quantum computers capable of correcting noise-based errors, which require integration at the scale of one million qubits.

Silicon quantum computers are expected to be suitable for large-scale applications because they can utilize existing semiconductor manufacturing technologies. For future practical application, it is necessary to address challenges across manufacturing, integration, and operation, such as smoothly bridging the gap from the research stage to mass production and industrialization and responding to performance variations in devices.

Hitachi is also strongly promoting research and development in the Moonshot R&D Project (Goal 6) led by the Cabinet Office*². Additionally, Hitachi has collaborated with research institutions such as RIKEN, a National Research and Development Agency, and imec, a global innovation hub for nanoelectronics and digital technology*³, and has built up foundational technologies such as control technology*⁴ that enables the stable operation of qubits over long periods. This project aims to translate these academic achievements into practical technologies and industrial applications. Hitachi will continue to advance everything from chip design to high-

density integration and cloud operations. By bringing together expertise from industry, government, and academia, Hitachi aims to realize large-scale silicon quantum computers and bring new solutions into practical use.

- *2 [Hitachi to participate in Phase 2 research projects of JST Moonshot Research & Development Program Goal 6: “Realization of a fault-tolerant universal quantum computer that will revolutionize economy, industry, and security by 2050” : Hitachi Global](#)
- *3 [Accelerating R&D Toward the Practical Application of Silicon Quantum Computers - Research & Development: October 2, 2025 \(in Japanese\)](#)
- *4 [Hitachi demonstrates high-fidelity qubit control technology that enables stable operation even in noisy environments - Research & Development : Hitachi](#)

About the Selected Project

In this project, Hitachi will integrate the design of qubit chips, 3D integration, and cloud operation to establish a quantum device manufacturing and system design foundation with an eye toward mass production processes. Through this, Hitachi aims to build the design, manufacturing, and operational infrastructure necessary for the realization of large-scale, highly reliable silicon quantum computers in the future. The main development items are as follows:

1. Design and packaging technologies for industrial-quality 100-qubit silicon quantum computers

Hitachi will design chip structures in collaboration with Intel to ensure stable operation of qubits. Additionally, by applying Intel’s quantum-device manufacturing processes based on Intel 18A process technology,^{*5} Hitachi will advance development to overcome performance variations among devices, which have been a major challenge during the research and prototyping stages. Furthermore, with future error correction implementations in mind, Hitachi will advance the overall chip design, including peripheral circuits. To ensure stable operation of qubit chips at extremely low temperatures, Hitachi will also work on designing components that house the chips and developing control circuits that reduce the amount of wiring. Through these efforts, Hitachi aims to establish the foundational technologies necessary for the design and implementation of chips equipped with 100 qubits or more.

- *5 For more information on Intel's 18A process technology, please see the link below:
<https://www.intel.com/content/www/us/en/foundry/process/18a.html>

2. Development of a process design kit (PDK) for industrial-quality 100-qubit silicon quantum computers

Through a qubit chip PDK^{*6} developed by Intel, Hitachi will be able to advance chip design with a focus on mass production, taking into account actual manufacturing conditions. Intel will additionally support Hitachi's design and advance the development of a design environment for the future transition to mass production.

- *6 Process Design Kit (PDK): A suite of tools that compiles manufacturing conditions and design rules required for semiconductor chip design

3. Development of 3D Integration Technology for 1,000-qubit Silicon Quantum Computers

To address the challenges of wiring and mounting area arising from the increase in qubit count, Hitachi will develop high-density mounting technology for quantum computers used in ultra-low temperature environments. While evaluating technologies that connect chips and components at narrow intervals, Hitachi will work to establish methods that can efficiently integrate large numbers of qubits. Through this effort, Hitachi will lay the foundation for realizing future systems at the 1,000-qubit scale.

