

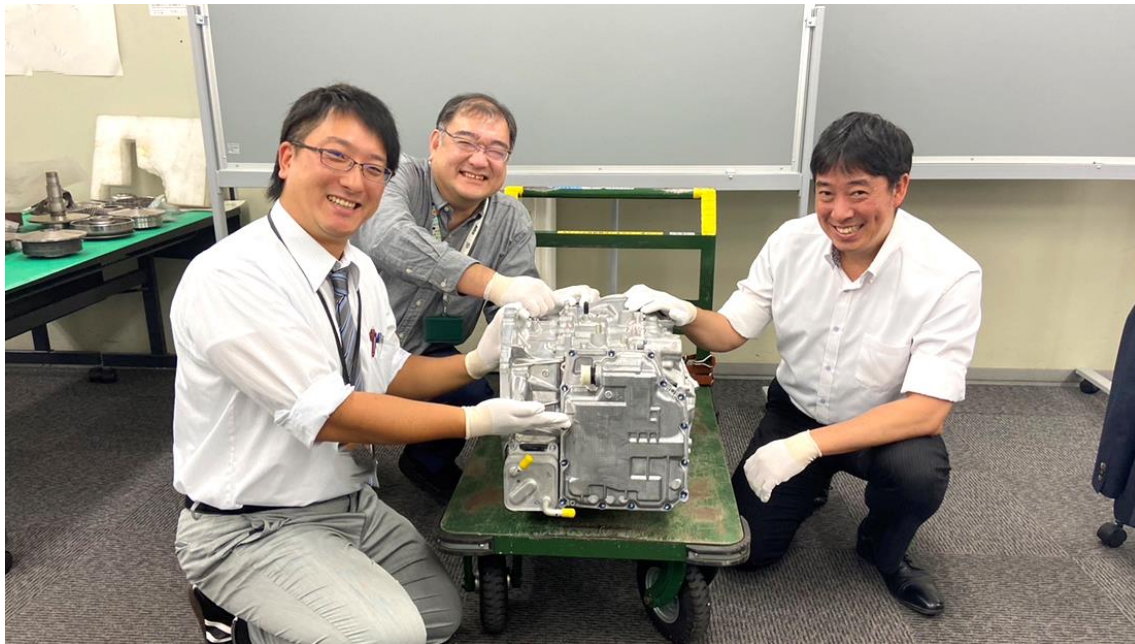
■Title

Jatco CVT-XS is born!

■Sub

What is Jatco CVT-XS, which was born in the age of electrification?

■Thumbnail



■Lead

In October 2023, a new CVT was born at JATCO Mexico. Its name is "Jatco CVT-XS" (hereinafter referred to as "CVT-XS"). What kind of unit is the CVT-XS, which everyone was surprised at how well it ran at the in-house test drive event held before the market launch?

This article features interviews with the R&D members who launched CVT-XS. We interviewed them about the product's features, key points, and also leads to the electrification.

■Member introduction

Interview scene: From left: Mr. Hashido, Mr. Narubayashi, and Mr. Kaneda



*Responsibility: Mr. Narubayashi: From Design Note release to SOP (Start of Production)

Mr. Hashido: From project planning to SOP

Mr. Kaneda: From project planning to Design Note release

■ Jatco CVT-XS is born!



CVT-XS cut model



Sentra

✓ CVT-XS specs and features

- Torque band: 200Nm (covers up to 280Nm)
- Equipped vehicle: Sentra (2 liter), etc.
- Unit base model: Jatco CVT-8 base
- Equipment: Jatco CVT-X base
- Features: Adopts a 3-way solenoid → Significantly improved lock-up hydraulic

controllability.

Vertical installation of control valves → Contribution to NCAP* (*North American vehicle safety standard)

- Strengths: Improved fuel efficiency, improved driving performance, and improved vehicle mountability

→Release link https://www.jatco.co.jp/release/2023/20231012_1450.htm

■Significance of CVT-XS development

Q: The new unit has been successfully launched. congratulations. Please let us know how CVT-XS was planned and the significance of developing CVT at a time when the shift to electrification is progressing.

Mr.Kaneda: The number of CVT/ATs will decrease in the future, but they will not disappear. We took this opportunity to develop a CVT that would continue to contribute to America's high fuel efficiency goals, and aimed to develop a unit that would be used for a long time. I believe that by having CVT-XS, which has competitive cost and fuel efficiency, which can be used for a long time, it will also continue to support the company's profits and play a role in supporting the shift to electric powertrains and the challenge of new businesses.



CVT-XS development base

■ The secret to successful development

Q: CVT-XS was launched solely by JATCO Mexico. What were the factors that allowed you to successfully launch at overseas plant and during the coronavirus pandemic?

