FLUID SCIENCE DYNAMICS

WHY THIS TECHNOLOGY CHANGES THINGS

Technology changes and making the best choice for gas conditioning systems has become easier and simpler with the FSD QFX model turbo gas booster.

This short paper examines the reasons to change to this new technology and what that change means to you

GAS CONDITIONING SOLUTIONS FOR THE TURBO MACHINERY INDUSTRY

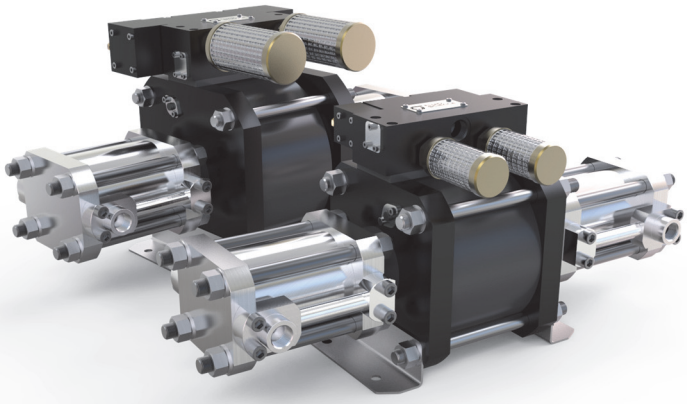
GAS HANDLING SOLUTIONS

Fluid Science Dynamics (S) Pte Ltd
1 Commonwealth Lane, #09-29 One Commonwealth,
Singapore 149544

ROC: 200915444D
Tel: +65 6659 2282 Fax: +65 6659 2262
www.fluidscdynamics.com

TB1-V1

FLUID SCIENCE DYNAMICS



The Air Driven Booster

In many cases Air Driven Boosters are the ideal solution for gas conditioning. They offer many advantages and the FSD range of air driven booster is the highest performing air driven range on the market today having been designed specifically for the protection of gas compressor dry gas seals.

However, as technology advances, the new benefits of the Turbo Booster from FSD are now beginning to outweigh all existing air driven technologies.

The Air Drive Supply

The first issue with an air driven booster is the air drive supply itself. By approaching the booster in a different way using electric power, the air drive supply is removed. The numerous benefits of this approach include:

- **Cleanliness**

The air supply must be clean to an ISO class to avoid contamination of the drive system. This requires external filtration and conditioning of the air drive supply to ensure this cleanliness level.

- **Dryness**

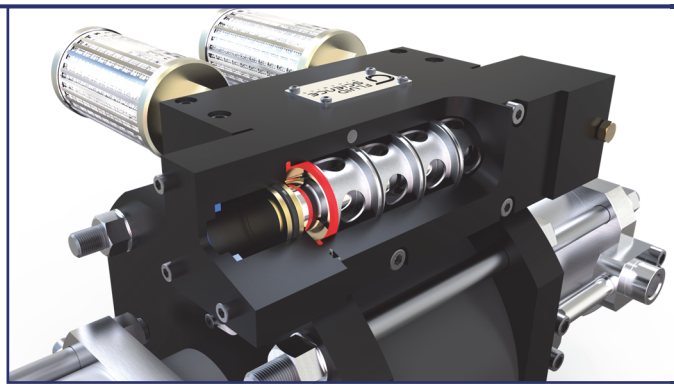
All air when compressed adopts the moisture in the air. This moisture may cause icing of the air drive when the booster drive air is released from the drive exhaust. To avoid this, the air drive supply must be provided with dryers and/or dehumidifiers to reduce any moisture to ensure icing is not a problem for the booster.

- **Capacity**

For larger compressor shaft sizes the gas flow requirements can be quite high. This means the air driven booster is large for high output which will then lead to high air drive consumption figures. This can put high demands on the air drive supply of the site.

- **Efficiency**

Consuming power to compress air and then using to drive other devices is not always efficient. The overall power efficiencies of any, and all, air driven boosters in comparison to the FSD electrical drive option is less. Substantial efficiency gains are achieved using direct electric drive.



- **Availability**

A major problem is that often air drive in sufficient volumes and quality is simply not available at many sites. The infrastructure needed to provide such a supply becomes a major challenge in itself. Direct electric drive is clearly a simpler and almost certainly available choice.

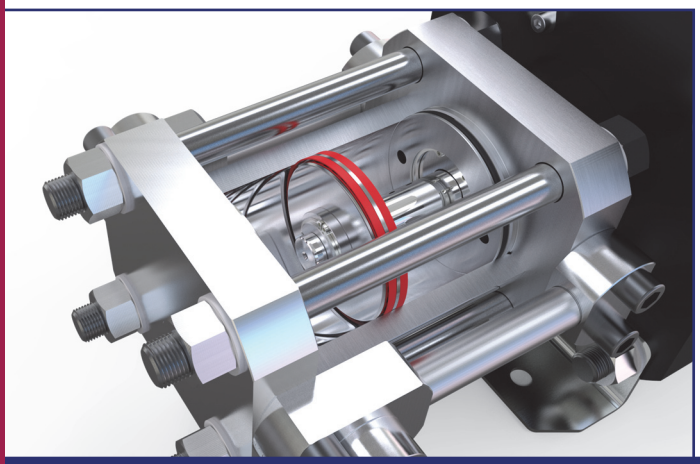
- **Installation**

The air drive supply to the booster requires other devices such as filters, pressure control regulators, speed control ball valves, start/stop valves and monitoring instruments. These devices along with the installation design overhead, installation space and installation time add space, complexity and a growing parts count.

