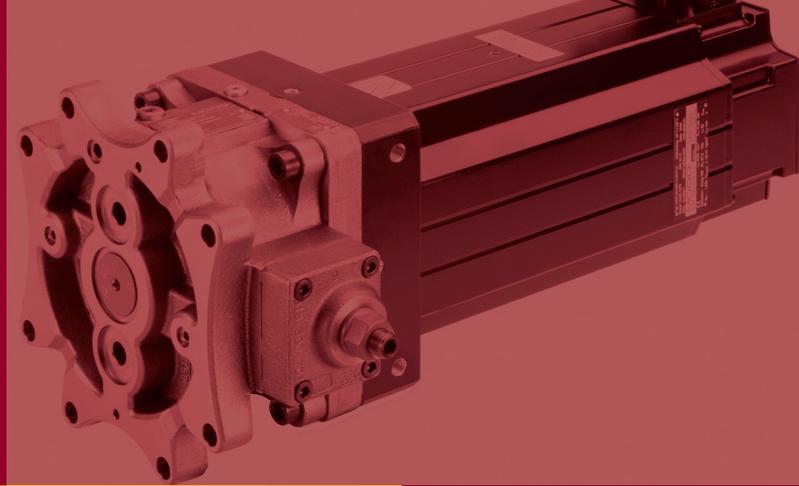


A WINNING COMBINATION

Moog's Electrohydrostatic Actuation System was developed jointly with SMS GmbH.

In this interview SMS' Erkhart Siemer explains how the project evolved, and how the system has improved the group's production performance.



Dr. Christoph Boes, Moog; Dr. Siemer, SMS group GmbH, Mr. Bolik, SMS group GmbH

Last year, as you know, Moog launched its new Electrohydrostatic Actuation System (EAS). Moog developed the EAS in cooperation with the SMS group who are a leading manufacturer of ring rolling mills. Could you provide us with some of the background to this project please?

Prior to the development of the EAS we operated our manufacturing machinery using a central hydraulic system, which featured a large oil tank and complex piping. This set up required significant and additional internal infrastructure – such as room space that housed our central hydraulics systems - near the machine operating area. This proved very costly for us, both financially and time wise.

Can you say a little more about why this particular arrangement proved to be so expensive?

Our previous actuation system required central hydraulics storage facilities that proved to be inefficient in energy terms, and especially during part-load operation. For instance, the accumulator assisted hydraulic system made use of pumps that were constantly working against high pressure. High-resolution, dynamic servo hydraulics operated

the rolling axes, and the power flow was controlled or throttled via the Servo Valve. As a result, some systemic throttling losses occurred, and these had a detrimental effect on the overall efficiency of the machine. Consequently, fast, rapid movements characterized our machine cycle but these occurred without force, which resulted in slow high-resolution movements and high force levels with partially changing directions of force.

What are your expectations of the new system? Do you wish to maintain any of the previous system's attributes?

The previous system was robust, overload-proof and characterized by high availability, and we wanted to preserve these qualities. On the other hand, we wanted to eliminate the complex central hydraulics and its various connected features. Our aim was to arrive at a simplified and shortened installation process, and faster commissioning of the rolling machines. The removal of the central hydraulics resulted in significantly reduced noise levels and an overall improvement in safety. Furthermore, the machine operated much more productively and with better levels of energy efficiency.



EAS of the processing axes (SMS group GmbH)



Ring rolling machine with EAS of the processing axes (SMS group GmbH)

In other words, you were looking to achieve higher productivity, lower power consumption and, at the same time, simplified and cheaper installation? How did the EAS help you to achieve this?

Moog's Electrohydrostatic Actuation System (EAS) combines the best of both worlds: on the one hand it offers the energy saving advantages of an electromechanical actuation system based on the principle of 'power on demand', and on the other it has the advantages offered by hydraulics in terms of robust power transmission, low cost, high performance and availability. Basically, the EAS design concept combines electrical and hydraulic components in one system.

We were very interested in this electrohydrostatic solution because we needed to apply very high forces (> 1 MN) in the production of ring rolling machines. In addition, extreme shock loads can occur during this process, which, in essence, is the domain of hydraulic actuation. The EAS can implement these forces during its hydrostatic transmission. Together with the experts from Moog, we carefully considered our requirements, embarked on the project and developed a new machine type.

Can you give us a brief description of how this system works?

We positioned the Electrohydrostatic Pump Unit (EPU) directly on the machine manifold in order to save space. The manifold contains all of the required overload and logic functions.



Moog Electro-hydrostatic Pump Unit (EPU)

We mounted it directly on the hydraulic cylinder, and the Servomotor, pump, manifold and hydraulic cylinder thus form a functional unit. By doing this, we were able to reduce all piping on the cylinder to a minimum. We integrated the electrohydrostatic functional units directly with the machine axes. Since the pump is able to vary delivery volume, high-speed fast movements and low-speed high-force working movements proved easy to implement. All servo drives are electrically connected via a common DC bus, powered by a regenerative power supply unit (PSU).

Thank you for your detailed explanation of the new system's structure. Can you tell us something more about energy efficiency? How were you able to save energy?

The EAS offers significant energy saving possibilities. Compared to conventional ring rolling machines, the modified axes on this machine operate with up to 40 percent less energy consumption. The connected load is significantly reduced, and in addition, the new machine design eliminates any need for piping. The construction of the machine is so much easier. Since we were able to reduce the oil requirement from roughly 2000 to around 200 liters, we eliminated the normal footprint generated by a large hydraulic unit. Because hardly any hydraulic oil is required, this significantly reduces the need for consumables and related equipment. In addition, the system is significantly quieter on the whole. By eliminating the flushing time of the central hydraulics and the pipelines, we were able to save between 1 and 2 days commissioning time.

As a partner of SMS group GmbH, we are very interested in further feedback. What was your experience of working with Moog?

The collaborative process with Moog lasted for over eight months. Throughout this period, our mutual relationship proved extremely productive and greatly beneficial, and we always conducted it on an equal footing. It began with the dimensioning of the axes, and continued through the machine integration process and assessments of functional safety, up to the commissioning stage and the final analyses of achieved machine performance. Moog's expertise in the fields of hydraulic design, pump technology and electric drive technology helped us a great deal.

We look forward to the further joint projects.

For further information visit moog.com/industrial

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