

# INNOVATIVE VACUUM SOLUTIONS FOR STEEL DEGASSING





## Mechanical vacuum systems for steel degassing

Edwards leads the way in vacuum for secondary metallurgy by a considerable margin. Our leading market position is built on our understanding of customers processes and our expertise in providing vacuum solutions for VD, VOD and RH processes.

Edwards has the largest installed base of dry pumps in the global steel industry, including the world's largest mechanical vacuum pumping system, in China. Used for degassing 230-tonne batches of liquid steel, the system has a pumping capacity of 1,000,000 m<sup>3</sup>/hr at 0.67 mbar and has now refined more than 6 million tons of steel during 4 years of operation.

Edwards pumps can be easily integrated into existing systems, with as much or as little technical support as you need.

Edwards can take care of the commissioning and start-up phase onsite. We can assist with integration of controls into the customer's device management system, fine-tuned to the particular process. And we offer a comprehensive range of options for aftersales service, maintenance and repair.

We don't just supply vacuum pumps. We provide solutions, and the system that's right for you.





## Edwards leads the way

Which vacuum technology do you choose when you're building a new steel degasser or upgrading an existing system?

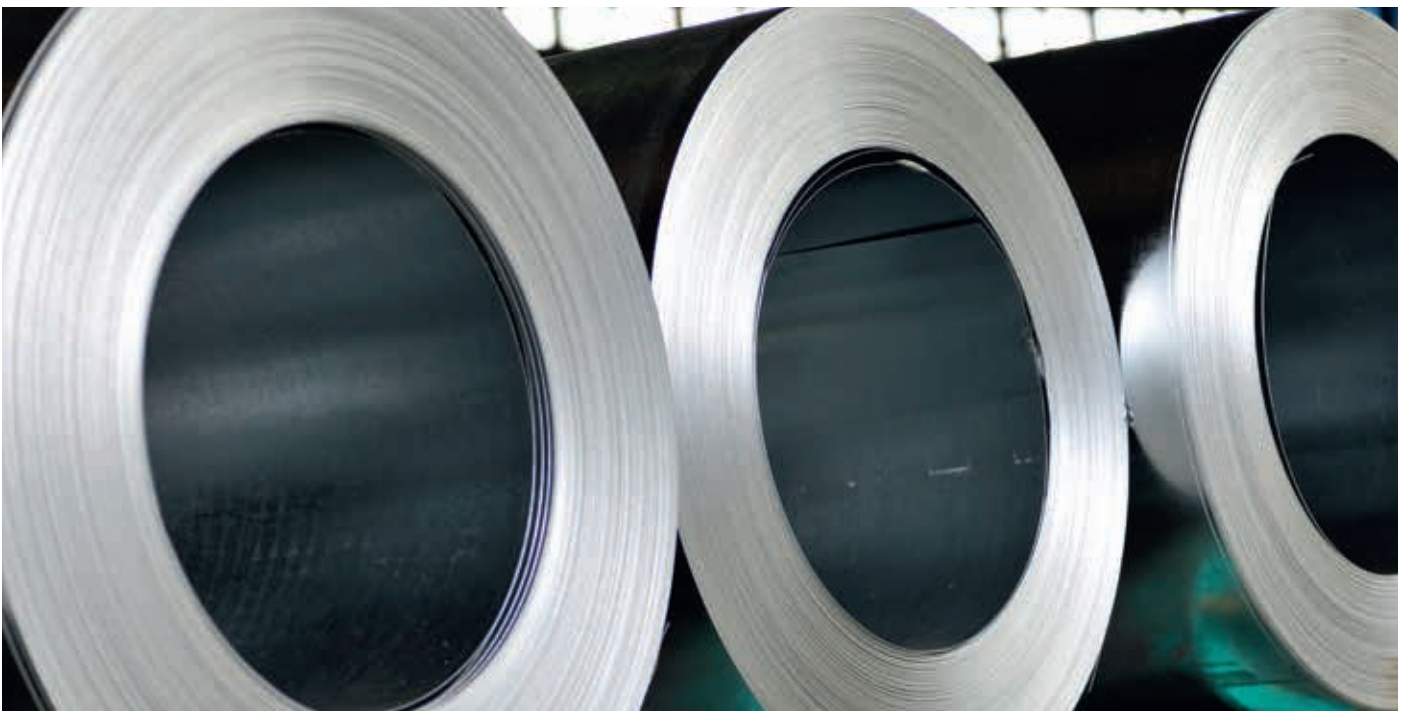
### **Dry mechanical pumps or steam ejectors? It's a key decision.**

For VD, VOD and RH processes, the smart money is on dry technology. Increasingly, mechanical dry pumps are replacing traditional steam ejectors as the vacuum technology of choice for new installations, and the trend is accelerating. It is not hard to see why.

Lower running costs and improved productivity are just two of the reasons. Dry pumps have been proven to reduce energy costs by as much as 97% compared to steam ejectors.

