Bühler
Improving uptime with insight

September 2019
IAOM - Ohio

Innovations for a **better world**.

BÜHLER

Agenda

1. The power of Inspiration
2. Maintenance to help get food from the field to the table
3. The changing role of maintenance operators, sensors and data
4. Adding value with predictive analytics
5. Using sensors to improve uptime
6. Thinking about how you determine what parts to have in stock
7. Connectivity to help maintenance
8. Time to get going

The power of inspiration

Maintenance to help get food from the field to the table

Maintenance Management
A lot of things happening to keep a facility running

Label (Product)	Due S...	Activity	PS
Peeler MHSA		3 Monthly Check	
MDDR / Roller Mill B1/B...		3-Monthly Check	
MDDK Walzenstuhl C1I/...		3-Monthly Check	
Peeler 1 MHSA		3 Monthly Check	
SMC Mixer		Weekly Check	

Bühler and non-Bühler Machines

Preventive Maintenance

- **Maintenance Job's**
- **Corrective Task's**

Corrective Maintenance

Notificati on

Plann- ing

Warehouse management

Finish- ing

Execut- ion

Working hours

Parts used and history

Documents

- **Job card's**
- **History**

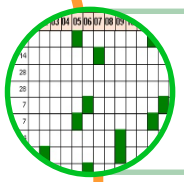
The changing role of maintenance operators, sensors and data

Food & Feed Safety? Safety at work? Sustainability?

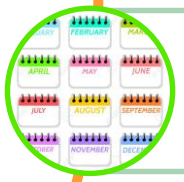
Maintenance – how do we tie everything together

Corrective / Breakdown Maintenance
Ad Hoc repairs as they occur – ***Worst case***

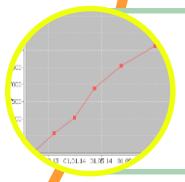
Reactive Maintenance
Timeous repairs of failures – ***Reaction of multiple failures = Overhaul!***



Periodic Maintenance
Daily checks of filters, air-/oil leaks – ***Short them intervals multiple equipment (Excel)***



Planned Maintenance
Doing Roll / Oil changes according to plan – ***Planned DO acts most time Calendar based***

