

## CASE STUDY

# HOW AQUAFIN CAN SAVE €400K PER YEAR WITH SMART MAINTENANCE

Aquafin is responsible for the transport and treatment of household wastewater in Flanders (Belgium). In fulfilling this, Aquafin manages 2,500 pumping stations and 318 water treatment plants. In June 2020 the Belgian Maintenance Association (BEMAS) organized a Hackathon, an online technical contest, for a challenge presented by Aquafin. By combining UReason's Asset Performance Management (APM) software and MaxGrip's consultancy expertise, we demonstrate how this organization can benefit from a proactive approach to their asset management.

## CHALLENGE: PREDICTING FAILURE

Aquafin wants to predict pump failure to be able to carry out smarter maintenance. Aquafin wishes to investigate whether blockages or other disruptions can be predicted with sufficient reliability using intelligent data analysis techniques. They are keen to find out whether there is any indicative value in their existing data that warns for potential pump failures.

## APPROACH: SMART MAINTENANCE SOFTWARE, DEPLOYMENT AND ADOPTION

### Smart Algorithms

Connected assets are the foundation on which your digital landscape is built.

This is translated into logic with a Programmable Logic Controller (PLC) or MES and harmonized in the monitor and control layer where SCADA (Supervisory Control and Data Acquisition) gathers, connects, analyzes and visualizes data. All asset-intensive organizations will recognize this as a regular setup.

## SUMMARY

### Challenge:

Aquafin wants to predict pump failure based on their available data to be able to carry out smarter maintenance. If urgent maintenance can be planned better during normal working hours, operations will become more efficient and the teams will have a better work/life balance as a result.

### Approach:

Data & systems: APM software for predictive maintenance and use of probabilistic BowTie model to predict failure 3,5 hrs before it happens.  
 Organization: Aquafin in the driver's seat with a changed way of working. Operations 'in control' - act before it breaks down; 24/7 standby is no longer necessary.

### Results:

- €400K yearly savings
- Over 50% reduction of night and weekend intervention cost.
- Improved work/life balance
- Reduction of unavoidable discharges
- ROI in six to eight months

For Aquafin we took it one step further and added an analytics and platform layer. Normally, we would select relevant data from the data lake (through the historians) as input, connect those and build smart algorithms. In this specific case, Aquafin made a dataset available that is comprised of logs of relevant online measurements as well as a description of the maintenance performed on the assets during a period of six to twelve months.

We put that data in an APM platform that can make the insights available in dashboards for Operations. These dashboards and the insights that they provide can be used to predict failure and avoid or prevent PLC/ SCADA alarming. This takes the organization from reactive fire-fighting mode to a proactive and predictive asset management approach.

### APM Digital Platform for Predictive Maintenance

APM Studio is software that is used for Predictive Maintenance. By detecting and acting upon early alarm notifications, a smarter way of working for maintenance and operations will have many benefits. We created rules to detect a low flow/power ratio and a downward trend on the flow. This results in the use of a probabilistic BowTie model. Since we can deploy this BowTie Model on all pumps with real time data, maintenance will be able to get indications of expected bad-actor pumps.

The model continuously calculates the likelihood of a pump degrading due to minor blockage or blockage across all pumps. It can be enhanced with weather data to take capacity requirements into account of individual pumps; heavy expected rainfall in combination with lower integrity will cause the degradation likelihood to increase.

With the APM software and modelling, we can identify critical issues on pumps 3,5 hours earlier than current PLC/SCADA alarms, lowering the risks on consequential damage due to complete failure of assets. This allows Aquafin to switch pumps prior to losing pump capacity/capability. Additionally, the importance of implementing this proactive approach to asset management was emphasized by the fact that the APM platform also showed that some PLC/SCADA alarms were previously missed.

### Processes and People

Working with asset management software like APM Studio impacts the organization in a big way. Because the Operations team can predict failure and intervene before the breakdown actually happens, actions and decisions are different. This has consequences for the Maintenance team as the need to be on standby and in fire fighting mode to fix breakdowns diminishes with the new way of working.

The screenshot shows the APM Studio interface. The main area displays a BowTie diagram for the 'PumpDegrading' class. The diagram consists of a central yellow circle labeled 'PumpDegrading'. To its left, three blue boxes represent causes: 'Minor Blockage', 'Blockage', and 'Weather'. 'Minor Blockage' and 'Blockage' both point to a white box 'Low Flow/Power Ratio', which then points to the central circle. 'Weather' points to a white box 'Expected Utilisation', which also points to the central circle. To the right of the central circle, two white boxes represent effects: 'Monitor Power Consumption' and 'Monitor Maint. Order'. 'Monitor Power Consumption' points to a red box 'Efficiency Loss', and 'Monitor Maint. Order' points to a red box 'Breakdown'.

