

# Why Jatco CVT-XS took first place in IQS

## Part 1

The Jatco CVT-XS (hereinafter referred to as CVT-XS), installed in the Nissan Sentra, which debuted in the North American market in 2023, ranked first in the drivetrain category of the Japan Automobile Initial Quality Study (IQS), a ranking that evaluates initial quality by customers.

In this series, we will explore how JATCO achieved this unprecedented feat of ranking first in initial quality in the year of its market debut.

In the first episode, we spoke with PCE Okumura of the Project Promotion Office, Director Aota of the Unit System Development Department, and Director Suzuki of the Control System Development Department.



(From the left) PCE Okumura from the Project Promotion Office, Director Aota from the Unit System Development Department, Director Suzuki from the Control System Development Department, and moderator Yamada from the Global Public Relations Department

**Firstly, what is IQS?**

Okumura: The IQS is a survey conducted by J.D. Power once a year, mainly in the American market, of customers who have driven a car for about three months, asking, "What did you dislike about the car?" Questions such as these will be asked and a score will be assigned. This is a score of customer dissatisfaction, so the higher the score, the worse it is.

**What was the reason for JATCO taking first place in the IQS for the first time?**

Okumura: The biggest challenge with our previous units was that we ran into major problems soon after launch, and it took a long time to implement quality measures, which led to a decline in our scores.

I think a major factor in the success of CVT-XS is that we were able to start off with extremely stable quality right from the start. Rather than being happy about coming in first place, I was most relieved that we were able to get off the ground in our first year without any major issues.



Okumura san

Aota: In June, I brought a car that is actually sold in the US to Japan and drove it.

At the time, I felt a strong sense of power and a great ride, so when I heard that it had taken first place, I thought, "I knew it!" I thought. I was convinced that its merits were well received by customers.

Suzuki: We developed the controls, and I think the strength of this project was the high level of perfection. This was something we aimed for, and although there are differences between the constants and so on of the CVT-X and the new CVT-XS, the control is fundamentally unified.

The CVT-XS uses the same control logic that was developed for the previous CVT-X. So, from the perspective of control, the VC lot\*<sup>1</sup> and the PT lot\*<sup>2</sup> of the CVT-X that was compatible with it at the time had already been completed to the level where mass production could begin, which I believe led to a high level of perfection and made for a smoother transition to the IQS and other adaptations that followed. In the end, because the software and hardware were completed quickly, we were able to combine them and work on unit issues shortly before the VC lot, something that would normally only be possible after the lot had progressed further. The vehicle this time was not new, so the design was solidified in a good way, and I think that was one of the reasons why we were able to achieve overall completion quickly.

### **What are your thoughts on the CVT-XS and what are its features?**

Okumura: From the moment the project was decided upon, we knew that this CVT would be the last, so we approached it as a culmination of everything we had done up until then. I was recalling the difficulties I had faced with the Jatco CVT7 and Jatco CVT8, in which I was involved, and since I was also developing the Jatco CVT-X (hereinafter referred to as CVT-X) in parallel, I intended to use that as a reference and pool all the wisdom I had gained so far. I'd say it's around 80 to 90 points.

Aota: In terms of features, first of all the hardware is basically based on the CVT-X. Furthermore, with the CVT-XS, we aimed to improve performance by making it even smaller and lighter. We learned a lot from the CVT-X, and by doing with the CVT-XS things that weren't possible with the CVT-X, we were able to achieve extremely high performance from the initial lots.

Furthermore, the CVT-XS is the first project to fully apply systems engineering\*<sup>3</sup>. Specifically, Nissan Motor and JATCO worked together to appropriately assign performance and functional target values from vehicles to parts, and to determine

how to resolve trade-offs where something cannot be achieved. As a result, we were able to assign very few unreasonable goals or have to go back later because we were unable to achieve them.

### **What are the special features of the CVT-XS?**

Aota: I look at the system as a whole, but there isn't any part that I'm particularly concerned about. However, our main focus for the unit as a whole was to achieve excellent fuel efficiency first and foremost. With past development units, we were unable to achieve our fuel efficiency targets until right before launch, which meant we had to change the specifications until the very last minute. We worked to overcome this with the CVT-XS, and as a result, fuel economy performance never fell short of our target throughout the unit's development period.