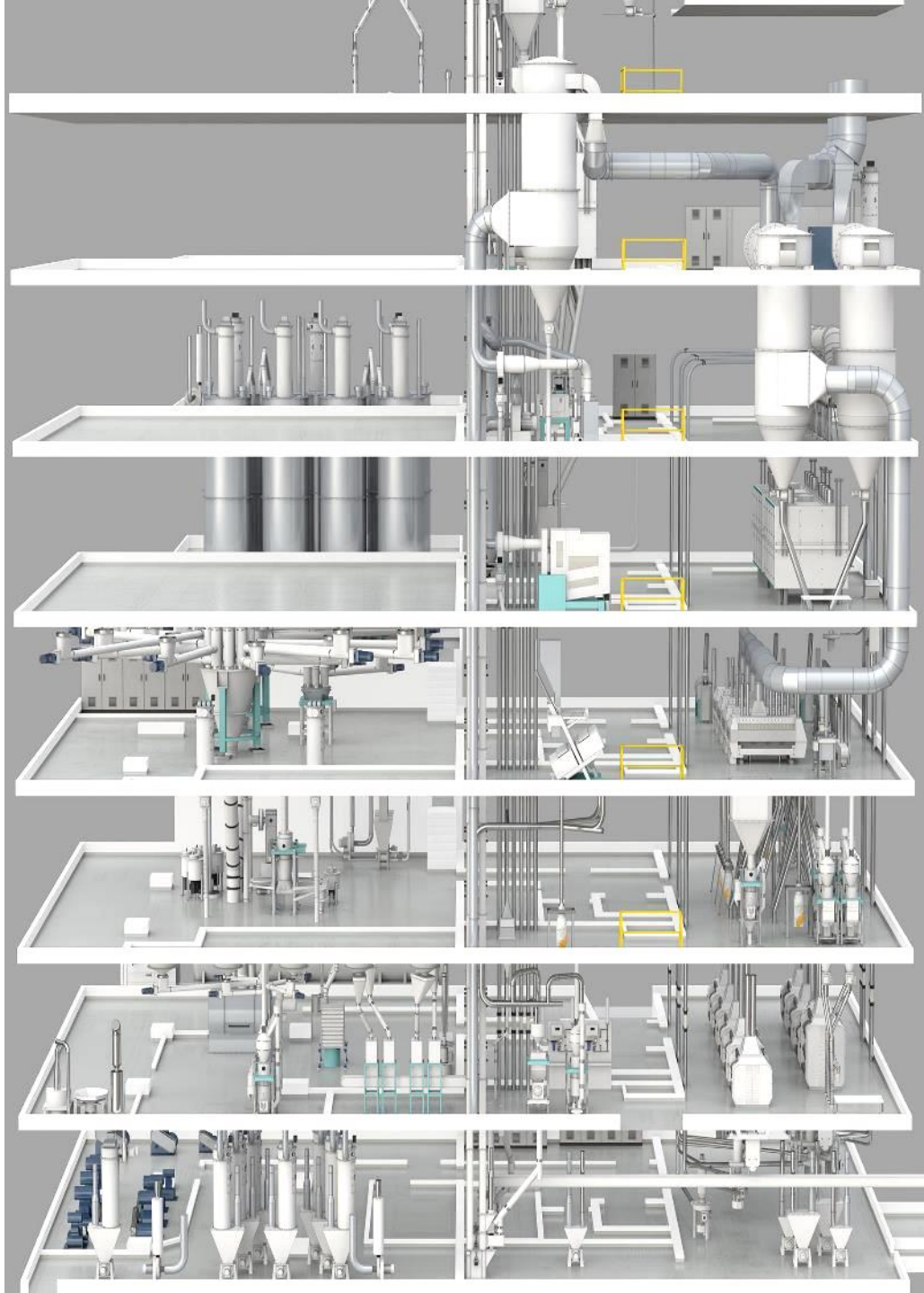


Preventive Maintenance
Tasks set out on a preventive job card real time on a daily basis = Target reaching plant availability of > 90%p – ***Calendar & Running Hours based intervals (ProPlant)***

Predictive Maintenance
Not available today since machines need to have certain intelligence (sensor technology a.s.o.) before we can get there! – ***Industry 4.0, IoT Sensors etc.***

Benefits of Service Management Systems

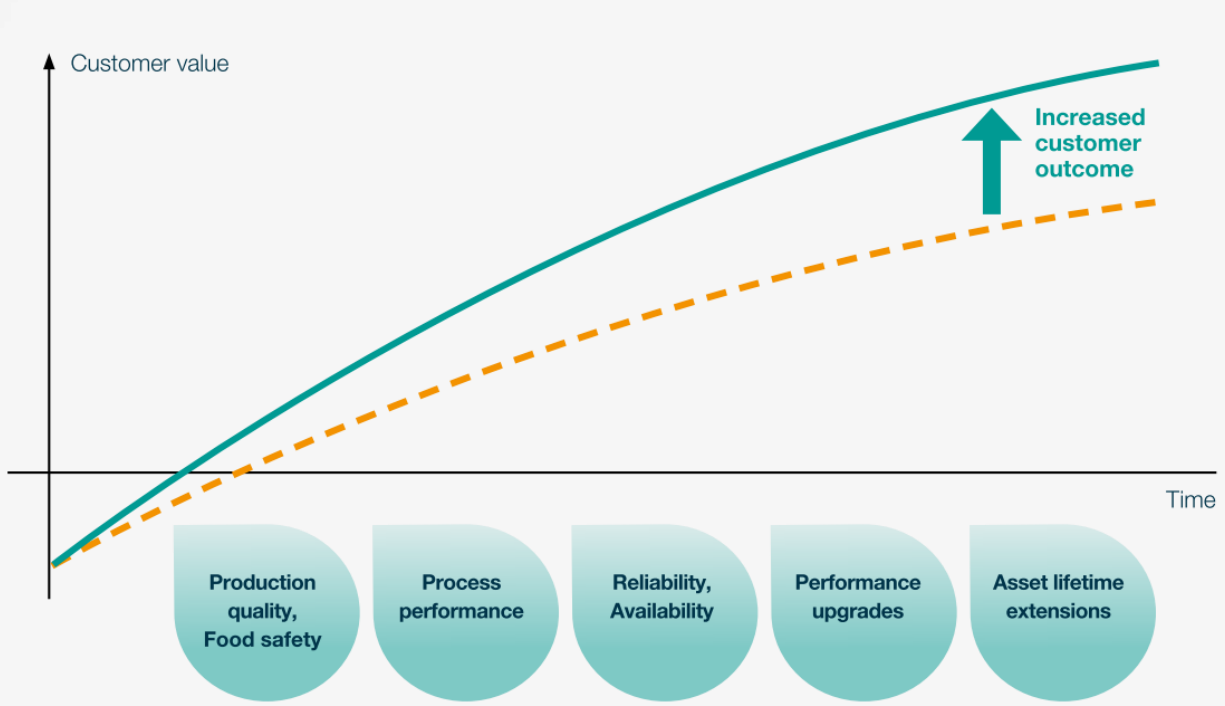
- Organized maintenance planning
- Detailed maintenance instructions
- Recording of failures and invested expenses
- History of all activities for Audits
- Optimization of Inventory System
- Plug and Play – all Data installed
- Lifetime update
- Reduction of faults
- Less unplanned downtime
- Increased plant availability



Lifecycle Services

Increased customer outcome over the entire lifetime

- **Automation Solutions** on Plant Level
- **Digital Services** related to Equipment, Production and Processes
- **myBühler Customer Portal** incl. Bühler Insights



Adding value with predictive analytics

Digital analytics to improve reliability and reduce down time.

- **Digital analytics** is the analysis of qualitative and quantitative data from your business and the competition to drive a continual improvement of the online experience that your customers and potential customers have which translates to your desired outcomes (both online and offline).”

- **Milling** can be highly complex and can suffer unplanned interruptions. Engineers have developed cloud based digital solutions called predictive analytics. In the future will use data and through artificial intelligence predict failures before they occur.

- It is a combination of a deep ***product know how with mathematics to predict*** machine failure that show up in easy to read display.

