Maintenance and Operational Excellence in Flour Milling

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Buhler Indonesia

BÜHLER

Bühler Services

>700
field service engineers on six continents are ready to help with their expertise.

500
customers are visited by Bühler service technicians every day.

32,000
different parts on stock in nine locations.

17,000
machines continuously enhanced by preventive maintenance agreements.

Our unique global service network: in the region, for the region

Main Driver in Flour Milling Industry

Higher revenue and lower cost with the same amount of raw material

Logistic

- Distance from port
- Distance to the market
- Efficient discharge capacity and storage
- Suitable scale

Raw Material

- Understanding market direction and origins
- Understanding of the variables impacting landed grain price.
- Build relationship with a few reliable suppliers.

Operational / Process Efficiency

- Efficient Mill design
- Energy efficiency
- Technical milling know-how
- Yield optimization
- Implementation of maintenance excellence

Product Differentiation

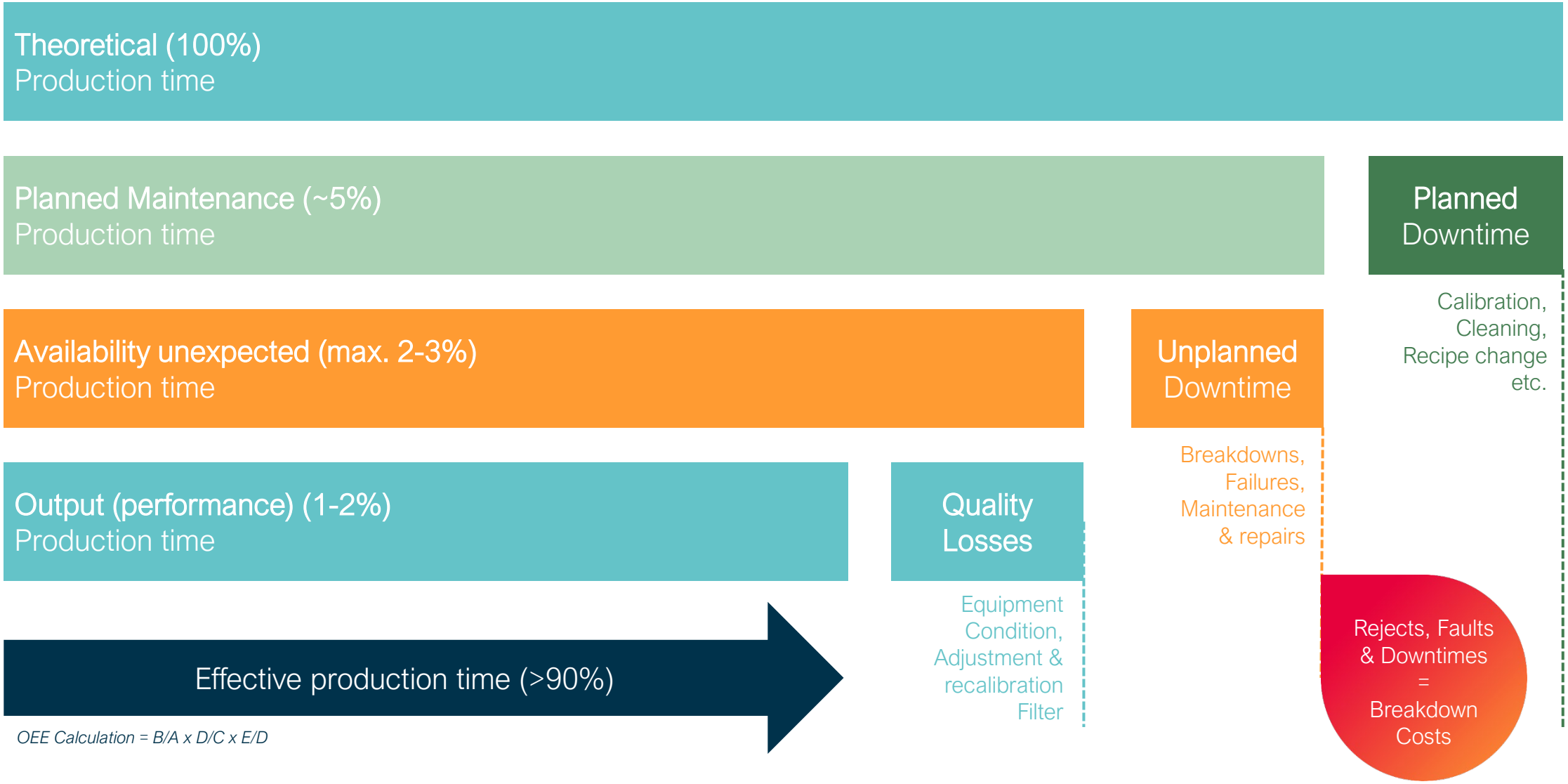
- Adapt to consumer trends
- Enter special / premium flour market
- Food safety policies and procedures
- Procedures to ensure top quality

