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Inspire the Next

SULLAIR

ALL YOU NEED TO KNOW ABOUT HITACHI GLOBAL AIR POWER'S NEW BEST-IN-CLASS* TWO-STAGE AIR END - FROM ONE OF ITS ENGINEERS

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'Two are better than one' as they say and now, with Hitachi Global Air Power's latest innovation, the new two-stage air end in the recently launched Sullair TS Series, this old adage has never rung truer. This compressor series is not just a leap forward; it's a game changer, achieving best-in-class efficiency.* As someone who had the privilege of working on the air end redesign for this groundbreaking project, I'm excited to share some insights into what makes it truly special. And while some aspects remain proprietary, I'm excited to share key design changes that push the boundaries of rotary screw air end efficiency.

Traditionally, two-stage air ends in rotary screw compressors have been hailed for their efficiency. Over time, design advancements allowed single-stage air ends to catch up with the two-stage models while offering a smaller footprint, lighter weight, and typically smaller price tag. But as businesses continually push for higher efficiency targets, the team of engineers at Hitachi Global Air Power saw an opportunity to reimagine two-stage air end design to help customers reach their sustainability goals.

**Based on current (March 2024) efficiency data published in accordance with CAGI third-party verification program.*

After completely rethinking how a two-stage air end functions – down to the smallest details – we launched the all-new Sullair TS 190-260 Series rotary screw air compressors. But what sets this two-stage air end apart, and how did we achieve such high efficiency? Read on to learn more.

It Takes "Two"-Stage

Our journey began with a commitment to maintain the legendary reliability and durability of Sullair air compressors while enhancing efficiency. This is a legacy not taken lightly in the engineering department. The new two-stage air end was designed for use in oil flooded, 190-315 kW (250-400 hp), 100-200 psi large industrial compressors. The machines in this category are some of the largest users of electricity making them expensive to operate. The new two-stage air end takes advantage of an over/under design – new for Sullair air ends - that keeps the footprint small and uses fewer parts for fewer potential leak points, and easy serviceability.

The other benefit of this design is we can now vary the displacement of the second-stage to match to the first stage. On our older, tandem-oriented air ends, the second stage rotors rotate at a fixed rate to the first stage. With this over/under design, we can change the speed of the rotors in the second compression chamber to match the first stage. This allows the pressure ratios to be matched for each discharge pressure rating.

Keeping it Cool

Functionally, the two-stage air end operates like two single air ends in one that work together to cool the air down gradually as it is compressed. In the first stage of compression, the air is compressed roughly 40% and the second stage completes the compression. Because air travels between the two stages, it is cooled back down before the air enters the second stage. This cooling in stages is what provides a lot of the air end's efficiency – 8–10% higher efficiency than single-stage air compressors. In the new Sullair two-stage air end, how we designed the interstage between the two air ends to improve cooling is what is unique as well as proprietary. Generally speaking, we were able to achieve less frictional loss and a more balanced heat load to get higher efficiency.

We currently have a patent on our interstage cooling design as well as a patent pending on improvements to our already efficient Electronic Spiral Valve technology that matches air supply with demand. Both these key design changes are what enabled the TS Series to really push the limits of efficiency and garner us the best-in-class rating.

A Green, Green Air Compressor

Beyond efficiency, sustainability is at the heart of our innovation. The TS Series and our new two-stage air end are designed to be remanufactured for second and third lives, aligning with our commitment to a carbon-neutral value chain by 2050. By engineering environment-forward solutions, we're not just meeting customer demands; we're shaping a greener future.

The end result of our countless hours of re-thinking the fundamentals of compressed air technology is an air end and air compressor series that not only delivers reliability and durability but sets new standards for efficiency. This project has been a testament to our team's dedication, creativity, and pioneering spirit. Together, we meticulously re-designed, re-imagined and re-engineered this series, and I am proud of the collaboration and creativity among my colleagues - not just for the advancements we furthered, but because we are helping our customers reach their goals.

We talk a lot about this being an exciting time to be at Hitachi Global Air Power and working with this team and pushing the limits of possibility – I can honestly say, it is a very exciting time indeed.

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