



Reducing Water Loss with Artificial Intelligence in Fellbach Germany

Artificial Intelligence and Virtual DMAs
Reduce Water Loss by 50%



BuntBrain LeakFinder: Case Study

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1/ The situation

Stadtwerke Fellbach is a utility company that provides electricity, gas and water to the municipality of Fellbach located north-east of Stuttgart in **Baden-Württemberg**, Germany. Stadtwerke Fellbach serves water to 43,000 inhabitants. Prior to industrialization Fellbach was mainly a wine-growing town and today 182-hectares of vineyards are still cultivated.

2/ The challenge

Before implementing BuntBrain LeakFinder, 11 flow meters were already installed and monitored in a 60 km pipe length DMA at Stadtwerke Fellbach for over two years. The **virtual DMA concept** had been designed and implemented by engineering company RBS Wave, but no artificial intelligence (AI) was applied. Alarms were generated automatically by the system whenever flow surpassed the threshold levels previously defined.

The water loss level was low (less than 10% NRW) and mostly **small invisible leaks** remained undetected. In an effort to further improve leak detection, in 2016 RBS Wave introduced to Fellbach the concept of leak detection by combining **artificial intelligence** and **hydraulic simulation**.

While Stadtwerke Fellbach already had a calibrated hydraulic model, combining their data with artificial intelligence represented an innovative forward approach to better water management. Senior management understood that the combination of AI with hydraulic simulation could be the next step to improve the efficiency of the water supply network and serve as a role model for other regions. They became BuntBrain LeakFinder's first customer and **pioneers in water loss reduction**.

3/ The solution

BuntBrain LeakFinder (advanced mode) was implemented in a 60 KM DMA.

2-years of flow meter data was analyzed in order to check if past leakage events could be detected and pre-located by BuntBrain's algorithms.

The tool required the following input:

- Flow data every 5 minutes sent once a day to BuntPlanet's FTP server.
- A calibrated hydraulic model.

The test was very successful as the tool detected and pre-located all past leakage events and a new one.

It was a 2.1 l/s hidden leak, which was 72 days old.

AI recognized an abnormal pattern by comparing forecast with reality:



AI and hydraulic simulation provided accurate pre-location of the leak in the supply network.

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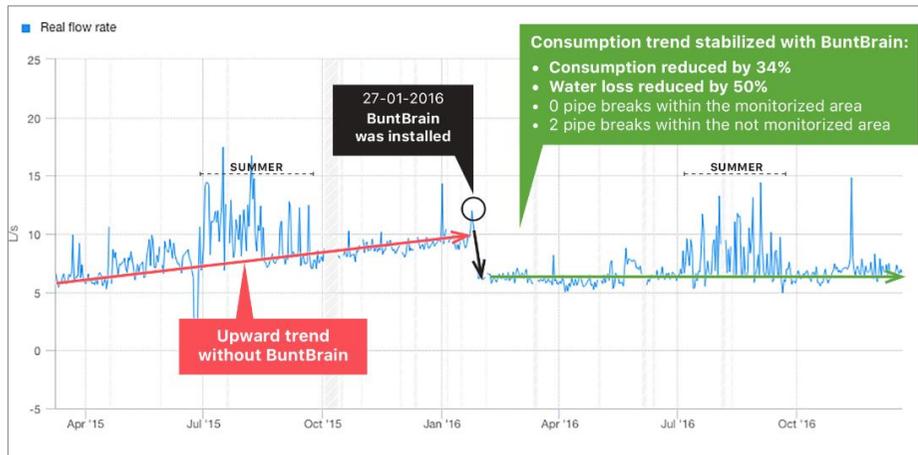
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4/ The benefits

BuntBrain LeakFinder has been in operation for over three years in Fellbach. The investment was amortized from the very beginning identifying hidden leaks and providing accurate pre-location data.

During the first six months, the key performance indicator was to **cut water losses in half**. The chart indicates total water consumption before and after the installation of BuntBrain. Before the installation, there was an upward trend. After the installation, the total water consumption was reduced by 34% (black arrow) and stabilized (green arrow). Since total consumption is the sum of actual consumption and water losses, and because actual consumption doesn't change, the 34% reduction in total consumption is equivalent to a 50% reduction in water loss during the first month of use. The most important result is the correction of the upward trend during the months of April to December.



Since installing BuntBrain Leakfinder, there has been no upward trend in water loss. 141 abnormal situations have been detected and solved, more than 40 corresponded to leaks. The installation has resulted in **zero pipe breaks** in the monitored DMA during the last three years.

5/ Project brief

- Municipality: Fellbach (Baden Württemberg, Germany)
- Population served: 44,000.
- Network length: 60 km.
- Implementation completed: January 2016.

6/ Scope of supply

- BuntBrain LeakFinder (advanced version) in the Cloud.
- Ultrasonic flow meters were available before implementation.
- Calibrated hydraulic model was available before implementation.



7/ Benefits at a glance

- 45 small underground hidden leaks were detected and repaired.
- Minimal historical night consumption has been reached by repairing leaks found by the software solution.
- Earlier leak detection: awareness time reduction from up to 72 days was achieved. With awareness we mean the time it takes to notice that there is a leak in the system. Results calculated based on historical data of past leaks. When compared to historical data of 2-years, results confirm that the AI model would have detected the leak up to 72 days (6 days on average) before the utility would have under business as usual.
- Pre-location algorithms based on AI and hydraulic simulation, reduced the time to identify the specific pipe leaking (from a 60km pipe length area to a 300m radius).
- The installation resulted in zero pipe breaks in the monitored DMA during the last three years.

8/ End customer

Stadtwerke Fellbach

9/ Distributor

RBS Wave

10/ Links

www.buntbrain.com