01

Maintenance Excellence

Overall Equipment Effectiveness

Theoretical vs Effective Production Time



OEE Calculation = B/A x D/C x E/D

Use Case

Average Flour Mill

Flour Mill 500 t/d		Throughput t/d	Income USD/d	Income USD/h
Flour	78%	390	~160’000 USD	~6’700 USD
Bran	22%	110	~45’000 USD	~1’900 USD
Total	**100%**	**500**	**~205’000 USD**	**~8’600 USD**

One hour of unscheduled downtime due to poor maintenance takes over **8’600 USD** of your income!

Example calculation based on :

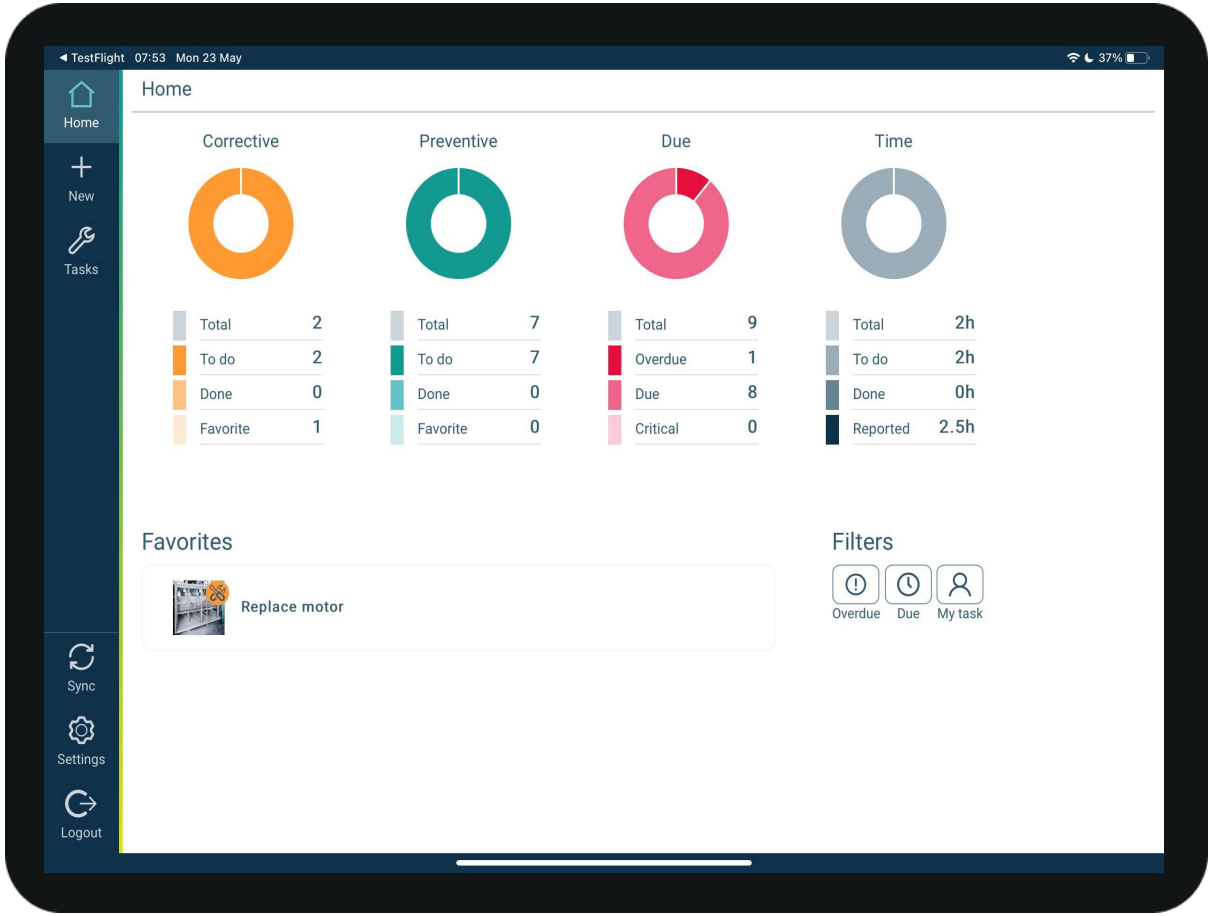
- Flour Mill 500t/24h
- Yield in %, Flour 78 - Bran 22
- Flour sales price ~350CHF/t * Mühle + Mischfutter 09/18
- Operation 240 Working days
- No fix costs and other expenses included

