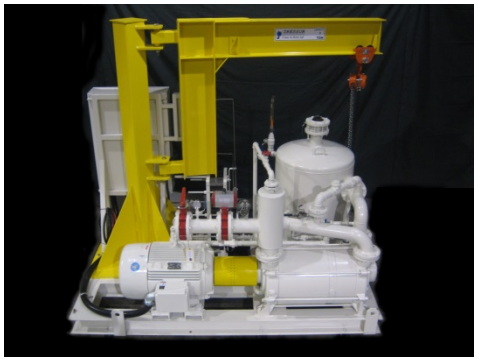
TRAVAINI VACUUM PUMPS: MAXIMUM BENEFITS IN POWER PLANTS

- *SUPERIOR HANDLING OF SATURATED AIR, VAPOURS, and LIQUID SLUGS.*
- *WIDER VACUUM RANGE ENHANCES TURBINE CONDENSERS EFFICIENCY.*
- *TOLERANT OF SMALL PARTICLES IN GAS STREAM.*
- *SUPERIOR DESIGN & CONSTRUCTION FROM OVER 85 YEARS OF EXPERIENCE.*
- *LOW MAINTENANCE & REDUCED COSTS.*



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✓ PFS Exhauster vacuum units are **engineered with maintenance accessibility** in mind. Travaini has catered its pumps to be able to thrive in facilities such as **power plants**; the units are **customised to client's** specifications, adapted with power and controls to meet the site's requirements.

✓ Each pump stage sees a compression ratio of **approximately 6:1**, allowing more even distribution & performance which hold up better than single stage pumps with as much as **30:1 compression ratios**.

✓ Large Capability to handle large amounts of condensable vapours, Vacuum ranges from **atmosphere down to 25 TORR.**

✓ Liquid ring pumps **(LRVP)** are ideal for condenser air extraction, where non- Condensable air is fully saturated with steam.

✓ With Travaini pumps shaft length is shortened to **minimize shaft deflections**, as a result mechanical seals have durable life with minimum risk for leakages.

✓ Pump designed with clearances that **allow small entrained particles** to be handled without damaging effect.

✓ Seal liquid **collects particulate** that can then be filtered out of the water loop.

✓ Mechanical seals **prevent water leakage**, a cleaner installation & safe operation as well as preventing leakage of air from atmosphere into low pressure areas of the pumps.

✓ Systems are designed, manufactured and tested under the **ISO 9001-2008** standards.

✓ Turbine back-pressure is lowered as cooling water gets colder and **TRAVAINI'S great performance flexibility** shows why it is such a vital partner in turbine power generating operations. Positive displacement characteristics allow the same unit to **quickly hog the condenser then maintain back-pressure**.

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Travaini LRVP offer excellent service in condenser exhausting due to their suitability for wet, saturated air service. The ability to condense water vapor while compressing air allows the plant to enjoy capacity far in excess of the displacement of the vacuum pump. Turbine back-pressure is lowered as cooling water gets colder and TRAVAINI'S great performance flexibility shows why it is such a vital partner in turbine power generating operations. Positive displacement characteristics allow the same unit to quickly hog the condenser then maintain back-pressure.

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Committed to stay ahead

The two-stage LRVP breaks down the compression process among two separate sections of the pump, allowing the first stage to operate cooler. Cooler operation means maximum condensing capability and air handling capacity from increased partial air pressure within its displacement. Warmed water cascades into the second stage where the temperature is far less critical.

In addition, typical compression ratio from 1" HgA to 29.92" HgA (discharge) is distributed among the impellers, so each stage sees a compression ratio of less than 6:1, superior to single stage pumps with a 30:1 compression ratio. Both stages in the **Travaini pump are hydraulically separated to prevent the warmed discharge compressant of the first stage from internal recirculation.** The weakness in pump designs with two stages using only a single impeller will become more pronounced with normal.

Travaini improved on two-stage pump technology by designing the pump specifically for mechanical seals. Shaft deflection varies as the cube of the unsupported shaft length, so small reductions in the distance between the bearings greatly improves shaft stiffness. **Shaft length has been substantially reduced for a more rugged pump with greater dimensional stability during operation**, which can be seen when comparing overall lengths with other pump makes. Mechanical seals prevent pump leakage for a cleaner installation and reduced threat of water contamination to the bearings. More importantly however, the mechanical seal also prevents in-leakage of air from atmospheric pressure into the low-pressure areas of the pump, assuring pump displacement is fully dedicated to draw from the condenser. This benefit is enhanced further with reduced maintenance.

If maintenance is required the Travaini pump will be easy to service. Detachable bearing brackets give easy access for seal replacement. There is no packing to wear the shaft and both bearings are outboard. Some competitor's pumps have a cantilevered second stage that must be removed to service packing areas or the bearings. The impellers on Travaini pumps are secured to the shaft by keyways assuring engagement, facilitating removal and reducing shaft stress under the impeller. Superior vacuum is maintained with the steam condenser as the pumping system acting as the process "workhorse" removes air leakage plus high vapor loads. Pumping speed is greatly improved via direct condensing action by both inlet water spray and contact with the pump seal water.