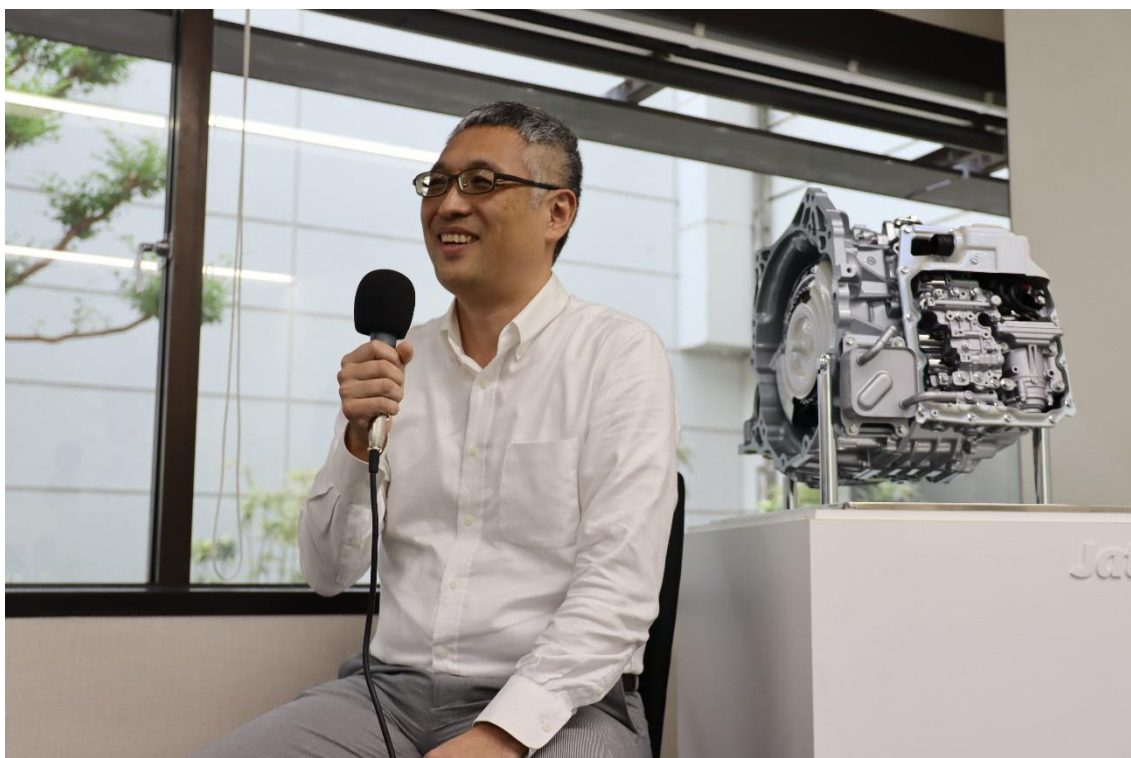
Aota san

### **What about collaboration with other bases?**

Aota: Since Motegi is the team that refines the performance, I felt a sense of accomplishment every time I received a report on the waveforms and performance. Although the COVID-19 outbreak early in development made communication difficult, I think the team turned a crisis into an opportunity.

Suzuki: This time, when we look at the control software, CVT-XS was transferred to JATCO Engineering and JATCO Korea midway through. This is something that has never been done before; up until now, JATCO has been in charge of launching the project, but this time we took on a new challenge.

JATCO Engineering and JATCO Korea have always been very involved in application (development), and they are adept at refining what they have already created to suit the vehicle, and then negotiating with automakers. I believe that the main factor in achieving IQS results in terms of control was that they went above and beyond what they usually do, and persevered despite difficult challenges, such as determining the precise control constants for the parts that connect to the IQS of a GM-class unit, where they designed the unit from scratch. In this way, I believe that everyone's knowledge and expertise was fully utilized, living up to the name "Final CVT."



Suzuki san

### **What are your future prospects?**

Okumura: CVTs still need to support the backbone of JATCO. I hope that over the next five or ten years, the CVT-XS will be adopted in vehicles and will support the backbone of JATCO, while also serving as a bridge that will lead to the development and production of e-powertrains in the future.

Suzuki: In fact, I think that the roots of not only e-powertrains but also JATCO's manufacturing, and all the other things we are trying out, such as wind turbines, electric bicycles, and e-bikes, are simply an extension of what we have cultivated with CVT/AT. In that sense, I believe that because we were able to do this well this time, we will be able to use it as an advantage to move on to the next step.

\*1 Abbreviation for Vehicle Confirmation lot.

\*2 Abbreviation for Production Trial lot.

\*3 Multidisciplinary approach and methods for system success.

Next time: Experimental section! I took it for a test drive at Motegi!