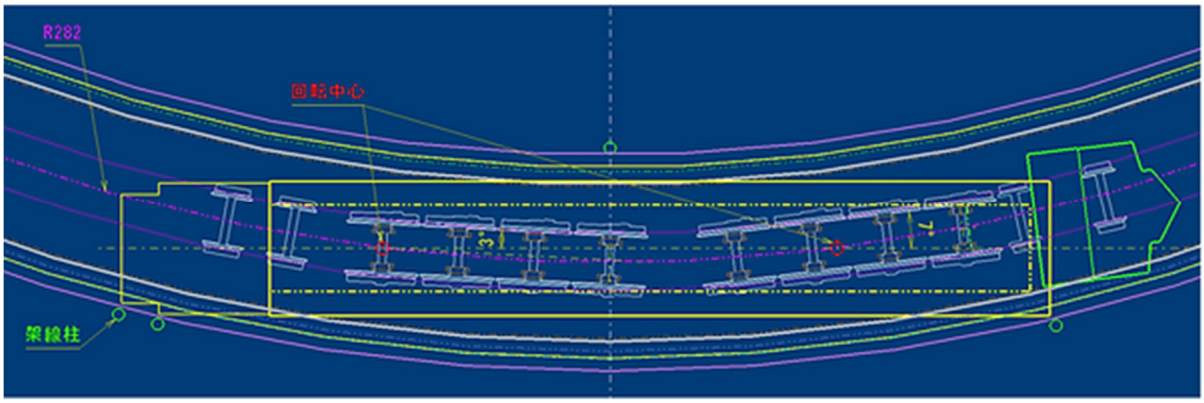
The Creation of the 'Big Boy' Steam Locomotive – An Interview with The Kato Team

This interview was conducted between the Kato Sales team and the development, design, and production departments about this big project.

The Development Department and the Mechanisms

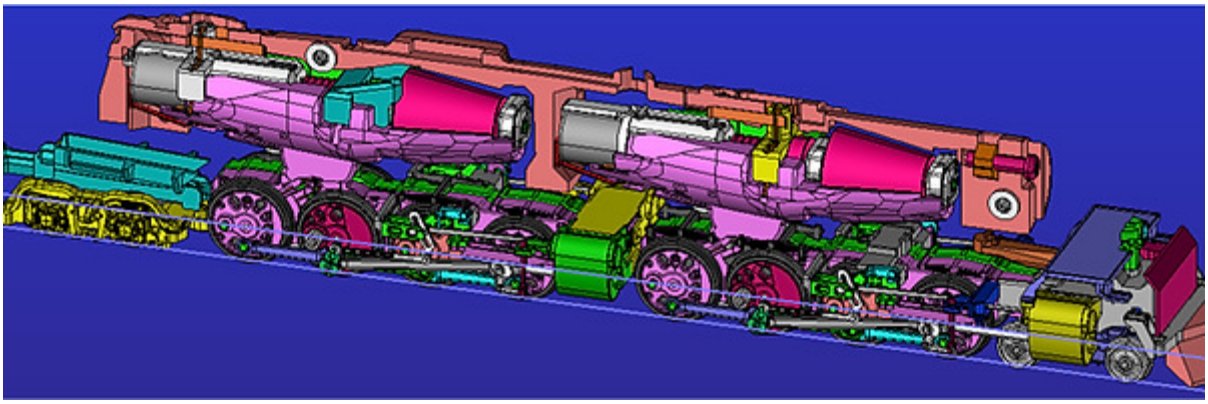
Q. *What was the most difficult part of developing the power mechanism?*



A. Enabling the train to pass through an R282 mm curve. Having a big body and a high number of driving wheels puts the Big Boy at a disadvantage when passing through a curve – the real train has a mechanism where it only turns its front driver section, but for the model we changed it to a mechanism that turns both the front and back sections the way the truck frame of an electric train does. That way, it can clear an R282 mm curve.

