

Vol.8 The New ITER Baseline and JT-60SA's Contributions

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Do you have any new ideas for how to get through to people about ITER, Mira?

Mira?

Here you go—our next newsletter.

Have I got just the job for you, Taiyo.

REPORT
The Relationship Between ITER and JT-60SA: A Comprehensive Analysis

The Relationship Between ITER and JT-60SA: A Comprehensive Analysis

Did someone say central control room?

If I were you, I'd go scope out the central control room to get some ideas for the article you're going to write.

Wow! Talk about perfect timing!

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High density
High temperature
High-quality plasma
Stable shape

JT-60SA will test a wide range of operating scenarios to find the optimal parameters for the highest quality plasmas.

and inform scientists of how best to optimize the design and operation of fusion power plants built after ITER.

JT-60SA will generate data that directly informs the operational strategies for ITER.

The goal is to create a "burning plasma" that can be sustained for 300 to 500 seconds.

10x more energy!

It is designed to produce 10 times more energy from fusion than the energy required to heat the plasma.

Thermal output

About half the size of ITER

JT-60SA is dedicated to studying plasma behavior to develop techniques for long-duration, stable plasma confinement.

It uses fuel that is easy to handle for more frequent experiments to help reduce operational expenses for future, larger reactors.

Allow me to expand on that.

Commissioning of JT-60SA began in 2020

Plasma obtained during integrated commissioning

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That's how I see it.

So you could say the new baseline is actually an improvement, with the added benefit of getting more scientifically relevant data sooner?

That's reassuring to hear, especially coming from you.

With ITER's assembly progressing and the new baseline in place, it finally feels like we have a clear path forward to a next-gen prototype reactor. I can't wait.

The Naka Institute is forging ahead towards the realization of fusion energy. At the heart of our R&D activities are the ITER Project and the JT-60SA Project.

Officially the "Naka Institute for Fusion Science and Technology," it is one of several institutes of QST, the "National Institutes for Quantum Science and Technology." The Naka Institute is a leader in the field of quantum energy and conducts R&D to produce fusion energy, i.e., energy generated by fusion reactions.

ITER LOCATION: FRANCE (SAINT-PAUL-LEZ-DURANCE)
JADA LOCATION: NAKA (Naka Institute for Fusion Science and Technology), IBARAKI

Superconducting tokamak JT-60SA

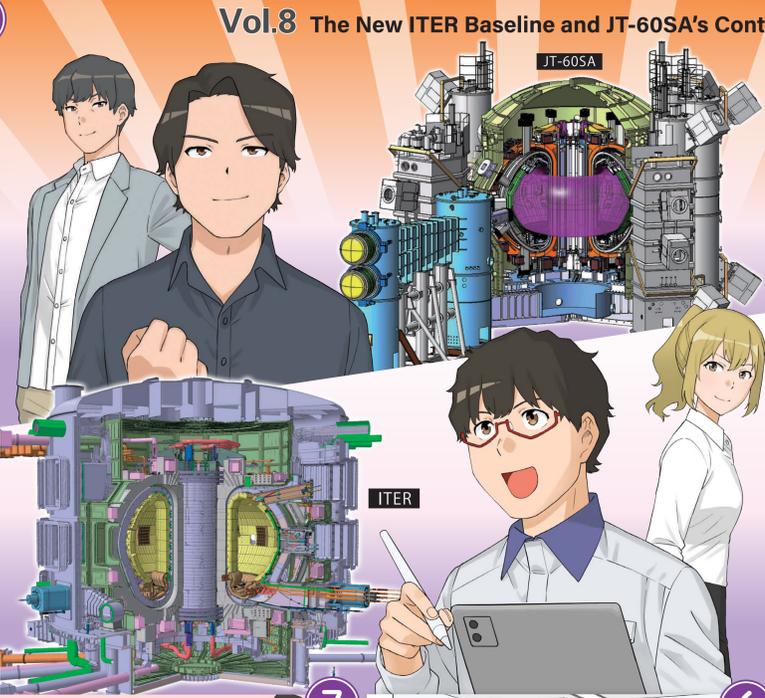
JT-60SA is a joint Japan-EU project. Its development, procurement of components, and construction were carried out collaboratively by Japan and Europe. To acquire the technologies required for ITER and future prototype reactors, researchers from around the world gather here.