Data, Automation and Process Know-how

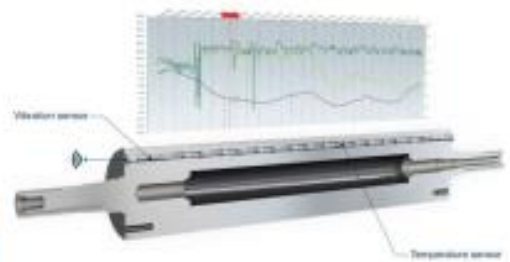
Machine, and energy monitoring

Online color & speck analysis

Real-time particle size measurement & control

Consistent product quality

Machine and production data measurement



Optimized process control

Using Data Analytics

- Heat recovery, compressed air production
- Roller mill, pellet press

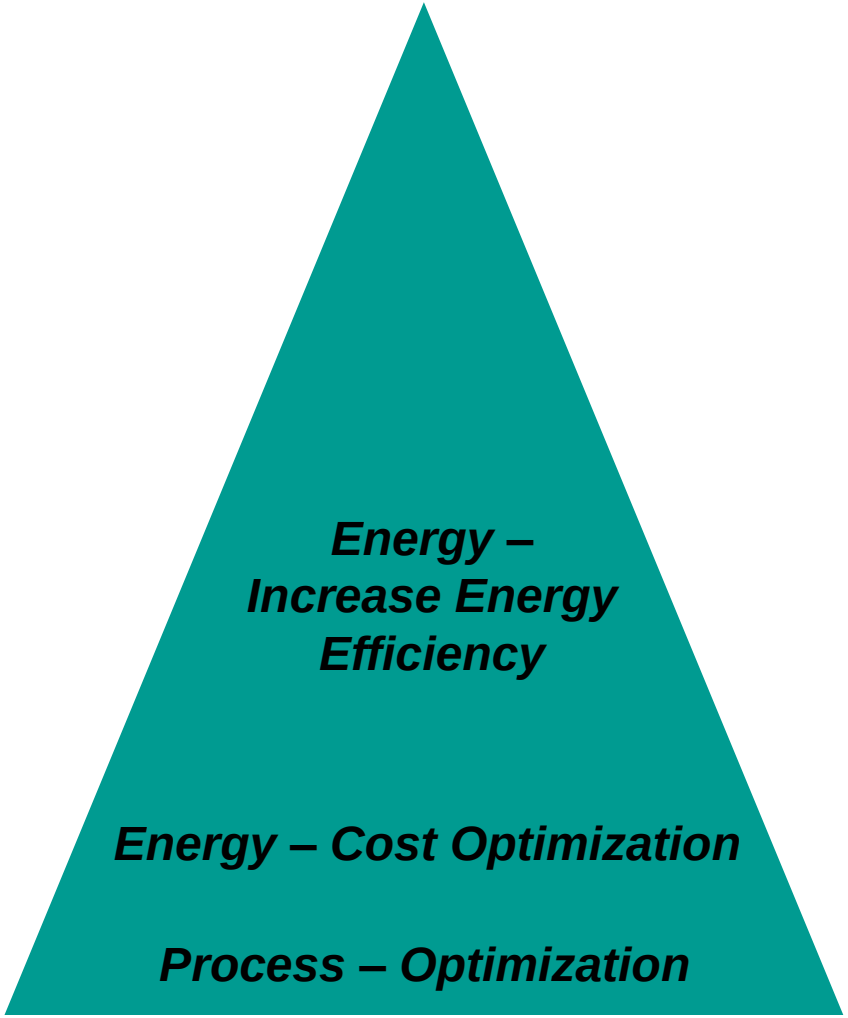
- Air leakage, heat leakage
- Optimization of cleaning air filter

- Machine optimizations

- Pneumatic and aspiration systems
- Electrical drive systems

- Load profile, reactive energy, etc.

- Adjustments, changes in the process, etc.



Error & Downtime analysis.
Get insights into your production and maintenance.

Benefits

- Less Downtime
- Higher transparency
- Fast identification of downtime

Step 1: Monitor and gather

Sensors monitor the production process and gather valuable data. Smart sensors enable the quality of the process to be measured. Measuring the quality of a process is essential to maximizing potential.

Step 2: Send data for analysis

The sensors send data to Bühler Insights for analysis and visualization. Bühler draws on its 150 years of process know-how to derive real value from the collected data, ensuring optimal efficiency.