x

Bühler ProPlant

Your Asset Management System

- **Plan & Prepare:** Organize your maintenance tasks with detailed instructions and clear roles and responsibilities.
- **Transparency:** History of all activities for audits and certifications, e.g. reports on maintenance work, consumed parts, recorded working times and unplanned failures and tasks.
- **Connectivity:** Condition-based running hours with Mercury MES & WinCos r2.



ProPlant

CIRCULAR ECONOMY

Energy Efficiency

Your Asset Management System

Plug & Play

All equipment, job cards, spare part lists, documents prepared and ready to use!

Condition based maintenance

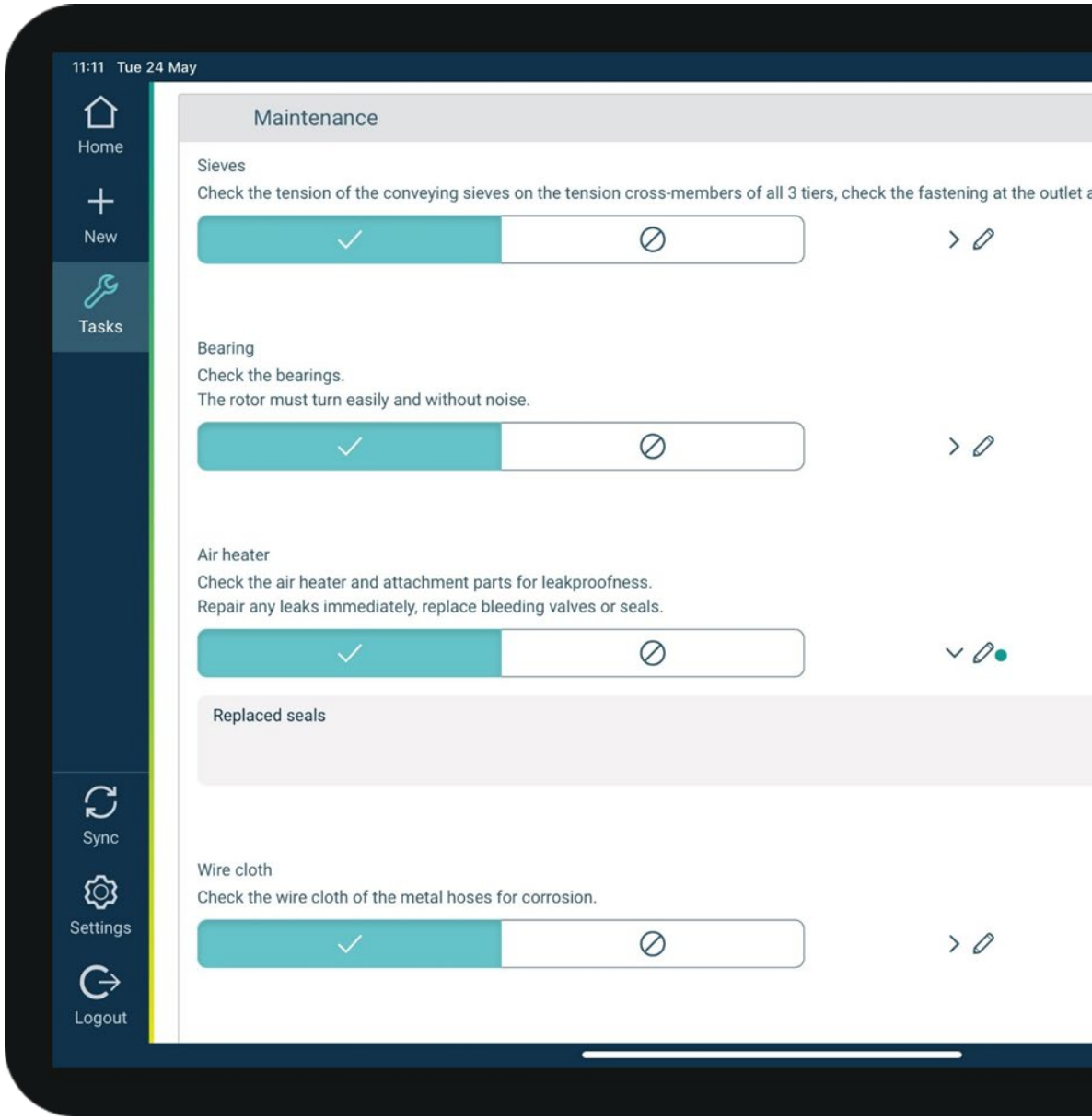
Maintain your equipment on running hour intervals instead of calendar.

Multiple plant installation

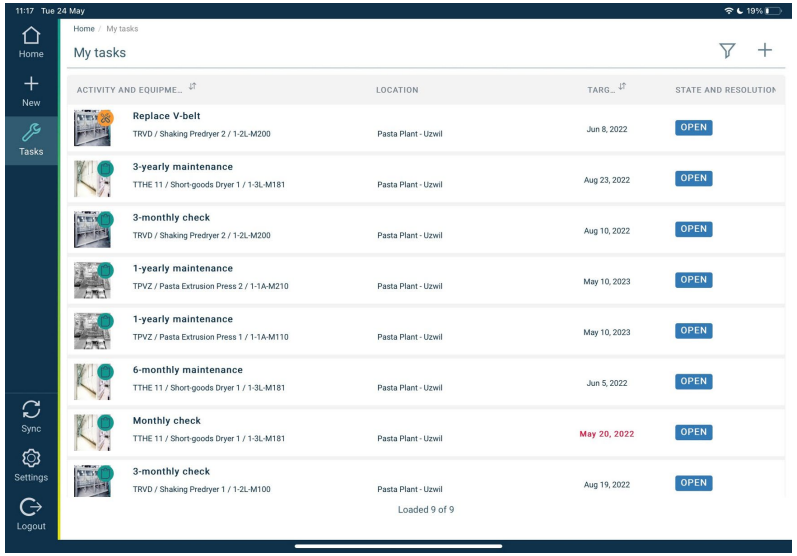
Benefit and share learnings in your maintenance routine or check spare part stock with other plants in your company.

