CASE STUDY

INDUSTRY: FERTILIZER PRODUCTION
PRODUCT: LIQUID AMMONIA (99,5 %)
APPLICATION: AMMONIA STORAGE & FEEDING
SOLUTION: SEMI-SUBMERGED MULTI-STAGE PUMP WITH MAGNETIC DRIVE (VS6 DESIGN)
LOCATION: TURKEY

The Job:

As part of the planning for a new ammonia storage facility within a fertilizer production complex, the objective was to identify pumps with exceptionally low NPSH(R) requirements. While low NPSH(R) is typically manageable with side channel pumps, the challenge here lay in the specific process demands: high flow rate and delivery head - unsuitable for such pumps. Although multi-stage centrifugal pumps could meet those operational parameters, they struggle with the low NPSH value, even with the addition of an inducer. Our solution: multi-stage centrifugal pumps based on API 685 in VS6 design.

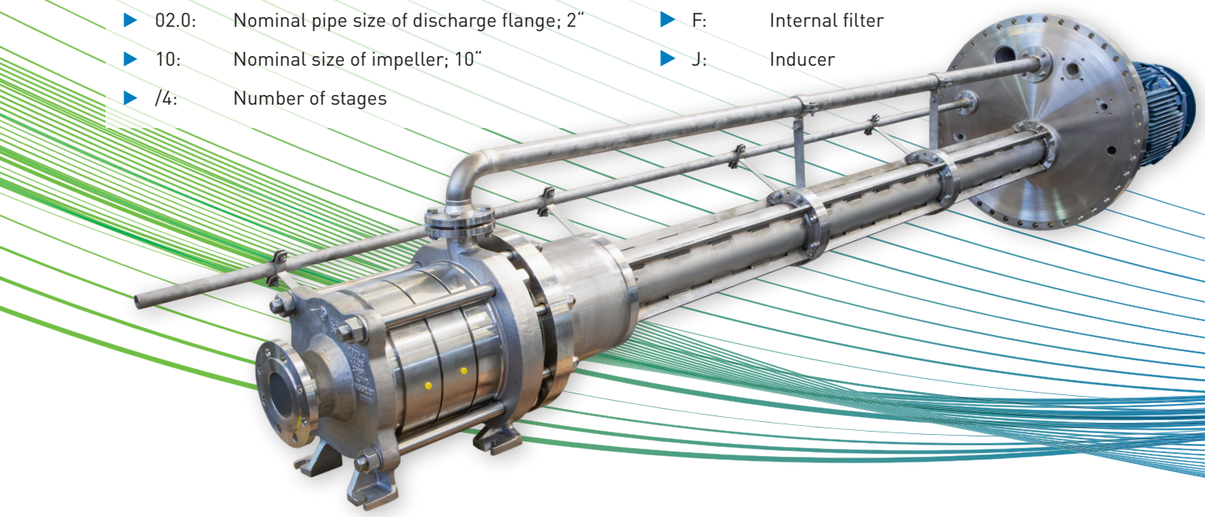
Operating Data:

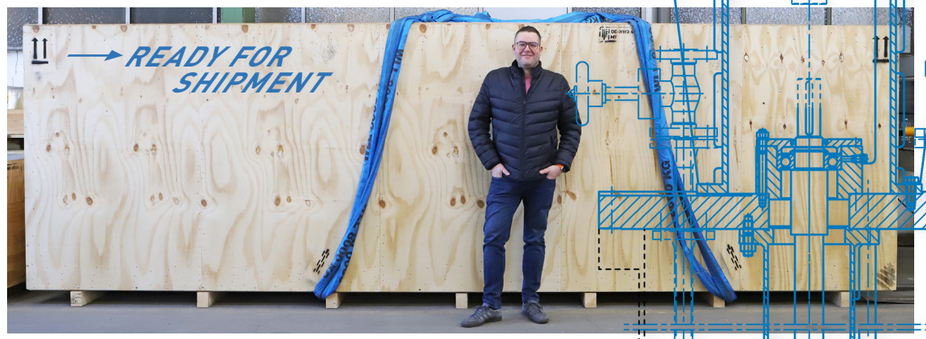
- Fluid: Liquid Ammonia (99,5 %)
- Flow Rate: 44 m³/h (194 gpm)
- Temperature: -33 °C (-27.4 °F)
- Delivery Head: 302 m (991 ft)
- Dynamic Viscosity: 0,24 cP
- Density: 670 kg/m³
- NPSH(A): 1 m (3.3 ft)

The Solution:

SLM APST 04.0x02.0x10/4-19E10Z FJ

- SLM: Sealless mag drive
- APST: Multi-stage, semi-submerged centrifugal pump
- 04.0: Nominal pipe size of suction flange; 4"
- 02.0: Nominal pipe size of discharge flange; 2"
- 10: Nominal size of impeller; 10"
- /4: Number of stages
- 19: Magnetic drive size
- E: Type of magnet
- 14: Length of magnetic drive
- Z: Non-metallic containment shell
- F: Internal filter
- J: Inducer



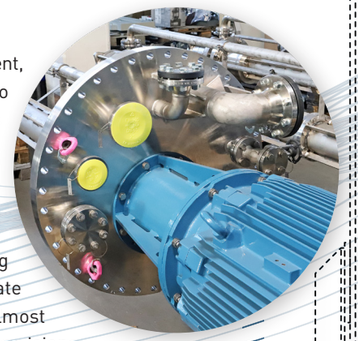


The Result:

Our solution centered on state-of-the-art semi-submerged multi-stage centrifugal pumps with magnetic drive series SLM APST in VS6 design. This pump type effortlessly meets the desired flow rate and delivery head. To tackle the NPSH(R) challenge, we opted for the VS6 design, which means that the pumps (blue) are submerged and operating in a special vessel (black) filled with the pumped liquid. Thus providing a submerging depth of 3.700 mm, the issue is eliminated. In addition the pumps are equipped with an inducer to further improve the priming performance.

With temperatures hitting chilly -33 °C, we geared up the pumps with a low-temperature design, incorporating dedicated journal bearings. Thanks to special materials and constructive measures, the bearings are suitable for temperatures of up to -130°C.

On top of that, we upgraded the pumps with our well-proven non-metallic containment shells. With these shells, no eddy current losses are generated in the magnetic coupling, increasing efficiency of the pumps and avoiding any heat generation normally associated with magnetic drive pumps if they are equipped with the standard metallic containment shells. With regard to possible solids in the liquid, the pumps were equipped with our internal filter - a simple, maintenance-free and low-cost solution to protect the magnetic drive.



In close collaboration with our client, the tank flanges were designed to securely acommodate various instrumentation.
This included a pressure transmitter for monitoring the non-metallic containment shell, a radar sensor for monitoring multiple fill levels, and a seperate fill level limit switch spanning almost 3 meters in length. Additionally, provisions were made for a venting connection and drain.