Have you scheduled your pump maintenance?

Hamdi Nadir Tural, the Business Development Director at the Turkish-based Standart Pompa shares his expertise on the various maintenance techniques. Here, he suggests that coupling alignment before commissioning should be performed monthly.

In industrial plants, continuous production relies on the reliability of manufacturing equipment and their auxiliary devices. Whether or not equipment selection is done correctly according to operating conditions, reliability, and maintainability of the whole system, is directly related to maintenance. Experiences show that, for the successful operation of plants, maintenance operations must be an integral part of production strategies. Hamdi Nadir Tural, the Business Development Director at the Turkish-based Standart Pompa shares his expertise on the various maintenance techniques with Pump Engineer.

Hamdi Nadir Tural, Business Development Director, Standart Pompa

Classification of maintenance techniques

Maintenance can be classified into two basic categories:

- Preventive maintenance
- Corrective maintenance

Preventive maintenance includes acts undertaken before the failure arises. It is conducted without stopping the whole system. Corrective maintenance, on the other hand, copes with the equipment after the failure occurs. Sometimes it may concern changing some small parts but it may also concern renewal of the complete system when there is catastrophic failure. Therefore, preventive maintenance is of vital importance for many systems.

Damaged bearings (c) of a high pressure pump (a) due to a mechanical seal failure (b).

Another classification for maintenance is as follows:

- **Periodic / duty-based maintenance:** Maintenance accomplished at periodic intervals or after a defined number of working hours increases a plant's maintainability. But, we need to know *when* to perform maintenance in order to achieve an optimum time interval or operating hours. It must be considered that replacing equipment, although it is in a good situation, increases costs.
- **Opportunity maintenance:** Production downtimes – not for maintenance purposes – gives an opportunity for maintenance. In this case, no production loss will occur due to maintenance.
- **New design maintenance:** As a result of technological development, production systems have to be replaced with the state-of-the-art equipment. This type of maintenance takes place to improve reliability and/or performance of the system.
- **Management maintenance:** It may be defined as maintenance done without any economical outcome, but for a purpose of visual, social, and environmental responsibility.
- **Condition-based / predictive maintenance:** This type of maintenance is based on monitoring operating conditions of a system/ equipment and analyzing the changes which may cause failures. Condition monitoring has the advantage of predicting incoming failures and preventing unforeseen breakdowns.

Vibration measurement is one of key factors to identify potential problems associated with the equipment. Based on the severity and frequency spectrums of vibration data bearing failures, misalignment, and the mechanical looseness from baseplates, the cavitation and corrosion/wear in rotor parts (associated with unbalance) can be detected. Detailed information and guidelines on condition monitoring and vibration measurements can be found at ISO 13381-1, ISO 7919 (parts 1 to 5) and ISO 10816 (parts 1 to 7) standards.

Generally, condition monitoring is a very effective method, but due to necessary measurement and analyzing tools, it has a high initial investment cost. Depending on the criticality of the system, it has different application areas, such as power plants, industrial furnaces, and refineries.

Periodic pump maintenance

All of the methods mentioned above can be applied to pump maintenance. However, periodic maintenance is the most common method in the industry. Most of the pump manufacturers give information on periodic maintenance in their instruction manuals. This information includes daily, weekly, and annual checks and maintenance acts. Please see Table 1 for a sample maintenance schedule.