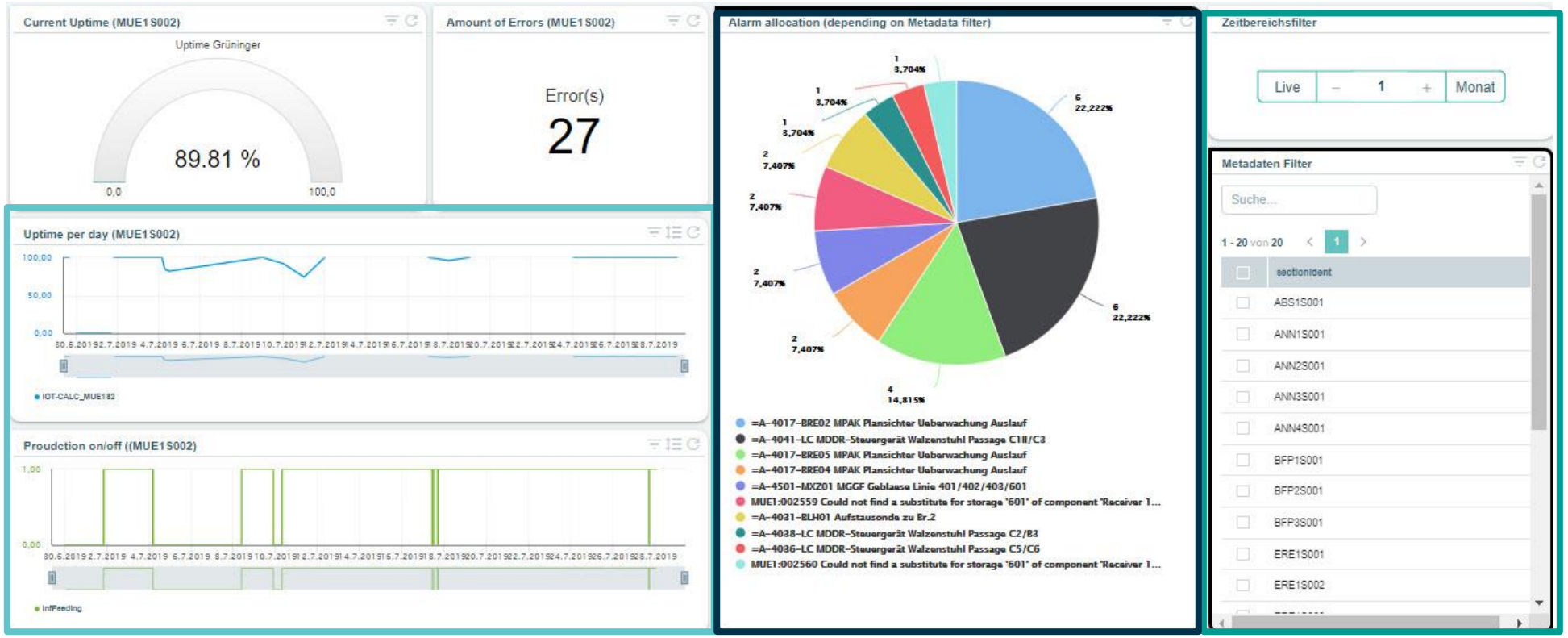
Step 3: Optimize processes

Depending on the digital service required, Bühler can optimize production processes in real time – it is like having your best, most experienced operator at your production line at all times.

Step 4: Customized information

The complete analysis is displayed on a dashboard. It can be viewed in the control room of a factory, a computer or a tablet. Users can customize the information they need based on their specific needs.

“Live view” of dashboard

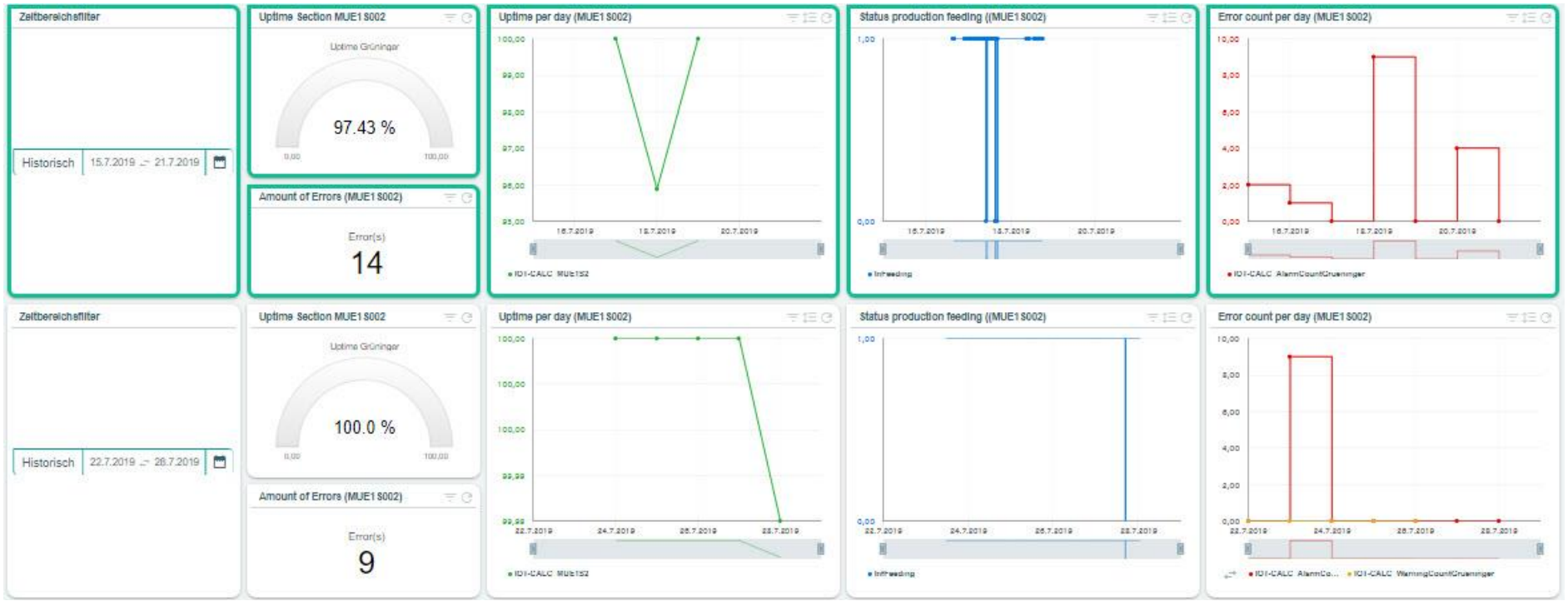


Filtering based on the sections and time periods

See which machines have the most errors

Identify plants, shifts, etc. with lowest uptime

Information on the dashboard
Reporting view to compare what is happening



Identify potential for improvement

Compare different sections/time ranges/plants

Bühler Insights Portal
PAEA

Key Features (1)

Customizable Dashboards

Configure the dashboard such that the most relevant information is always easy to find.