High reliability and dependable performance are also key factors, given the exceptional demands that secondary metallurgy processes can make on vacuum equipment.

Higher pumping speeds, lower ultimate vacuum, minimal maintenance and lower environmental impact all lend further weight to the case for mechanical dry pumps.



## VD and VOD processes

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Processes in the growing secondary metallurgy sector depend on several vacuum-based treatments: Vacuum Degassing (VD) for alloy steels; Vacuum Oxygen Decarburising (VOD) for stainless steels; and combinations of both treatments, for example Vacuum Degassing Oxygen Blowing (VDOB) and Vacuum Carbon Decarburising (VCD), for low and ultra-low carbon steels.

These processes operate at varying vacuum levels, with different process gas loads, and in differing types of vacuum vessels, including tank, lid, ladle to ladle, stream and designs.

Edwards vacuum systems have been successfully applied to all of these secondary metallurgy processes at production facilities around the world. Modular system design enables degassing and decarburising melt sizes up to 200 tonnes in electric steelmaking facilities (mini-mills).

There are different types of systems available: the latest development for ladle sizes up to 60 tons are the 'MAXX' systems, that allow optimised adjustment to the very particular suction speed requirements in applications for foundries. For all ladle sizes the 'Sport' steel degassing modules have proven reliability with many years in the field.

## RH processes

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In large integrated steelmaking facilities, typically equipped with basic oxygen converters, secondary metallurgical processing is carried out mainly in Ruhrstahl Heraeus (RH) systems.

These facilities process steels in ladle sizes of over 400 tonnes and require much larger pumping capacities – up to 1,000,000 m<sup>3</sup>/hr or more. Until a few years ago, RH plants were considered too large for dry mechanical pumping systems. But technological advances and successful installations mean that the huge potential for dry pump technology in this process is now being recognised.

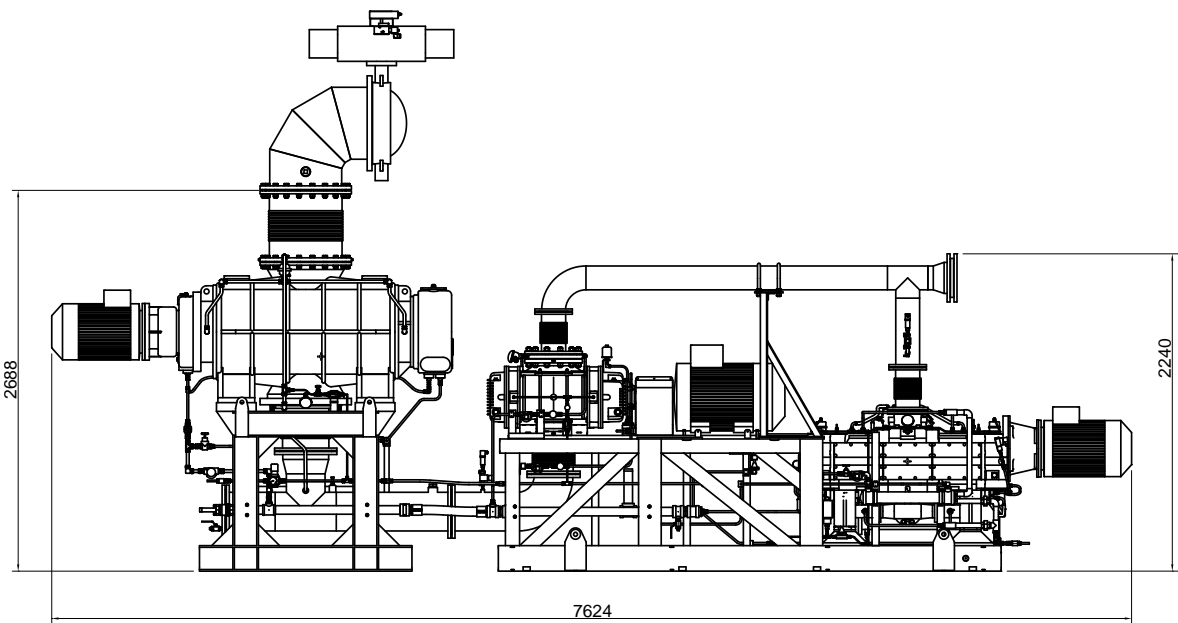
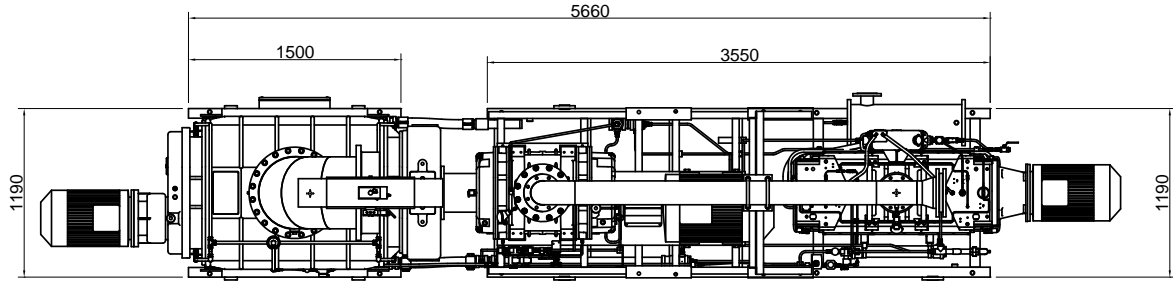
Edwards has developed a 'super' degasser module to address the high volume flow rates needed to successfully degas and decarburise steel products, using multiple high volumetric flow boosters in parallel to handle the gas loads produced, while optimising the total number of system elements required.

