TECHNISCHE UNIVERSITÄT DRESDEN

Vibration Measurement and Visualization in Semiconductor AMHS

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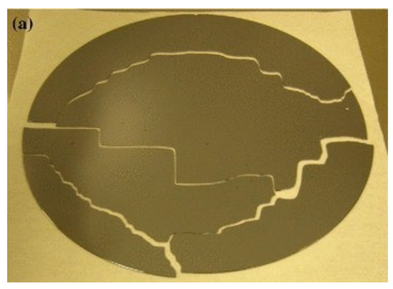
Summary

We present an approach to automate a legacy measurement device used for offline vibration measurement within automated material handling systems (AMHS) of semiconductor manufacturing plants by using a modern, state of the art IoT framework.

By using the approach, the time-consuming and error-prone procedure of offline measurement and data evaluation using the legacy measurement device was largely automated and the visualization of the results greatly enhanced. The required time to conduct a measurement could be reduced by 83%.



Motivation & Objectives

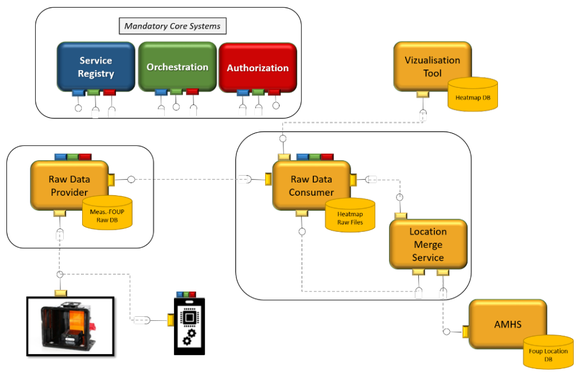
- High demands on manufacturing (quality, quantity, price,...) requires automated manufacturing and transport as well as production monitoring
- Competing manufacturing parameters (transport speed, vibration risks) together with vibration-sensitive products require vibration monitoring during the manufacturing and transportation processes
- **Goals:** Easily and effectively detect and rectify faults using a suitable visualization which allows to assign measured vibrations to their place of occurrence within the fab layout, the solution must be automated as far as possible

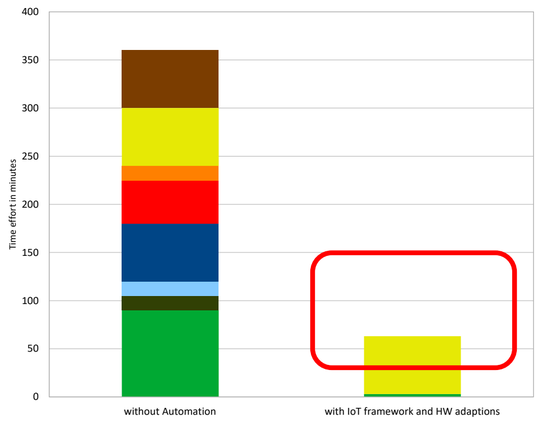
Approach

- Retrofitted meas.-FOUP with WLAN interface, native Android App to start/stop measurement
- Implemented data collection and evaluation services within the Arrowhead IoT framework
- RDP Service copies new data, stores raw data and provides measurement directory as a service
- RDC uses services of RDP, copies raw vibration data, triggers location merge service, aggregates vibration values, prepares data for visualization
- **Visualization tool to display as heat map**, fault location quickly identifiable, fast recognition of the defect location (severity color-coded), which helps to find the cause of critical vibration

Discussion

- Automated transmission, processing, linking, storage and visualization of vibration data.
- Significantly simplified operation of the FOUP, providing high time gain, simple operating sequence
- Secure, scalable, and expandable implementation using the Arrowhead IoT Framework.
- Useful with many systems and services, but introduces measurable overhead when (only) used for simple use-case
- Some deficiencies in documentation, features and ease of use still present
- Issues to be rectified will be communicated to the Arrowhead community





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