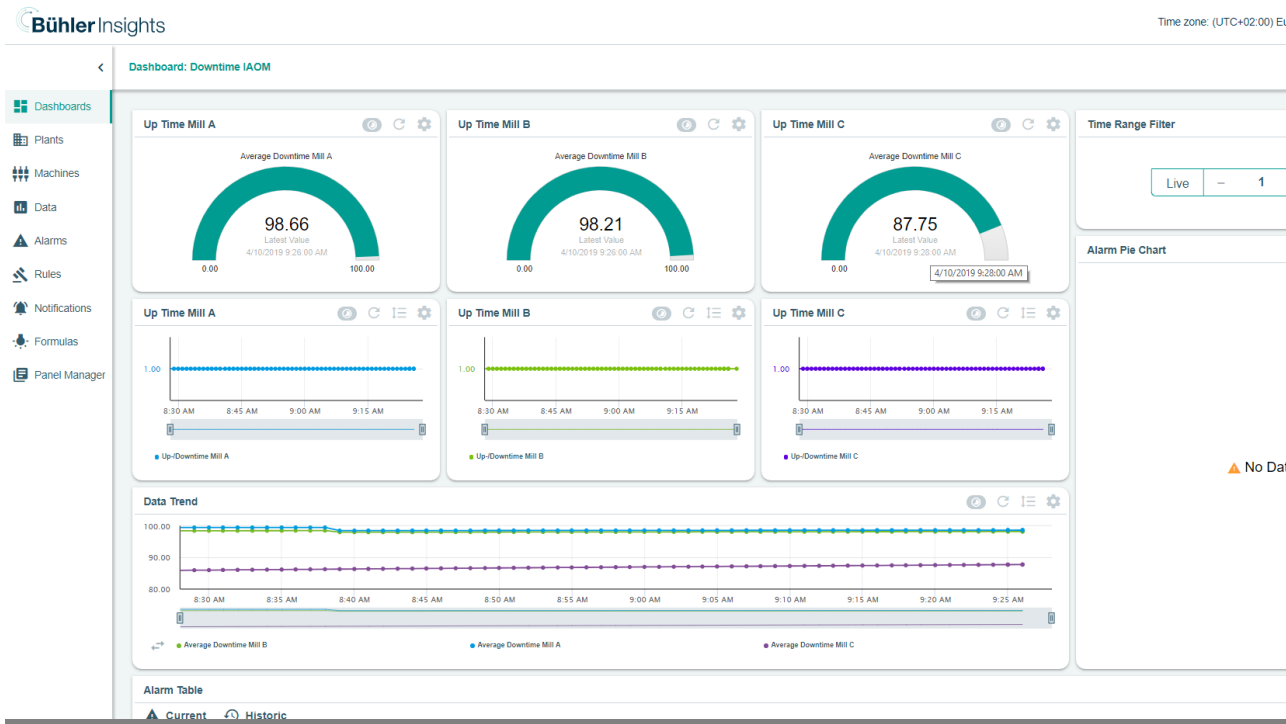
Configurable KPIs

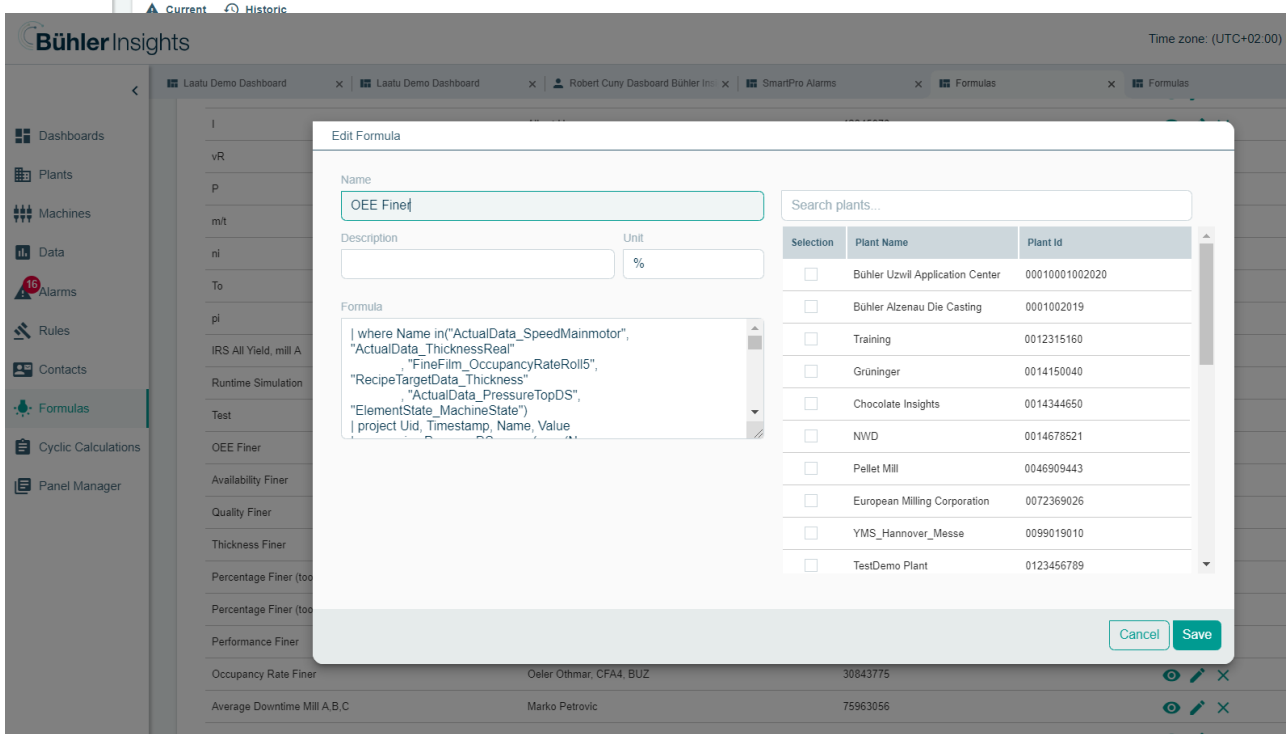
Use the Bühler Insights Calculation Engine to customized how KPIs are calculated.