Data Analytics

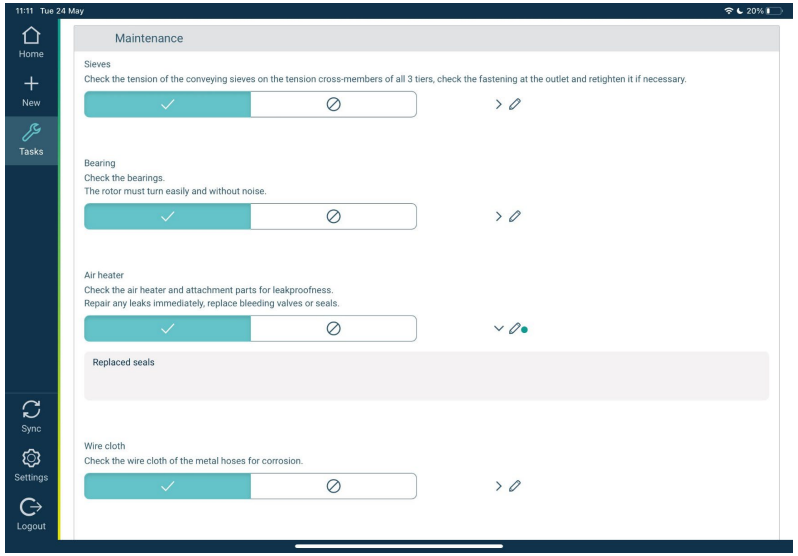
Get insights over your maintenance performance on Bühler Insights.



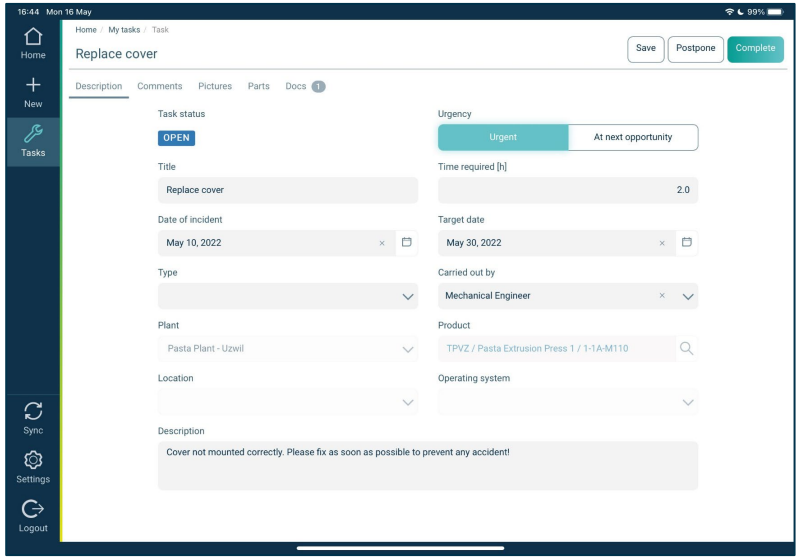
Maintenance Overview



Preventive Maintenance System



Corrective Maintenance System



- Installation Data Management System
- Stock Management System
- Document Management System