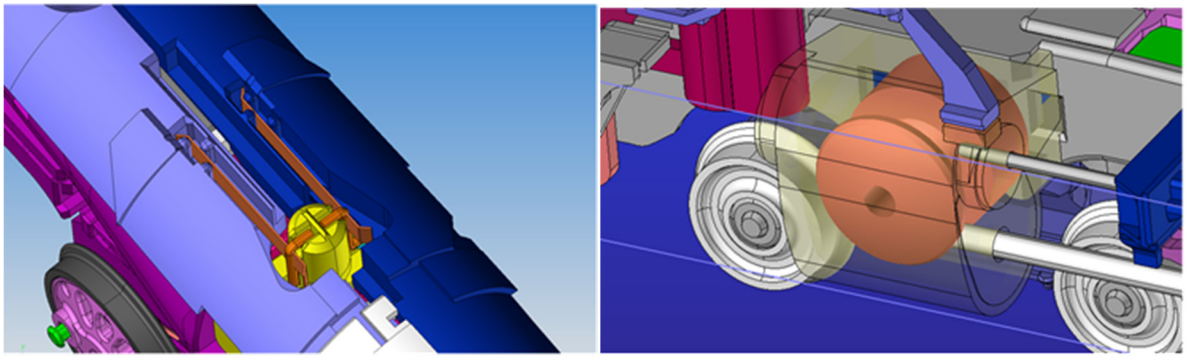
What's important while setting all this up is taking into account many different conditions, for example the position of the front and back axis of revolution, the correlation with the body's posture and inner structure at the time of the turn, the external pressure when pulling something, and the reduction of discrepancies between the model and the real train. At the end, our product differed even in the position of the axis of revolution from a product of an American company. This kind of difference in the thoughts behind the designs is, I think, very interesting.

Q. *What would you say is a distinctive mechanism or structure of the model?*

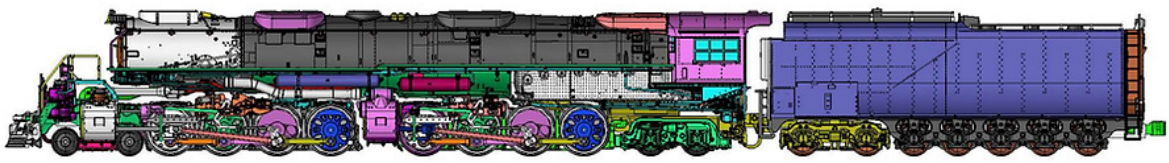


A. The power unit. We made the front and back driver sections to be independent from each other, and developed a new drive mechanism that employs a coreless motor. The interior of the sections follows a mechanical structure that we developed with our Japanese steam locomotive products, and we aim at drivability that is as high quality as it has always been. These independent sections are each in charge of leading/piloting (front) and pulling (back), so structurally it resembles the praxis of double heading. Essentially, the power of two trains is gathered in one, thus you can expect effects such as an increase in pulling power and a stabilization of the body's posture/behavior while moving. Furthermore, this structure takes the same form of output as the real train, which is something that our clients will surely enjoy.

Q. *What is an element that is featured for the first time in a KATO product?*



A. The electric conductivity structure (contact points) between the front and back driver sections and the weights for the cylinders. The former was newly developed as a mechanism that enables electric conductivity in the aforementioned axis of revolution components. By getting the friction between contact points down as much as possible, it makes both electric conductivity and durability possible.
As for the cylinder weights, we created them to be contained in each cylinder for optimizing the balance of the body's weight.



The Design Department and the Splitting and Reconstruction of the Huge Steam Locomotive

Q. *What did you struggle with during the design process?*

A. Even though it's just one train, it is made out of over 400 components. That is about twice as much as the D51 – a famous Japanese steam locomotive – which has around 200 components. Components that small require a lot of finesse not only when designing the product, but also during the quality control process. We kept a close eye on the reference data to identify each component, what it was made out of and how it had to be assembled.

There are also components where it's hard to know what they look like based on their names alone. For example, among the tube-like components, there were several that had the word "pipe" in their name, such as "movable pipe LR," "blastpipe LR," "terminal pipe LR," "joint pipe," and so on.

Because it was a structure we had no experience with, we used the knowledge of the Product Design group, Production Technology group, and Assembly group at Saitama to decide on a direction to go in when arranging the jigs for production. Depending on the jigs, the shape of the components can also change.

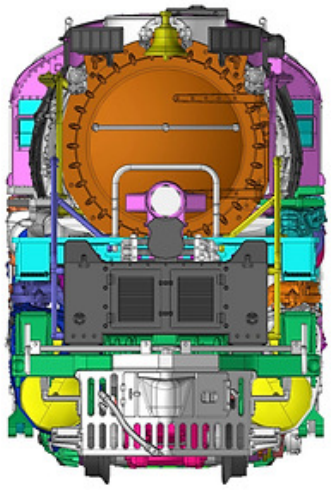


Image by EIKI SEKINE

Q. *What was a particularity you had to deal with when creating the molds?*

A. It was quite difficult because there were so many components, and it was a structure that was more complex than anything we had worked on until now. To select the tools we could use, we had to understand the relation between all the components and make sure of every single purpose the designed shapes have. Additionally, high grade quality control was necessary because aligning the parting lines perfectly was often complicated. All of us are working together and tackling this challenge as one, and I believe this is an opportunity to show off the abilities and efficiency of KATO's molds.

A big thank you to all the team at Kato for the information provided in this interview.