Whether you are planning a new installation at a greenfield site or upgrading/replacing an existing installation, Edwards is your vacuum partner of choice.

**For all processes FLEXX-solutions are possible to meet special requirements, in particular in view on older installations.**

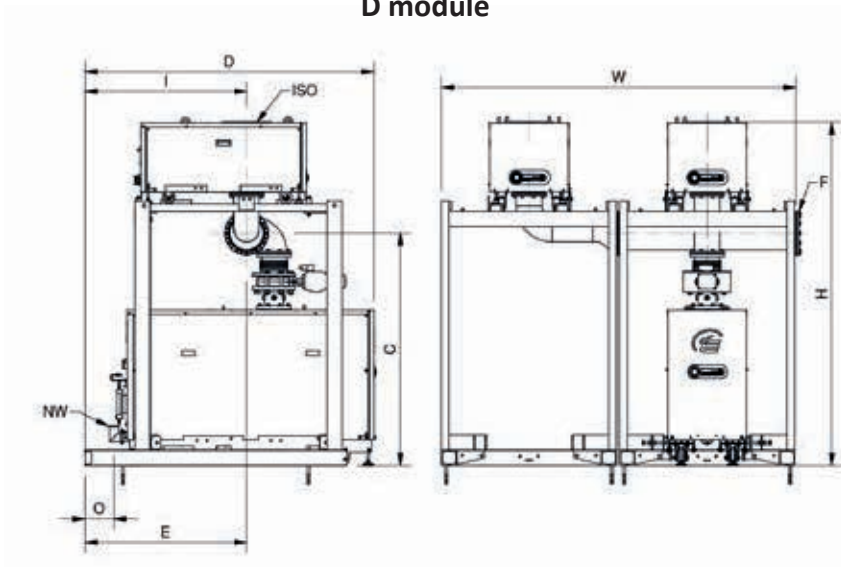


# Dimensions



Note: this is an example of a typical steel degassing module system for VD applications. Edwards systems can be adapted for individual customer requirements

## D module



Refer to MAXX brochure for more info

## Operating costs

Operating costs	Steam ejectors	Dry running pumps including filter
	€/tonne	€/tonne
Energy and fluids	1,6041667	0,0282000
Maintenance	0,5694556	0,0042014
Spares	0,0100000	0,0300000
TOTAL COST	2,1836222	0,0624014
Saving	0%	97%

On a typical VD plant processing 300,000 tonnes of steel per year, the operating costs of a modular dry pump system can be less than 10% of the equivalent steam ejector system.

## Service and support

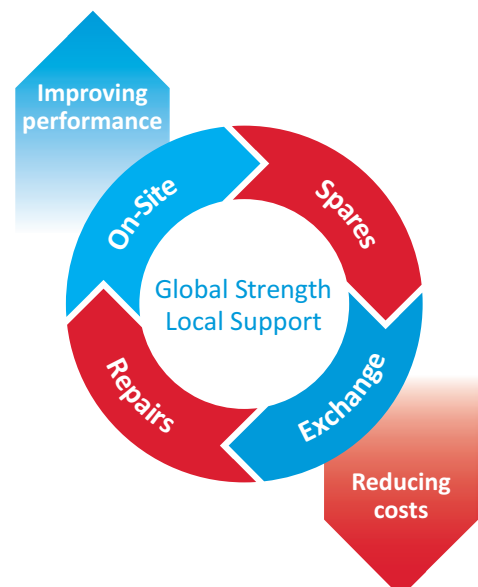


### Our expertise, your advantage

Our expertise is in vacuum technology, we have been in the business since 1919 and our knowledge runs deep. We design, develop and manufacture vacuum equipment to the very highest standards.

But it's not just the technology. With a global installed base of 750,000 pumps, we understand how vacuum pumps and systems perform in real life. We know how to get the best from our products, whatever the application. We know how to look after them. That's why a large section of our expert workforce is dedicated to service and support.

Our service solutions come under three main headlines; on-site service, repairs and exchange, and quality spares. All built on our world-class technical know-how and backed by our sophisticated logistics and supply chain infrastructure.





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