02

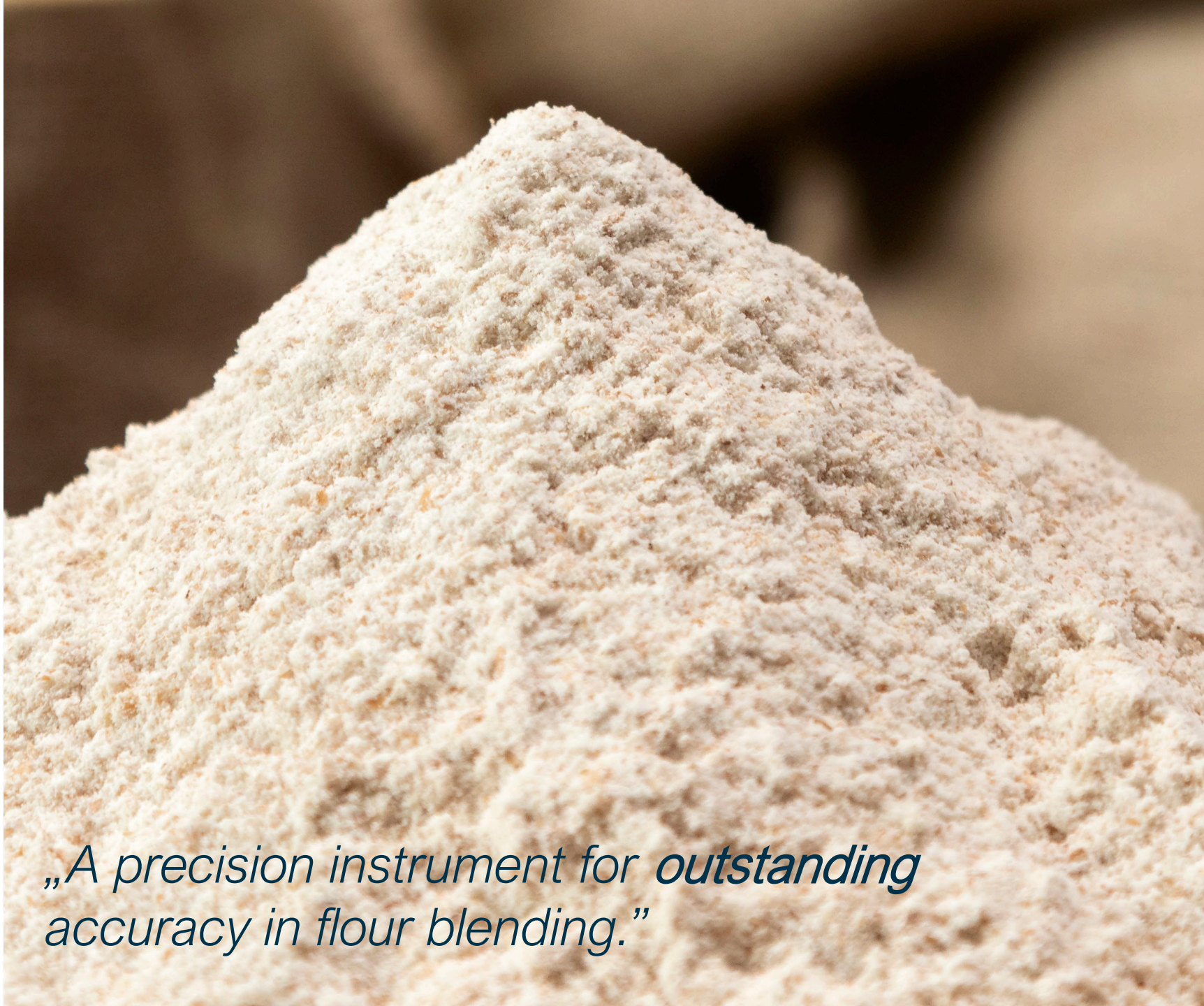
Operational Excellence

Outstanding precision with Ash Loop

Ash Loop

is an automatic process control solution for optimal adjustment in flour blending.

Based on real-time **mineral content analysis**, the ash loop automatically adjusts blending process to **maximize the yield of your desired flour while ensuring the right product quality**. Data documentation and traceability further **reduce lab test efforts**.



Ash Loop

Comparison of manual process with digital process

Manual Process Min. 30 min.

Before close control ash loop implementation

1 Sample collection » 2 Sample to the Lab » 3 Identify sample » 4 Analysis » 5 Register quality data » 6 Attach quality data to the sample » 7 Notify operations team » 8 Operation team acts over the plant

Digital Process 3 sec.