These more complex systems also mean there is more to fail and therefore more to maintain.

FLUID SCIENCE DYNAMICS

The Reciprocating Booster



As well as the challenges of the air drive supply itself, the air driven booster uses a piston rod that reciprocates to drive a single or dual process gas pistons act as a positive displacement “pump”. The FSD Air driven boosters are the highest output boosters available on the market today, offering outputs sometimes 5 times that of competitive alternatives.

Although these high efficiencies make these the best air driven booster choice there are still limitations and disadvantages.

- **Piston Rod Seals**

The main drive piston rod of the air driven booster must be sealed from the outside atmosphere. The FSD air driven boosters are fitted with multiple piston seals making them the most reliable of choices. However, these seals will wear as any reciprocating seal will.

- **Planned Maintenance**

As the piston seals wear, an issue is understanding or predicting when the piston rod seals actually require replacement. The conservative approach is to plan frequent maintenance. This means there is higher down time for the booster and a suitable maintenance programme must exist.

- **Monitoring**

A more effective approach is to monitor the seal behaviour. This is done by collecting any leakage emitted from captured vents and quantifying leakage either by flow measurement or pressure changes over a vent orifice. These installations require expensive instruments that consume space, cost and add to system devices that require maintenance and management.

- **Moving Parts**

Any positive displacement booster has pistons, check valves, seals and so on. These are all parts that either move, wear or require maintenance over time.

System Integration and Control

When an air driven booster is used in a gas conditioning system, it has external control and monitoring requirements which mean integration into some form of control system. Air driven boosters can sometimes create complicated and challenging integration tasks.

- **Controllability**

Air driven boosters will experience different running seal frictions at different settle out running pressures. These different friction forces mean achieving a fixed running speed, and therefore flow rate, is extremely difficult. Sometimes the output can at best, be roughly estimated and no air driven booster will escape this reality without extremely complex and costly stroke control systems

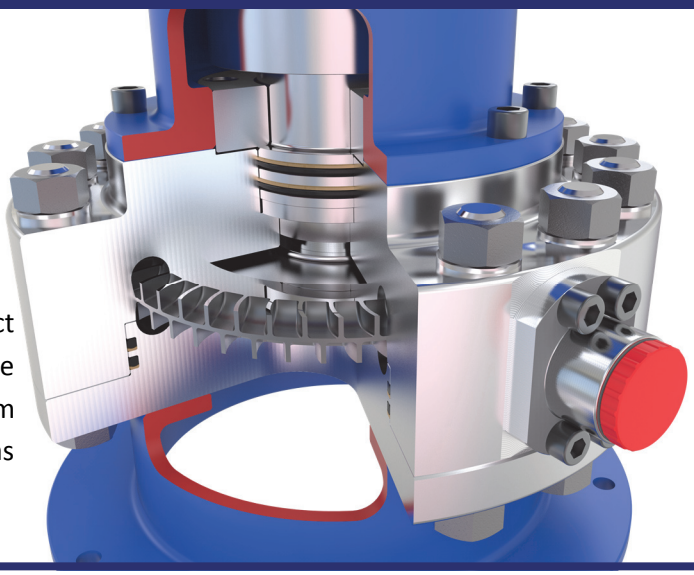
- **Monitoring**

When an air driven booster is running it is often hard to be sure of flow output. The usual approach is to monitor stroke rate and stroke count. However these pose challenges for integration into external control systems such as the speed of signal collection and the hardware for this monitoring. Strokes can be missed leading to incorrect system readings. The only solution is more complex monitoring devices leading to further integration costs, challenges and parts count.

FLUID SCIENCE DYNAMICS

The FSD Solution

This technology changes everything. This direct electrically driven gas conditioning booster is the only electrically powered booster designed from the ground up, inside to outside for gas conditioning to protect your valuable dry gas seals.



- **No Air Supply**

No need for a high capacity, high quality and costly air drive supply. Savings in physical size and a much more simple installation.

- **Significant Wear Reduction**

No piston seals or other replacement items to wear out and plan maintenance for. Longer operating life between planned service which generally applies only to the sealed bearing cartridge

- **No leakage Losses**

The direct magnetic coupling design means there are no seals to wear out. There is therefore no seal leakage and no need for costly seal performance monitoring devices.

- **Higher Efficiency**

Direct electric drive offers the best levels of efficiency using the regenerative turbine technology of the FSD Turbo Booster.

- **Higher Reliability**

The vastly increased interval to maintenance makes a gas conditioning system that is reliable, available and carries a huge reduction in operating expenditure.

- **System Integration**

Hugely simplified system integration requiring simplified input and output signals to implement a basic system with vast potential for intelligent system integrations

- **System Intelligence**

The FSD Turbo Booster can be provided with an intelligent interface module that can read pressure and temperature signals, perform structured start/stop tasks to further increase system intelligence.

- **Enhanced System Intelligence**

Embedded technologies allow a booster master module to communicate with the host system in real time and understand flow, pressures, running times, maintenance intervals, health and more. The control and monitoring possibilities are simply limitless.

GAS CONDITIONING SOLUTIONS FOR THE TURBO MACHINERY INDUSTRY