Plant Comparison

Easily compare KPIs of different plants.

Accessible from all over the world





The role of the machine supplier to help customers

NOVAPUR

Lab Services

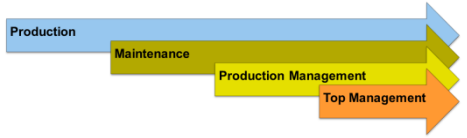
- Tests and analyses of products and materials
- Proven processes

Consulting

- Process optimization
- Increased productivity
- Greater energy efficiency

performanceBoost

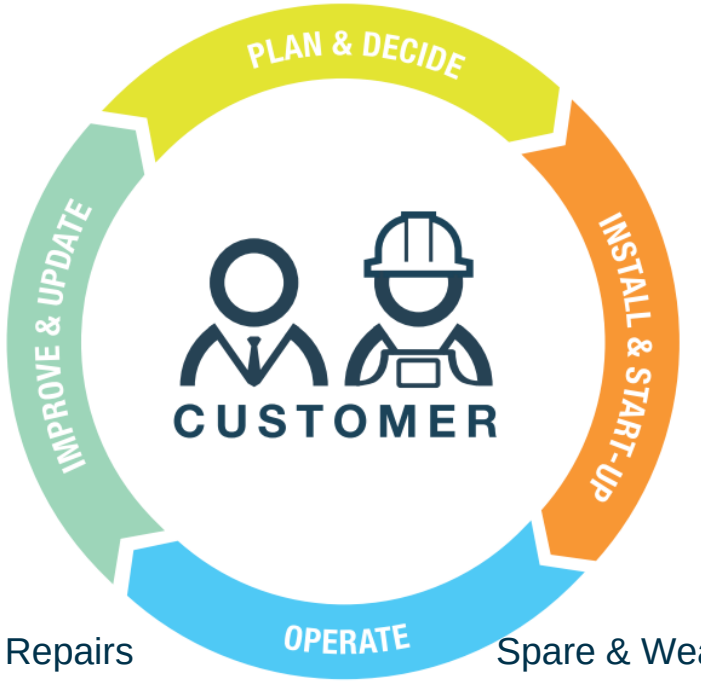
Energy Saving



Flow retarder

Retrofit

- Latest technology and efficiency standards
- Lower operating costs
- Reduced maintenance requirements



Training

- Education and professional training in training centers around the world

Revision

- Overhaul of Bühler and non-Bühler installations
- Latest production technology
- Extended lifecycle

Maintenance

- Minimum downtimes
- Highest reliability and availability
- Scheduled machine service

Sieve tensioning

rollDetect

Repairs

- Short response times
- Reduced downtimes
- 24/7 international helpline

Spare & Wear Parts

- Longer machine life cycle
- Higher operating safety
- Bühler guarantee

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Using Sensors to improve uptime

Working together with a higher level of information

Service:

- We could call it a virtual technologist (AI)
- Cloud located process knowledge to identify anomalities in the process through data analysis

Customer benefit:

- Permanent data monitoring of production relevant data
- Full process visability in the palm of your hand
- Optimized yield ratio and incrased throughput
- Energy reduction
- Optimization of raw material usage

Dashboard function

Overview page

Plant Alert	Plant interruption
TREND	Plant data (yield, energy, temperature, material,..)
Assistant notification	Anomaly machine, process data

Thinking about how you determine what parts to have in stock

What options do you have?
Using online resources to connect the data.

Spare parts service: Ordering is easy with high availability

Order spare parts conveniently online

PITSTOP maintenance schedule: All parts always on hand

There are different classes of parts to have on hand.

~ If this part will it shut this machine down completely.

~ Is this a wear part that is readily stocked by the machine supplier.