After implementing closed-loop ash control

24/7 quality control through autonomous adjustment based on mineral content

1 Product Inspection

Mineral content measurement in real-time

2 Product Analysis

Automatically calibrate and analyze product characteristics in real time

3 Quality Control

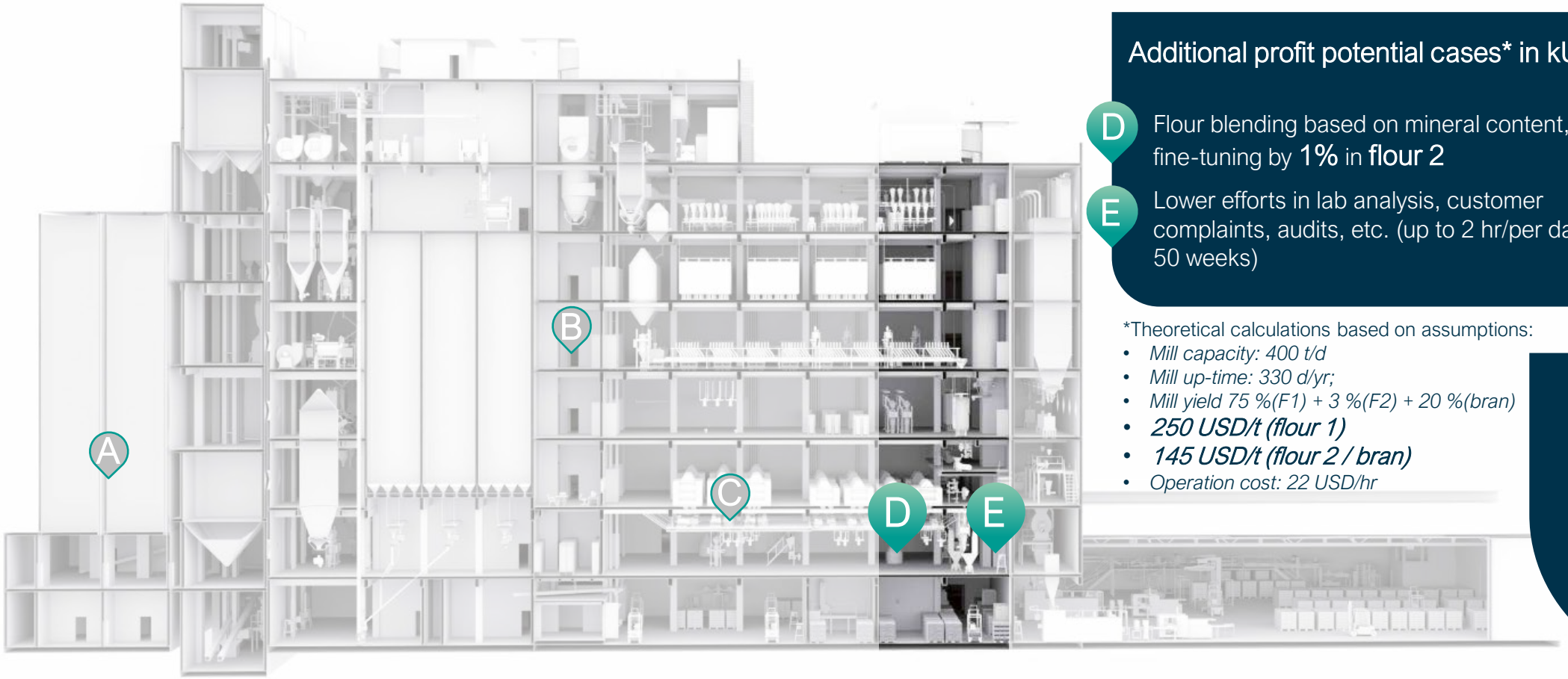
Smart algorithms to compare results to targets

4 Automatic adjustment

Based on results, control system automatically adjusts mixing process to reach quality target

Ash Loop

Maximize profit and reduce human intervention during production



Additional profit potential cases* in kUSD / year

D	Flour blending based on mineral content, fine-tuning by **1%** in **flour 2**	145
E	Lower efforts in lab analysis, customer complaints, audits, etc. (up to 2 hr/per day, 50 weeks)	9