Below the diagram is a table titled 'Alarms of Class PumpDegrading'.

TimeStamp	Source	Summary	Name	Severity	Clr	Clr TS	Ack	Ack TS
2020/05/27 12:33:02	S1003_P003	Pump S1003_P003 detected to be degrading. Change control regime and create a workorder.	MAINTENANCE_REQUIRED	HIGH	-	-	-	-

The changes in technology and processes also mean that the existing roles and responsibilities have to be adapted. Field technicians and operators can see actual performance information on the spot and are able to intervene at any time. With that, the responsibility of maximizing the asset availability shifts towards operations as they have early insights and can take actions proactively. Asset managers get (longer-term) insights in asset health through user-friendly dashboarding and reliability engineers can predict degradation. Planners can optimize their work and improve their efficiency working with the revised processes and new technology.

In addition, the changes will also ask for new roles. These include managers of algorithms and semantic model libraries, asset data managers and product owners.

## Factors for Success

Unquestionably, this organization's maturity growth and step towards APM 4.0 is a big undertaking. These important factors improve your chance of success:

### 1. Software tips: ownership and ease of use

With APM Studio you have ownership over the asset data that you put into the software system. This is important to safeguard your Intellectual Property. Additionally, you need to understand the functionalities of the software and what you need; APM Studio makes it easy, for instance, to build models yourself which puts your work crew in the driver's seat.

### 2. Scale to grow

The solution can be implemented on a small scale adjusted to your current asset management maturity level, and then be scaled up to allow the organization to familiarize themselves with the new technology, processes and way of working. The starting point is an Asset Improvement Mapping (AIM) which maps the current maturity level, the project's first scope and realistic improvement potential.

### 3. Phased approach

Using toll gates in the deployment process enables the organization to reach project milestones together. This phased way of working is transparent for all stakeholders as toll gates are only signed off on when all involved agree that the requirements for the milestone are met. This phased approach is the key to success.

### 4. Multidisciplinary collaboration

Maintenance and operations will have to collaborate increasingly if you want to improve your asset management maturity. To get people on board with the changes, you need to train and coach the team intensively. Provide insights, celebrate successes, and share pitfalls to learn how to improve as a team. This is your chance to emphasize that everyone works towards a common goal.

### 5. Promote a new mindset of being in control

With the new Industry 4.0 solutions, the updated way of working and new roles added to the team, your company's culture will be impacted in a big way. Keep in mind that it takes time to make a lasting change to work culture. Actively promote and cultivate the mindset of being and staying in control. Being able to better predict asset performance should inspire confidence in the team. Unexpected alarms, many standby shifts and firefighting mode are things of the past. Benefit from this by highlighting the positive consequences of proactive working and staying on top of performance.

## RESULTS: FROM PREDICTED FAILURE TO LASTING IMPROVEMENTS

Based on the available data, a healthy Return on Investment (ROI) of six to eight months is achievable for Aquafin. The solution identifies critical issues on pumps 3.5 hours earlier than the PLC/SCADA alarm, lowering the risks of consequential damage due to complete failure of a pump. In addition, alarms that are not picked up now by Maintenance are also added to the system for early detection and action. All these factors result in annual potential savings of €400k.

This is based on:

- Over 50% reduction of night and weekend intervention cost.
- Minimal 50% reduction of night and weekend hours possible. Further night and weekend hours reductions are possible.
- Improvement of work/life balance, meeting Aquafin HR goals to position Aquafin as an employer of choice.
- Reduction of unavoidable discharges, helping to comply with the requirements of the European water framework directive and keep the purification results 100%
- Maintenance maturity growth: move from reactive to proactive maintenance organization
- Higher productivity of installation
- Capabilities to improve electricity consumption to reduce carbon footprint and to help with achieving CSR target of 1% energy consumption reduction per year

### ABOUT MAXGRIP AND UREASON

MaxGrip and UReason have joined forces to help asset-intensive organizations realize their best ability to perform resulting in lasting improvements in their asset management.

MaxGrip enables organizations in asset-intensive industries to achieve continuous improvements in their asset performance, also using the power of Digital Transformation. We get the data and technology to work for you; we get it done.

UReason is an innovative software company that manufactures and sells Asset Performance Management (APM) software. UReason's APM systems act to improve the reliability and availability of physical assets while minimizing risk and operating costs.

### GET IN TOUCH



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