Mr.Narubayashi: The main factor of success is communication to understand each other. Despite the coronavirus pandemic, we traveled to Mexico for a few months to understand each other's ways of thinking and improve the quality of our relationship through face-to-face communication. This is the secret to our success. Once a relationship is established, we can know what the other person thinks even in the remote environment. I feel I have a better understanding of things, and that my work is progressing more smoothly. To be honest, I was a little scared to go to Mexico due to the coronavirus pandemic, but I'm really glad I went there!

■ Challenge with CVT-XS!

Q: Please tell us about the challenges with CVT-XS.

A①: Thinner pulley shaft (T-E-A-M)

Mr.Narubayashi: There was a time when we were unable to adopt the fuel efficiency items that we had originally planned, and we were forced to make changes. Although we were unable to reach our goals in terms of fuel efficiency and other performance, the entire company worked as One Team without giving up. Ratio coverage (=speed ratio width) is particularly important for improving fuel efficiency and driving performance. It was necessary to increase the ratio coverage (the higher the ratio coverage, the better), but since there were strict layout constraints on the outer diameter side, we decided to focus on the inner diameter side. As a result of determining the strength of the pulley shaft and making it as thin as possible, we were able to expand the ratio coverage by 11% compared to the existing Jatco CVT8. Thanks to the cooperation of everyone in the production department in taking many measures, such as changing the method, we were able to somehow achieve our target performance. thank you very much.



Pulley shaft that took on the challenge of making the shaft thinner (left: CVT-XS, right: CVT-X)

The pulley diameter is small and the shaft is also thin (hard to tell from the appearance?)

A②: Vertical control valve

Mr.Hashido: The main vehicle equipped with CVT-XS is a sedan called Sentra. Unlike SUVs equipped with CVT-X, the engine compartment space is narrow and NCAP* (*N Cap). There were high hurdles to meet the North American standard for evaluating vehicle safety performance such as collision safety. Therefore, we took on the challenge of creating a "vertical control valve."

This was JATCO's first challenge with CVT, and when driving, it traps oil in the oil pan to lower the oil level and reduce mechanical losses by reducing contact with rotating parts. On the other hand, in order to prevent air suction, which can cause problems in cold regions with extremely low temperatures, we have created a function that actively returns oil to the strainer's suction port to achieve a good balance. It was particularly difficult to predict this oil return performance, but we were able to achieve this performance by skillfully adjusting the connecting hole (orifice diameter). There are our souls in this connecting hole! (lol)



This connecting hole is the key!



Enlarge the connecting hole. This is the hole!

Improve performance with vertical control valve!

■ Highlighted points

Q: Please tell us about other great features of CVT-XS!

A: Adoption of a 3-way solenoid that achieves both fuel efficiency and driving performance.

Mr.Kaneda: CVT-XS is a unit designed to contribute to strict fuel efficiency regulations. A three-way solenoid (part that controls hydraulic pressure) is used to achieve the highest level of hydraulic control, and a multi-disc clutch is used to increase lock-up heat capacity. This suppresses excessive engine speed and enables slip lock-up at high speeds. Additionally, the use of twin pumps (mechanical oil pump and electric oil pump) and expanded ratio coverage have contributed to improved fuel efficiency.

Additionally, in terms of driving performance, the vehicle now accelerates smoothly in response to the driver's accelerator operation. The car delivers excellent driving that is completely controlled by the driver's wishes, without any of the rubber band feel (the gap between the way the engine speeds up and the sense of acceleration) that was previously pointed out in the North American market. The test drive event was a great success!

A: Adoption of weight reduction technology (downsizing of mechanical oil pump and change of dummy cover material)

Mr.Hashido: The weight was also a struggle. How much can the mechanical oil pump be made smaller when adopting a twin pump? Through thorough performance verification, we were able to reduce the pump discharge capacity by 14% (12.2cc/rev) compared to CVT8, making it smaller and lighter. We also changed the material of the oil pump dummy cover from steel to aluminum, successfully reducing its weight by 60%. It's surprisingly light! Of course there was a rebound in cost, but in the end, we are able to balance the QCT (Quality, Cost, Time).



14% smaller mechanical oil pump



Dummy cover 60% less weight!

Changed from conventional cast iron material (left)
to aluminum material

■ Solid Quality activities that also apply to electrification

Mr.Narbayashi: Lastly, regarding the quality of CVT-XS. The position of CVT-XS is that it is the last CVT that cannot afford to fail in order to connect it to JATCO's electrification business. Therefore, without compromising on quality, we "do everything we can and make one more effort!" We have been working on the internal term "overshoot."

As a first initiative, CVT-XS will carry out 18 comprehensive quality checks from SE (systems engineering) to production, checking for omissions in important features, and checking for omissions in workmanship evaluations (process capability evaluation, vehicle evaluation), etc.

By setting up a working group covering various items and carrying out a one-year comprehensive quality inspection up to the SOP, we ensured rock-solid start-up quality.

Currently, we are applying the experience gained from this activity to our quality processes. We have begun to horizontally expand this activity to other application projects, and we would like to elevate the electric powertrain business to a process that can deliver high-quality products to customers in a short lead time.