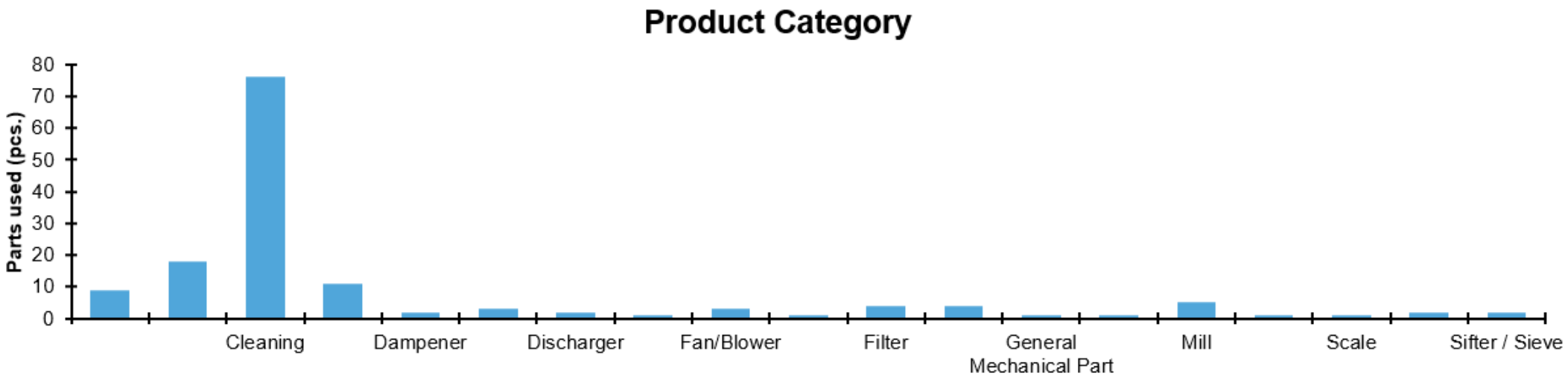
New ways to display parts - myParts

- Find the right parts for your machine or browse through the in this case a Buhler assortment of parts to find what you're looking for.
- Identify a part using the pictures or the 360° view of the parts.
- Check the details of a part including price, availability, volume and weight.
- Find out in which of your machines the part is used.
- Can't find what you are looking for?
  Use the online «Find-a-part Service» and our specialists will help you out!

Service Management System.

Maintenance costs control of used spare parts over the year.

Intake							
	Airlock						
		MPSH	MPSG Airlock Silo A / A-2276		Skift af komplet trieur kapper	1	pcs.
	Cleaning						
		MTVA 200	MTVA Grain Cleaner Sieve / =A-0014		Motor og gear udskiftet til ny. Madolie.	1	pcs.
		MTVA 200	MTVA Grain Cleaner Sieve / =A-0014	UXM -46076-301	Vibration motor til (MTVA) 0.12KW 400V 50Hz 1000/min IP66 F ATEX MVSI 10/100-S02 MGN	1	pcs.
	Conveying System						
		MNKA	MNKA Chain Conveyor Silo A / A-0053		Gap adjustment print EBD-1263	1	pcs.
	Elevator						
		nELEV	nELEV Elevator Silo A / A-0066 1504.M1	UXM -17003-031	Planetary gear with motor	1	pcs.
	Flow Balancer						
		MZAH	MZAH Automatic Flowbalancer Silo A 1231 / A-0432	UXM -17003-031	Planetary gear with motor	1	pcs.
		MZAH	MZAH Automatic Flowbalancer Silo A 1257 / A-0400	DFZH-50043-010	Beater 155x60x6:2 L 28	1	pcs.



Added value to target root cause and stop unplanned stoppages.

Use information to tailor insights on specific machines.

What if we use connectivity to change how we work together in new ways.

Are you ready for something new?
~ Interactive head sets to communicate directly Buhler service techs!

