



PRODUCT INFORMATION FOR LINING OF BLOWERS



Process blower in special material due for delivery

General

For process blowers exposed to harsh environments and corrosion there is always a need to manufacture the gas exposed parts in a corrosion resistant material. However not all material is suitable for the purpose. Also the number of machines on the world market is so small that it is hardly worth the investment cost for patterns to allow for alloy castings. Even if alloy materials are available they can often be too soft to absorb the required design pressure or they elongate too much under the thermal expansion. In some cases both phenomenon can be present at the same time.



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In order to overcome this a lot of restrictions are applied, tolerances are increased and design pressures are reduced to mention a few.

There is however ways to overcome this draw backs by protecting the standard base material. The standard material is normally cast- or ductile iron. These materials have great form stability, which make them ideal for casing and rotors but they cannot be exposed to corrosive gases and need to be protected.

Thermoplastic materials can do this, which is acceptable in many cases. Other means are to clad the exposed surfaces by a thin-layer method.

The two latter suffer sometimes from a porous "orange skin", which can allow the corrosive gas to penetrate and reach the underlying material. Yet another method to reach a far better corrosive resistance, fully in parity to caste alloys, is to use flame spray protection of solid material with an additional thin outer protection of PTFE.

The corrosion resistant material added can be up to 1.0 mm and the combination will give a long lasting excellent protection. The added benefit is that the structural strength of ductile iron is kept and thus the blower can be used to its design limit.

Manufacturing preparation

In order to prepare the castings, drawings of the individual parts with tolerances are required. For the rotor profile a 3-D format is required. A program will be set up for a 5 axis-milling unit and part of the surface will be taken away. Sharp edges will be rounded and specially prepared to be able to keep a uniform material thickness in the final stage.

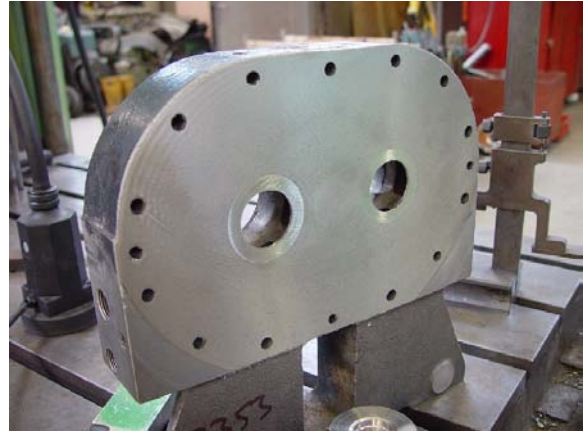


**Rotor with protection layer AISI 316L
prior final machining**

At casing penetrations an insert ring or bushing often will be added prior the surface protection. In case of hollow rotors, a stainless steel plug with O-ring seals will be fitted. The material thickness of this plug must be enough to allow for later balancing. The rotor shaft penetration area will also be prepared for surface protection. The task is to protect all surfaces that are open for exposure to the corrosive gas.



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End plate with stainless steel bushing

Surface protection

Depending on required protection material different methods for application will be used. Heat treatment will always be part of the process and needed to keep the material stress-load down. Retaining forces of $> 50 \text{ N/mm}^2$ can be expected. After the process of applying the protection layer is finished, a rough machining will take place to find any cracks or fissures. Any cracks is found will be opened and filled again and a final surface machining will be initiated to a minus tolerance allowing for a PTFE sealing layer. Before fitting, a tolerance check and balancing of the rotors will be done.



Protection layer in place before machining



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Finished casing with PTFE sealing layer over AISI 316L



Parts ready for fitting

The above parts are used for building an MVR-unit size PD Plus 4012 exposed to heavily corrosive gas with high RH content.



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The customer proved that the original cast iron unit lasted less than 8 hours of operation. During this period of time cavities has developed up to 5 mm deep. The unit has now been in operation some time and is accumulating hours.



The picture above shows different stages in the process. The bottom rotor is a scrap unit used for testing the setting up of the milling preparation. The surface groove has a tolerance of $2/100$ mm. The top rotor is the finished part surface protected by a PTFE layer.

Materials for protection

Not all alloys can be used but Stainless steel 316L, Hastelloy and many other qualities are possible. For blowers exposed to saltwater saturated water, Aluminum bronze can be used.

Production time

It is to be expected that preparation and manufacturing will take 6-8 weeks.