CANADIAN PURCELL MACHINERY LTD.

"A World of Compressed Air & Gas Solutions"

A COMPARISON OF ROTARY VANE AND ROTARY SCREW AIR COMPRESSORS

As a supplier of both rotary vane and rotary screw air compressors, one of the questions that we are often asked is, “which is better, rotary screw or rotary vane compressors?”

The answer is not simply which is better, but which is best suited for a specific pressure, capacity, and application.

Each offers its own unique benefits!

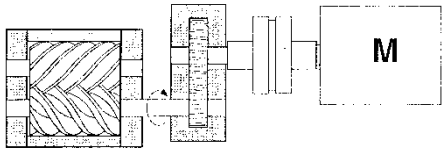
While rotary screw compressors are well suited for larger horsepower applications and higher pressure requirements, the rotary vane compressor offers several distinct advantages for applications where pressures of 100 – 125 PSIG are required.

FIELD PROVEN DESIGN

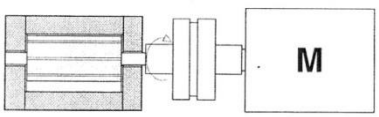
Rotary vane compressors have been designed and manufactured since 1958 and offer well proven performance with over 500,000 units operating in all conditions and environments throughout the world.

LOW ROTATIONAL SPEEDS

Rotary vane compressors operate at a rotational speed of only 1750 RPM, while rotary screw compressors generally utilize a speed increasing gear-box or v-belt drive that produce rotor speeds of 2500 to 9000 RPM. This is particularly notable in smaller horsepower screws, which tend to run small diameter rotors at high rotating speeds in order to remain price competitive. Lower rotating speeds result in longer bearing and air-end life.



Because of reduced volumetric efficiencies at low speeds, most small screw compressors are fitted with gears or pulleys to increase the rotor speed



Rotary vane compressors work at the same speed as electric motors.
They are connected to the electric motors through flexible couplings which do not cause any power loss.

NO AXIAL BEARING LOADS

Due to the geometry of a twin-screw compressor, the air under pressure produces axial thrust on the rotors. This thrust develops because high-pressure air at the discharge end tries to push the rotors back toward the inlet end. Since the male rotor often has a larger surface area the discharge pressure will exert a greater force on it than the female rotor. When the compressor is unleaded, reverse thrust occurs from the inlet to the discharge.

If these forces are not controlled through the use of additional thrust bearings, the discharge pressure can cause the rotors to make contact with the end plates at the inlet end of the compressor resulting in severe damage.

To absorb these axial forces, rotary screw compressor manufacturers use several angular contact ball bearings or tapered roller bearings to prevent the rotors from touching the end plates. Each set of thrust bearings consists of two bearings; one for thrust force from discharge to suction and the other one for reverse direction (suction to discharge.)

LONGER BEARING LIFE

Because rotary vane air compressors operate without any axial forces on the bearings, bearing lives of 100,000 to 150,000 hours real running time operation are often experienced. At least two to three times the air-end life of a comparable rotary screw. Note: This is not a B-10 or L-10 bearing failure life rating, but true running hours in operation. This axial bearing load is the weakest point of all rotary screw compressors.

LOWER BEARING REPLACEMENT COSTS

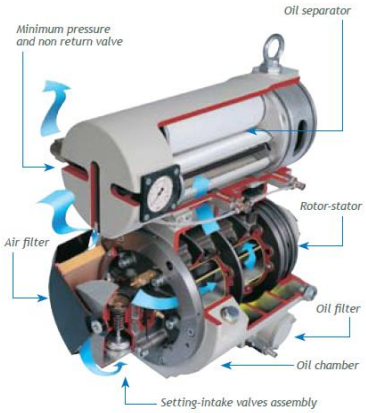
Rotary vane air-ends do not use ball or roller bearings which can result in catastrophic air-end damage in the event of a bearing failure. Bearing failure in rotary screw compressors generally allows the male and female rotor to make contact often resulting in major damage to the rotors, shafts, and stator housing.

Since there are zero axial forces acting on them, vane compressors require only two simple shell type bearings rather than the six roller bearings required in rotary screw compressors. As a result, repair costs associated with bearing replacement are substantially less than rotary screw compressors.

INTEGRATED DESIGN

All of the components in a rotary vane compressor are built into one compact integral unit, rather than having a multitude of individual components with interconnecting piping and tubing.

Rotary vane compressors have no external control tubing and use an integral design, which requires only two (2) external oil lines. This integral design minimizes the possibility of oil leakage and results in cleaner, less complicated and more serviceable equipment.



COMPACT DESIGN

Their compact design results in compressors, which require less floor space and are lighter in weight than most comparable units thereby reducing structural costs if the compressor is to be installed on a mezzanine area.

PERFECT MOTOR/COMPRESSOR ALIGNMENT

Rotary vane compressors are directly flange mounted to the electric motor (without the use of a speed increasing gear box) through machined bell housing. This coupled design ensure perfect alignment of the compressor and motor eliminating the maintenance and noise associated with gear boxes. Further, there are no bearing side loads, horsepower losses, and slippage common to v-belt drives.

LOWER OIL CHANGE COSTS

Because rotary vane compressors are oil-injected rather than oil-flooded, the oil sump is smaller in size than rotary screw resulting in oil change costs that are 30 to 40% less than many rotary screw compressors.

HIGH EFFICIENCY OIL SEPARATION SYSTEM

The rotary vane's cartridge type coalescing oil separator elements offer the lowest oil carry-over figures in the industry… less than 1 – 3 PPM. Rotary vane compressors use a multilevel internal separation system before the vapor is ever introduced into the separators. This increases their performance and explains the oil separator element's 10,000 hour nominal service life.

By simply installing final coalescing type oil removing filters rotary vane compressors are used in oil-free applications.

NO LOSS OF PERFORMANCE

Rotary vane compressors self-adjusting vanes means no decrease in output with air increase in age; 100% output is maintained for the life of the compressor. The Meehanite iron vanes are the hearts of the air-end and air backed by a revolutionary 10 year warranty against wear or defects under normal operating conditions.

SIMPLE TO SERVICE

Because of their uncomplicated design, rotary vane compressors can be serviced by most plant maintenance staff often without the need for factory trained service technicians.

The only routine maintenance required is to change the oil, clean or replace the air and oil filters, and to clean the radiators.