ITER Japan Domestic Agency

QST has been designated by the Japanese government as the ITER Japan Domestic Agency (JADA). In this role, QST procures key components for ITER, such as the superconducting coils, and delivers them to the ITER site in France. But it's not just equipment that is sent to France; QST actively recruits skilled Japanese personnel to work at the ITER Organization to contribute to the ITER project.

And don't forget to read my article!

Naka Institute for Fusion Science and Technology



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ITER

Height: approx. 30 m
Width: approx. 30 m
Weight: approx. 23,000 tonnes

Location: France
Over 30 countries worldwide

The JT-60SA at the Naka Institute plays a crucial role in the ITER project. ITER will demonstrate that fusion is a viable and sustainable source of energy (through experiments using deuterium-tritium fuel).

* ITER will not actually produce electricity.

It is designed to produce 10 times more energy from fusion than the energy required to heat the plasma.

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The New ITER Baseline

Let's see what your future holds under the new ITER baseline.

1	2025	1st ITER machine assembly
2	2026	2nd ITER machine assembly
3	2027	3rd ITER machine assembly
4	2028	4th ITER machine assembly
5	2029	5th ITER machine assembly
6	2030	6th ITER machine assembly
7	2031	7th ITER machine assembly
8	2032	8th ITER machine assembly
9	2033	9th ITER machine assembly
10	2034	10th ITER machine assembly
11	2035	11th ITER machine assembly
12	2036	12th ITER machine assembly
13	2037	13th ITER machine assembly
14	2038	14th ITER machine assembly
15	2039	15th ITER machine assembly
16	2040	16th ITER machine assembly
17	2041	17th ITER machine assembly
18	2042	18th ITER machine assembly
19	2043	19th ITER machine assembly
20	2044	20th ITER machine assembly
21	2045	21st ITER machine assembly
22	2046	22nd ITER machine assembly
23	2047	23rd ITER machine assembly
24	2048	24th ITER machine assembly

For more details, check out the new baseline explainer video.

Note: The "New ITER Baseline" is a proposal by the ITER Organization and may be subject to change.

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Thank you Miyazaki, Yamoto-san, Soléane...

I certainly hope so!

Oh... I know you just got done with the last one!

I'm doing my part to contribute to the ITER project!

Alright, I'll post it on QST's website right away!

Whaaat?!? Already?!

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National Institutes for Quantum Science and Technology (QST) Naka Institute for Fusion Science and Technology

What's that? You want to see ITER at the Naka Institute?

Our machine is the JT-60SA

ITER is in France, so...

Well, you see... it's just that—

Beep!

ITER... Naka... People still get them mixed up...

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Thanks for being a good sport, Miyazaki.

JT-60SA Researcher Hyuga Miyazaki

I've been looking forward to giving you the grand tour, Taiyo.

Sorry—I forgot to mention it the other day.

Taiyo started working at QST around the same time as me.

Oh? You two knew each other?

And exactly what I wanted to touch on.

Please break it down for us, Miyazaki.

That's a great question.

Let's see... how are ITER and JT-60SA related?

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The new baseline consolidates tokamak assembly steps and reorganizes work steps.

It hasn't simply postponed the old deadlines.

based on our current state of knowledge, we switched to tungsten, which is more heat resistant and durable.

The blanket first wall was originally planned to be beryllium—light and easy to process—

Neutral Beam Test Facility (NBT-F)

Divertor

Neutral Beam Injector

Electron Cyclotron Resonance Heating System (Gyrotrons)

Diagnostics

Remote Handling System

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Clack clack clack

Aaaaand—finished!

You clearly explained how ITER and JT-60SA are related.

Not bad.

What do you think?

and the two wheels of the same bicycle analogy works really well.

Now you can handle any question thrown your way with confidence.

2

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She's coming to the Naka Institute to talk about ITER's new baseline. You might be able to get some intel from Soléane for your article.

How have you been, Taiyo?