4. System Development for Cloud Deployment of Silicon Quantum Computers

Hitachi and AIST will develop a cloud system compatible with experimental environments for silicon quantum computers and aim to make it available through the Global Research and Development Center for Business by Quantum-AI Technology (“G-QuAT”), AIST. This will enable

external researchers and engineers to utilize experimental environments for qubit chips and control devices, which is expected to improve R&D efficiency. Additionally, by creating a development environment that allows a wide range of personnel to participate, Hitachi aims to foster the formation of an open development ecosystem.

Comment from Shigetoshi Samejima, Vice President and Executive Officer, CTO, GM of the Research & Development Group, Hitachi, Ltd.

“With the advancement of AI, demand for computing that supports society and industry is expanding rapidly. At the same time, challenges are becoming more apparent, including rising power consumption in computing infrastructure such as data centers, as well as optimization issues in drug discovery, materials development, energy systems, logistics, and supply chains that are difficult to address with conventional computing alone. Hitachi positions quantum computers as a strategic technology that can break through the limits of computation itself and support future social infrastructure and industrial systems. We are pleased to have been selected for this NEDO project and to launch R&D together with Intel and AIST. By bringing together the collective knowledge of industry, government, and academia around the world, Hitachi aims to contribute to the early realization of FTQC (fault-tolerant quantum computing). In addition, through the realization of large-scale quantum computers originating in Japan, the creation of new markets, and the development of an ecosystem, Hitachi will continue to drive the further growth of its digital business centered on Lumada.”

Comment from Makoto Ohno, Representative Director and President of Intel K.K.

“Quantum computing holds tremendous promise to help solve scientific and industrial challenges that are beyond the reach of classical computing. Realizing that promise will require chips, manufacturing processes and system technologies designed for an entirely new model of computing. Through this collaboration, Intel and Hitachi are bringing together Intel’s advanced semiconductor process and design expertise with Hitachi’s quantum R&D capabilities to help establish the foundational chip design, manufacturing and packaging technologies needed to move silicon quantum computing from research demonstration toward scalable industrial application.”

Comment from Masahiro Horibe, Deputy Director, Global Research and Development Center for Business by Quantum-AI Technology, National Institute of Advanced Industrial Science and Technology

“G-QuAT, AIST is equipped with evaluation capabilities for quantum devices and a demonstration environment for a fusion computing platform combining quantum computers and supercomputers. We are very pleased to be fully involved in leveraging these capabilities under the collaborative project between Hitachi and Intel, from research and development of silicon quantum computers to providing experimental environments via the cloud. We believe that this new silicon quantum computing initiative at G-QuAT, AIST will accelerate the formation and expansion of the ecosystem, and we will continue to contribute to market formation through quantum technology.”

Looking ahead

Based on the foundational technologies for qubit-chip design, implementation, and cloud operation developed through this project, Hitachi aims to launch the cloud service by fiscal year 2027 and then roll out services in stages. At the same time, as important milestones toward practical application, Hitachi will work to realize prototype silicon quantum computers implementing quantum error-correcting codes at the 100-qubit scale in fiscal 2028 and at the 1,000-qubit scale in fiscal 2030. Going forward, Hitachi will accelerate research and development through collaboration with Intel, AIST, and other partners. Furthermore, through these achievements, Hitachi aims to support the evolution of Lumada and contribute to solving social challenges that are difficult to address with conventional computing platforms, thereby helping advance industrial and social infrastructure and realize a sustainable society.

About Hitachi, Ltd.

Through its Social Innovation Business (SIB) that brings together IT, OT(Operational Technology) and products, Hitachi aims to be a global leader in continuously transforming social infrastructure through digital, contributing to a harmonized society where the environment, wellbeing, and economic growth are in balance.

Hitachi operates worldwide across four sectors – Digital Systems & Services, Energy, Mobility, and Connective Industries – as well as a Strategic SIB Business Unit focused on new growth areas. With Lumada at its core, Hitachi creates value by combining data, technology and domain knowledge to solve customer and social challenges.

Revenues for FY2025 (ended March 31, 2026) totaled 10,586.7 billion yen, with 606 consolidated subsidiaries and approximately 290,000 employees worldwide. Visit us at www.hitachi.com.

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