



## VM32 upgrade - discharge elbow + bearing modifications

**Industry:** Oil + Gas - chemicals

**Region:** Europe

**Territory:** France

**Category:** Site fault investigation

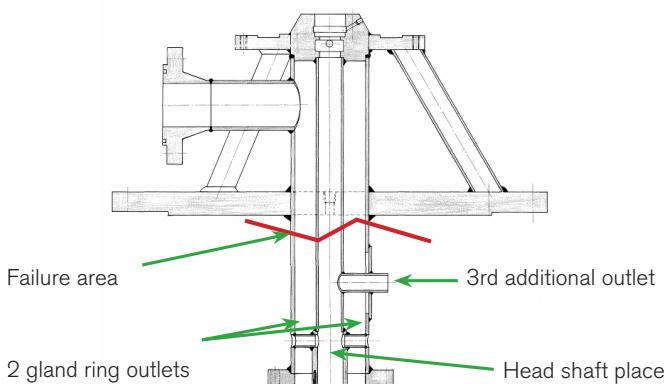
**API Type:** VS6

ClydeUnion Pumps Aftermarket Technical Services team has experience across a range of services on critical rotating and reciprocating equipment to improve operational safety, reliability and efficiency. The design upgrade of the VM32 for the oil and gas market is one of our success stories documented in our library of case studies. These case studies highlight the requirement from the customer, how we achieved the goal and the process we followed to deliver the improvements.

*Image left: Vespel® bearing*

### Situation

Our customer had previously independently repaired the discharge headpiece pipe on a vertical chemical pump as it had cracked several times. Due to the complexity and difficult accessibility of the welding, plus relative fragility of the assembly, the consultation between ClydeUnion Pumps and the customer resulted in agreement to re-design the whole discharge elbow.



### Challenge

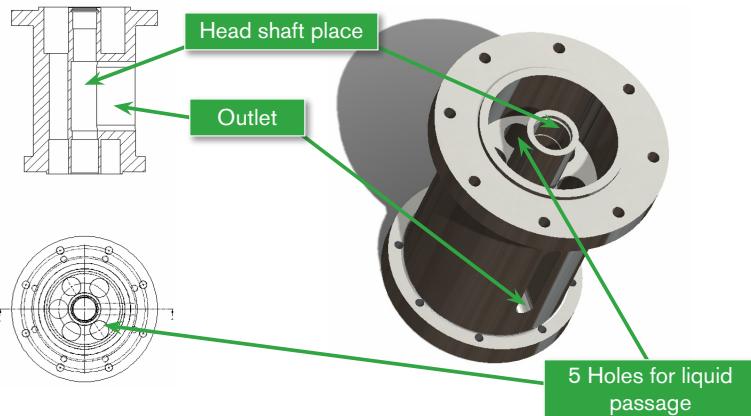
The gland ring outlets on the discharge elbow were not sufficient to evacuate the liquid that passes around the head shaft. To solve this problem a third outlet had been added to the discharge elbow, but this modification has weakened the lower part of the discharge elbow. This weakness leads to a crack of the discharge elbow.

### Solution

The solution was to re-design the discharge elbow and separate it in two parts, the elbow itself, above the support surface, and a suction spool under. ClydeUnion Pumps also made the decision to change the former bearings material to a Vespel® CR6100 (carbon fibers in PTFE resin matrix). Indeed the corrosive nature of the liquid pumped increases the hydraulic clearances of the pump. These gaps generated vibrations that contribute to the destruction of the discharge elbow. The choice of Vespel® CR6100 was done for its excellent resistance at wear and abrasion and chemical compatibility.

- Re-design of the upper part of the discharge elbow**

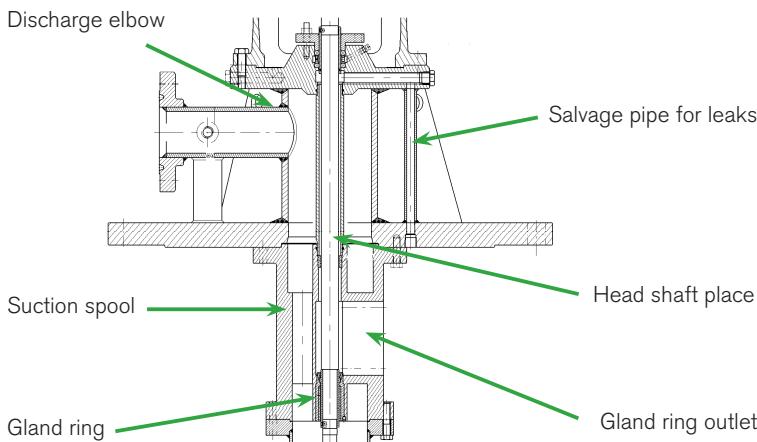
This part is designed to be stiffer than the older version. It also integrates a salvage pipe for possible leaks.



- Re-design of the lower part of the discharge elbow (suction spool)**

The preferred design was made to have a single piece part to increase its solidity. The former 3 gland ring outlets are replaced by one, and the liquid pumped passed by 5 holes that represent an area equivalent to the former version.

- View of the assembly**



- Assembly of Vespel® CR6100 bearings**

Due to the abrasive nature of the liquid pumped (water + organic matter), the choice was made to change the former PTFE based bearings to Vespel® CR6100 bearings.

## Operational improvements

Since the upgrade and the change of bearings material from PTFE to Vespel® CR6100, there has been no abnormal wear of bearings. Before the MTBF for the PTFE bearings was less than one year. The pump is operating well with the new discharge elbow.

## Financial illustration

### Analysis on 3 years

- Current version:**

Expertise, overhaul of the entire pump + studies and supply of new designed parts = 70K Euros  
MTBF is currently more than 3 years.

- Former version:**

Maintenance cost required for bearings change and expertise of pump state = 20K /year  
Cost for 3 years = 60K Euros + spare parts + weld repair of discharge elbow > 70K Euros