Connectivity to help service maintenance

Remote Guidance

React quickly to save time and costs

The power of support anywhere, anytime

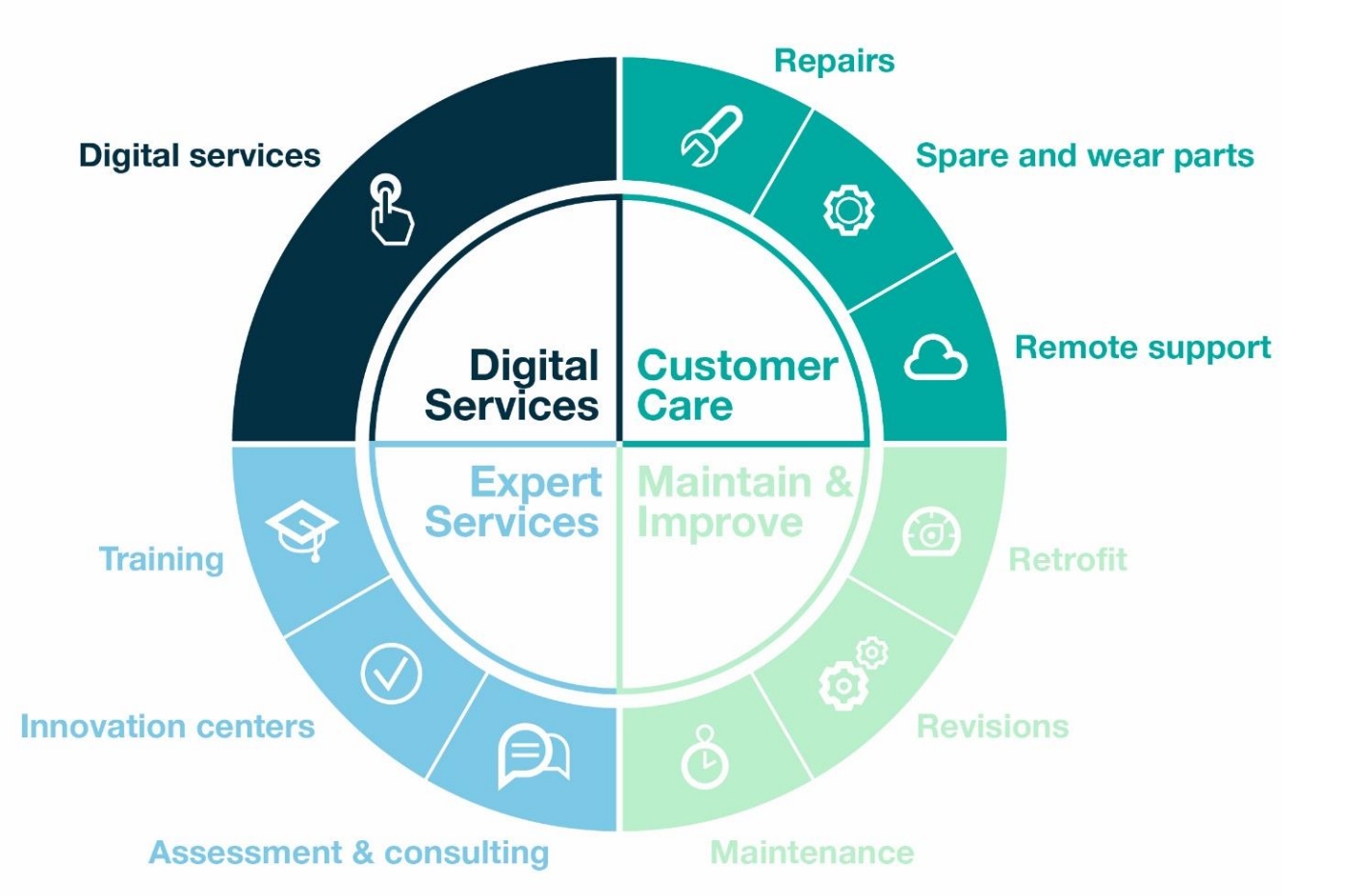
- Technical issues must be resolved as quickly as possible to avoid production loss.
- Technical staff can use smart glasses to be guided remotely by specialists.
- In a short amount of time without any travel costs, troubleshooting gets a new dimension.

Facts

- 1-2 hours, typical duration of issue analysis
- Supporting a wide variety of machines

Time to get going

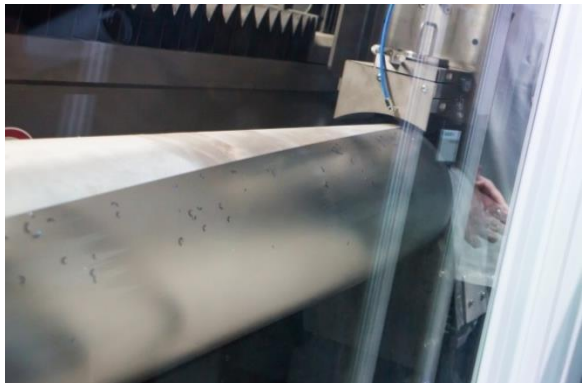
Keeping machines running from a supplier perspective



Digital applications in action

ecoReport for corrugated passages @ Customer

- economically optimal time for a roller revision
- based on measurements tecReports and customer-specific operation data

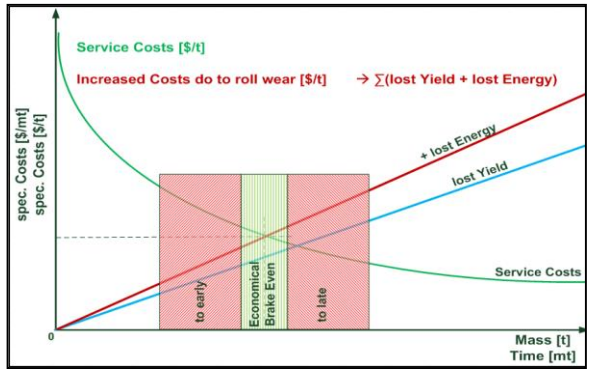


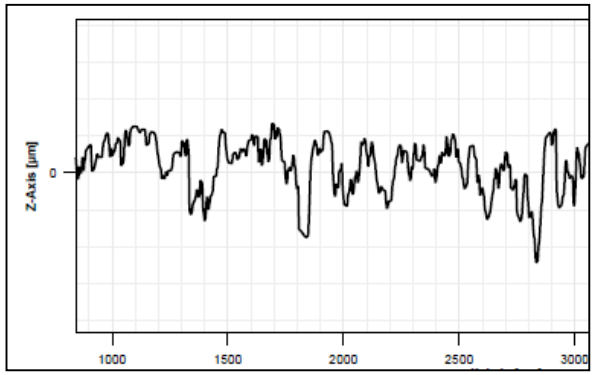
tecReport for corrugated rollers @ Customer

- graphic representation of target and actual corrugation profiles
- wear prediction & recommendation for next roller revision

rollReport for corrugated rollers @ Workshop

- quality report and service transparency after revision
- target value, actual value and tolerances of corrugation





tecReport for smooth rollers @ Customer

- recommended date for next roller revision
- measurement of roller roughnes Ra along the product flow

This is on the way to a higher level of functionality for Millers

Act now to be ready for the future.

- Technology to help is changing quickly
- Are we willing to use what is available
- Using data to support maintenance

Engineering Customer Success