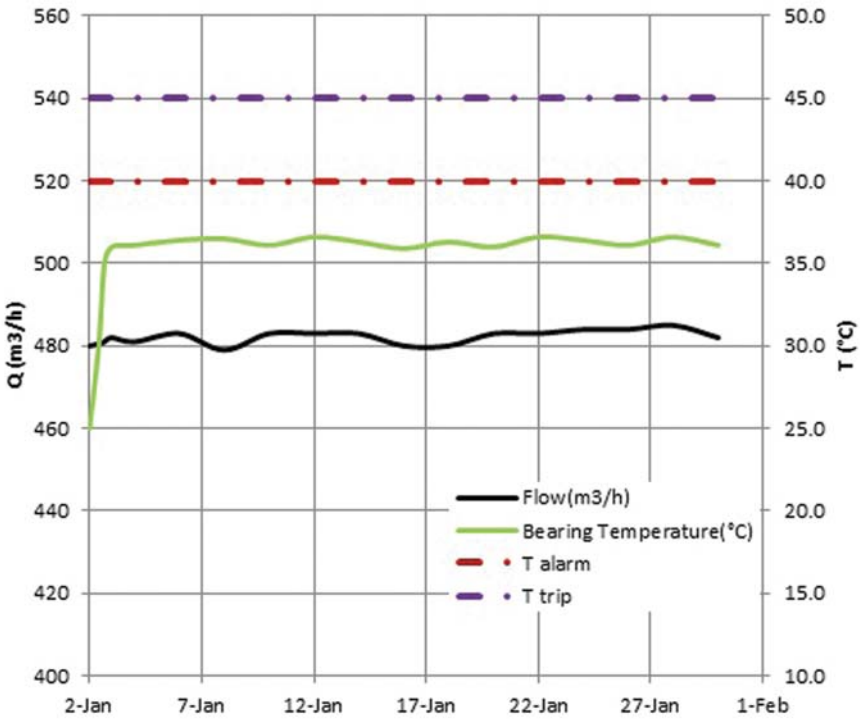

Figure 1: *Condition Monitoring for a RO Pump in terms of flow and bearing temperature (alarm and trip limits are also indicated on the trends).*

Choosing your pump maintenance techniques wisely

While periodic maintenance of pumps seems to be the most popular method currently used, predictive maintenance is increasing in popularity. Predictive maintenance is likely the most effective technique and it is becoming much more widespread as technological developments decrease equipment and monitoring system prices. Many production plants are suffering reliability problems because of their lack of maintenance strategies. Maintenance teams cannot focus on every single piece of equipment in detail because they have to handle various types of equipment with different criticalities. The amount of care an equipment receives is directly proportional to its cost of ownership. Furthermore, most of the auxiliary equipment is only brought into focus when they breakdown, or, in other words "they run to failure". The main point to stress is that you must make sure there is some sort of pump maintenance technique in place.

PERIODIC MAINTENANCE SCHEDULE

Frequency	*Staff*	*Time*	*Task*
DAILY	1	10-15 minutes	• Check for bearing temperatures • Check for cavitation and bearing noise • Check for motor current and voltage
WEEKLY	1	20-30 minutes	• Check for suction and discharge pressures • Check for vibration and noise • Visual check for sealing leakage
MONTHLY	1	20-30 minutes	• Remove safety guards and check for shaft and auxiliary devices • Check for coupling alignment • Fill lubrication oil (if necessary)
ANNUALLY	2	2-3 hours	• If spare pump, run the pump and check for maintainability • Check for axial movement of motor shaft • Remove and clean all auxiliary devices (valves, manometers, pipings, sight glasses, etc.) • Remove coupling halves and check for wear at rubber part (renew if necessary)
2 YEARS OR 10000 HOURS	2	6-8 hours	• Dismantle the pump from the piping and disassemble • Make inspection on parts, renew if necessary: – Impellers – Wear Rings/Wear Plates – O-rings – Shaft • Apply coating on un-machined surfaces

Table 1: *Using periodic maintenance for pumps is the most common maintenance technique.*

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Hamdi Nadir Tural is the Business Development Director at Standart Pompa, which is a Turkish pump and pump systems manufacturer. Previously, Tural worked in several different positions in the R&D Department within the same company for more than 10 years. He is currently responsible for promoting innovative and tailored solutions, consulting, and training on pump plant design and installation. He holds BSc and MSc degrees in Mechanical Engineering from Istanbul Technical University. He is a member of ASME, SIAM, and Technical Committees at the Turkish Standards Institute. His current research interests includes energy management, turbomachinery design-operation-maintenance, and project management.

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