**Stream Processing – Use Case**

**Source:** [Kafka : the definitive guide: real-time data and stream processing at scale](https://ie.on.worldcat.org/detailed-record/992751510?databaseList=1271&databaseList=1672&databaseList=1697&databaseList=1842&databaseList=2038&databaseList=2236&databaseList=2237&databaseList=2259&databaseList=2269&databaseList=2270&databaseList=2278&databaseList=2375&databaseList=239&databaseList=2572&databaseList=2626&databaseList=2897&databaseList=3200&databaseList=3410&databaseList=638) (Available as E-Book at IE-Library) – Page 277

**Link:** <https://web-a-ebscohost-com.ezxy.ie.edu/ehost/ebookviewer/ebook/bmxlYmtfXzE1ODU5MzVfX0FO0?sid=8544eaac-1d45-4128-81ec-34ded668840a@sessionmgr4007&vid=0&format=EB>

**Task:**

A description of a use-case that has at least one of the following characteristics:

1. It requires Stream Processing or Real-Time Analytics to be useful and why:

Industry 4.0 – Internet of Things (IoT) – Manufacturing Use-Case

An interesting field of application for stream processing is the real-time analysis of process and machine data in a manufacturing-environment. The interpretation of sensor data (e.g. infrared, acoustics (partial discharge and ultrasound), vibration analysis, sound level measurements, etc.) makes it possible to make predictions that form the basis for maintenance in line with requirements. This enables very precise advance planning of maintenance. There is also maximum transparency regarding the performance data of the respective machines.

The real-time analysis of the data is also important to ensure that maintenance is not only cost-efficient but also performance-efficient, i.e. that maintenance is carried out before the machine is at risk of a loss of performance.

1. It can benefit from using Stream Processing or Real-Time Analytics to deliver more value and why:

Real-Time Analytics in the manufacturing environment offers a number of different advantages, these are among others:

Monetary-advantages:

* Predictive detection of maintenance requirements can reduce downtime (respectively increase plant availability), as technicians can solve the problem before it arises.
* Costs can also be reduced compared to routine or time-based preventive maintenance, as tasks are only carried out when they are actually necessary.
* Optimized prediction lead to a better resource planning and resource allocation for maintenance work.

Non-monetary-advantages

* increase in plant safety and the resulting optimized accident statistics.
* Depending on the machine, this may also reduce the emission of pollutants, so that the impact on the environment can also be improved.

**Case Description.**

An interesting field of application for stream processing is the real-time analysis of process and machine data in a manufacturing environment. The interpretation of sensor data (e.g. infrared, acoustics (partial discharge and ultrasound), vibration analysis, sound level measurements, etc.) makes it possible to make predictions that form the basis for maintenance in line with requirements. This enables very precise advance planning of maintenance.

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**Overview.**

Our use case pertains to the Bosch Connected Industry or Industry 4.0 application known as *NEXEED*. In this application, a software collects and harmonizes production and machine data from many different sources across the shop floor in real-time. The data is visualized and passed on to the employees as defined events, which means that reaction times can be shortened, errors avoided and tasks clearly assigned.

The analysis and transmission of data in real time make it possible to respond quickly and process maintenance orders efficiently even without extensive specialized knowledge and makes it available to machine operators and maintenance personnel on mobile devices.

For example, technicians can use their smartphones to monitor machines, read out fault history data and access historic errors codes that have been fixed. They can also call up digitized documents, images and videos. In no time, operators and technicians have all the information needed for efficient maintenance.

This modular, scalable system offers improvements across value streams by performing the following tasks precisely,

*Condition Monitoring;*ongoing status recording for maximum transparency.

*Live process data analysis;*minimizing production errors and process deviations.

*Predictive maintenance;* through configurable rules, automatic notification and task assignment.

**Advantages.**

By applying Real-Time Analytics in a manufacturing environment, the following advantages are seen.

*Monetary.*

* Up to 15 % higher machine availability through predictive maintenance, as technicians can solve the problem before it arises.
* 5-10 % higher production performance by reducing scrap.
* Average disruption period reduced by 20 %, as tasks are only carried out when they are actually necessary.
* Upto 5% higher OEE (Overall Equipment Efficiency).
* Optimized prediction lead to a better resource planning and resource allocation for maintenance work.

*Non-monetary.*

* Increase in plant safety and the resulting optimized accident statistics.
* Depending on the machine, this may also reduce the emission of pollutants, so that the impact on the environment can also be improved.
* Employees can contribute their expertise without the need for special IT skills.
* Improved manufacturing flexibility by reduction in changeover time.
* Higher transparency: Machine and process data available live at any time.