Soléane!

What?! Soléane is coming here?!

Oh, and another thing— I saw that Soléane's coming to Japan.

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Researchers and engineers

They are inextricably linked.

Not just the physical tech—the people who gain experience here will go on to participate directly in research and operations at ITER.

Fostering the next generation of scientists and engineers is also an important role for us at JT-60SA.

To put it another way, ITER and JT-60SA are like the two wheels of the same bicycle.

So, are things shaping up for your article?

By all means.

Yes.

Wow—that's a really clear way to put it. Can I use that in the newsletter?

The new baseline for ITER was released to the public. Some have begun to cast doubt on the project.

It's just—

thinking that it'll be delayed indefinitely. I'd love to hear your thoughts, Soléane.

Hmm...

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Absolutely. I'll be waiting for you.

When that day comes, I'll be counting on you again, Soléane.

Back when I was a student, I witnessed the moment JT-60SA achieved its first plasma.

The atmosphere was electric and I guess you could say ignited a spark in me.

That's what set me on this path, spending my days researching at the Naka Institute. But someday, I want to follow in my seniors' footsteps and work at ITER.

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CHARACTERS

TAIYO TENNO
Interested in fusion since his days as a student, he's now a staff member at QST (National Institutes for Quantum Science and Technology), the Japanese Domestic Agency of the ITER project.

HYUGA MIYAZAKI
Junior researcher studying plasma physics at JT-60SA and a work friend of Taiyo's. Despite his reserved demeanor, he is a deeply compassionate person who dreams of conducting research at ITER.

SUSUMU YAMATO
An expert in the field of components, he oversees the JT-60SA components from their design to assembly. He is also involved in procuring equipment for ITER.

SOLÉANE
A French researcher at ITER in Saint-Paul-lez-Durance, currently living in Aix-en-Provence. She introduced Taiyo to the ITER project.

MIRAI MITSUHASHI
Administrative staff at QST, the Japanese Domestic Agency of the ITER project.

Our story so far...

Now an administrative staff member at QST's Naka Institute for Fusion Science and Technology (Naka Institute), Taiyo has been getting up to speed on the various components Japan supplies for the ITER project through on-site tours led by his senior colleague Mira. So far he has learned about the TF coils, gyrotrons, and divertor. In this episode, Taiyo learns about the connection between ITER and JT-60SA, the advanced superconducting tokamak at the Naka Institute, as well as ITER's new baseline.

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Miyazaki. Where have I heard that name before?

In that case, I'd love to have one of our promising up and comers, Hyuga Miyazaki, show you around.

I'll tag along for good measure.

It's no trouble at all. I can move my schedule around!

Are you sure, Yamato-san?

Thank you so much! You didn't have to do that.

Arn't you here for a different meeting...

What?! Soléane is coming here?!

Oh, and another thing— I saw that Soléane's coming to Japan.

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JT-60SA will lay the foundation for ITER to run efficiently and chart the course for Japan's DEMO reactors.

ITER is an international fusion research and engineering project. Most of the ITER members plan to use the knowledge gained to build their own next-generation "DEMO" reactors.

600MW reactors will be the first to generate electricity from fusion energy based on the achievements of ITER.

Broader Approach (BA) activities in fusion energy research.

Naka Institute, Ibaraki, Japan

Superconducting tokamak JT-60SA

Supporting ITER

Experimental reactor ITER

Serving as a training ground for scientists and engineers

DEMO reactors

Towards the realization of fusion energy

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So, Miyazaki—what made you want to become a researcher at Naka?

Back when I was a student, I witnessed the moment JT-60SA achieved its first plasma.

The atmosphere was electric and I guess you could say ignited a spark in me.

That's what set me on this path, spending my days researching at the Naka Institute. But someday, I want to follow in my seniors' footsteps and work at ITER.

Official SNS Account of the ITER Japan Domestic Agency

Facebook: @iterjapan
X: @iterjapan
Instagram: @iterjapan_qst
YouTube: @iterjapanQST

JT-60SA

Twitter: @NakaQst



ITER Japan Web
A small Sun on Earth ITER Comic QR code