

## When faced with challenging process conditions

Ma'aden Wa'ad Al Shamal Phosphate Company (MWSPC) is a leading player in phosphate fertilizers. Its complex in Umm Wu'al, Kingdom of Saudi Arabia, includes a world-class phosphoric acid plant. Sulzer was selected to supply the gypsum evacuation booster pumps needed to evacuate gypsum cake resulting from the filtration of phosphoric acid slurry.

MA'ADEN Wa'ad Al Shamal Phosphate Company (MWSPC)



“The project was identified as highly critical. Therefore, we started a technical exchange with the customer to identify the key parameters and operating conditions. Also some field tests were made to define the best technical proposal. The schedule for the manufacture of six (6) EMW350M slurry pumps was very tight. We delivered the pumps on time early 2021 and our customer is very satisfied with their performance.”

Alaa Abuissa, Area Sales Manager, Sulzer

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Heavy-duty slurry pump type EMW350MS at the site (2021).

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### The challenge

The gypsum produced by the reaction between phosphate rock and sulfuric acid must be separated and removed from the mainstream phosphoric acid production process. The gypsum cake is collected from the filter, slurrified and then pumped to stacks. Over a period of time, the height of the stacks increases, and more energy is required to continue discharging the slurry. In this case, additional booster pumps were needed.

The constraints of the application were:

- Corrosive liquid with presence of contaminants
- Medium solids content slurry
- High flow
- Very high head
- Very erosive application

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### The solution

After having analyzed the slurry properties and operating conditions, we opted for a heavy-duty slurry pump type EMW in metal alloy construction. Even if the pumped mixture itself is not among the most severe ones, the required flow and head make the application tough.

The main characteristics of our solution are:

Heavy-duty slurry pump type EMW350MS  
Full-diameter closed impeller and low rotating speed  
Wear-resistant material (FC1) with corrosion-resistant properties

A heavy-duty slurry design is primarily intended to withstand erosion and offer the most durable performance despite inevitable wear. The wear can be mitigated by an appropriate combination of hydraulics and materials. In practice, this means a lower rotating speed, correct position of the nominal flow with regard to the best efficiency point (BEP), and selection of a wear-resistant material within the range of high chromium iron.

### Customer benefit

For a customer, transparent exchange of technical information with the supplier is highly beneficial, especially when the supplier can offer a broad range of materials of construction and various pump designs for different types of applications.

In this case, Sulzer considered the composition of the slurry (i.e. chemical and physical properties) and the operating conditions. We estimated that the first factor to be considered was the erosive character of the application. We did not want to select a material that has a very good resistance to corrosion, but that would not last long because of a weaker resistance to erosion. However, some contaminants possibly made the liquid aggressive. Because of this, we proposed corrosion testing at the site to confirm the suitability of the pre-selected materials. Having analyzed the results, we were able to select the optimal equipment.

Item	Description
Application	Gypsum slurry booster pumps
Fluid	Acidic water containing < 22% w/w of gypsum (estimated size < 500 µm), pH < 1, high chloride content possible, fluorine
Temperature	< 40 (°C)
SG	< 1'100 (kg/m³)
Flow / head	< 3'000 (m³/h) / < 65 (m)
Pump type	EMW350MS
Serial number	100238857 (660880)
Material of construction	FC1
Nominal speed	< 750 (RPM)
Lubrication	Grease
Installation	Pump/motor on common baseplate
Motor	HYOSUNG 750 (kW) – 4'000 V – 60 Hz VFD-driven
Transmission	Flexible coupling (Metastream TSKS)
Sealing system	Dual mechanical seal (John Crane SB2S-PR) Flushing plan similar to API 53A

### For any inquiries please contact

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