*Theoretical calculations based on assumptions:

- *Mill capacity: 400 t/d*
- *Mill up-time: 330 d/yr;*
- *Mill yield 75 %(F1) + 3 %(F2) + 20 %(bran)*
- ***250 USD/t (flour 1)***
- ***145 USD/t (flour 2 / bran)***
- *Operation cost: 22 USD/hr*

Additional profit: 154k USD

Wheat → Receiving, Pre-cleaning, Storage → Cleaning → Grinding, Purifying & Sifting → Weighing, Dosing, Mixing & Blending → Bagging and Loadout

Ash Loop

Other sensor services possible

Sensor information
Online ash content measurement unit

MYRG Channel 1	Active
Recipe A.2	OnlyMYRG.000010 | 1
Moisture	13.84
Protein	14.61
Ash	1.598
Starch damage	24.6
Water absorption	58.0

ATEX certified

MYRG sensor basic information

Height, width, depth: 80, 170, 100mm

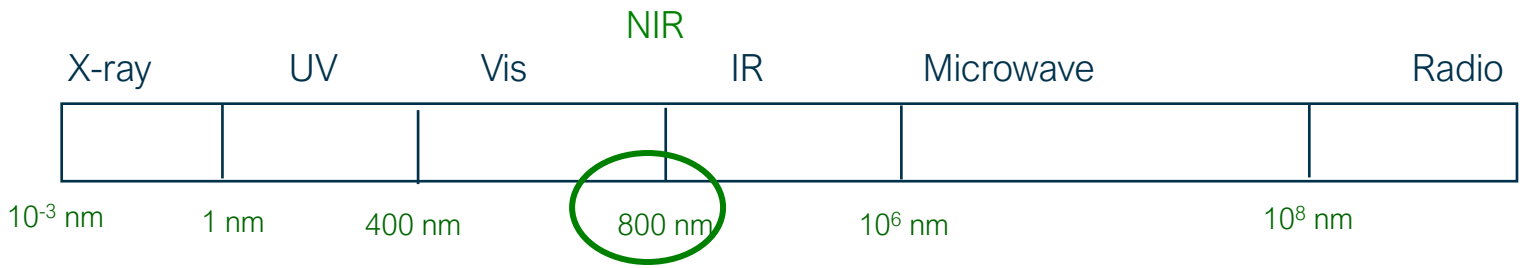
Surrounding conditions: 10-50°C

Ash measurement range: 0.4-2.5%

Technology: Diode Array Detector (DAD)

Working principle

- A multi-NIR sensor, fitted to gravity spouting and retarding sections, with real-time measurement of mineral content for passing product.
- NIR spectrometer measures how much light is absorbed at various wavelengths in the NIR region.
- Due to the ash content increase, it helps to detect specks in the production.



Sensor information

Various properties pre-calibrated, like:
moisture, protein, gluten,
ash,
starch damage, water absorption, etc

Host system

Bühler Insights
IoT Cloud

plant control
Wincos/Mercury or third party

PLC:
S7, AB-CL, GE, SN

host interface

option:
digital I/Os

Process integration

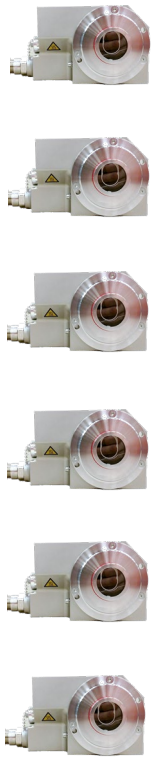
Connectivity

- **Plant control.** Various PLC types and other possibilities for automation integration.
- **Bühler Insights.** IoT connectivity pave mill's future.

Accuracy

- **NIR pre-calibrations.** Mature NIR database provides measurement accuracy close to wet chemistry methods.

NIR probe



Application


raw grains


clean grains


semolina

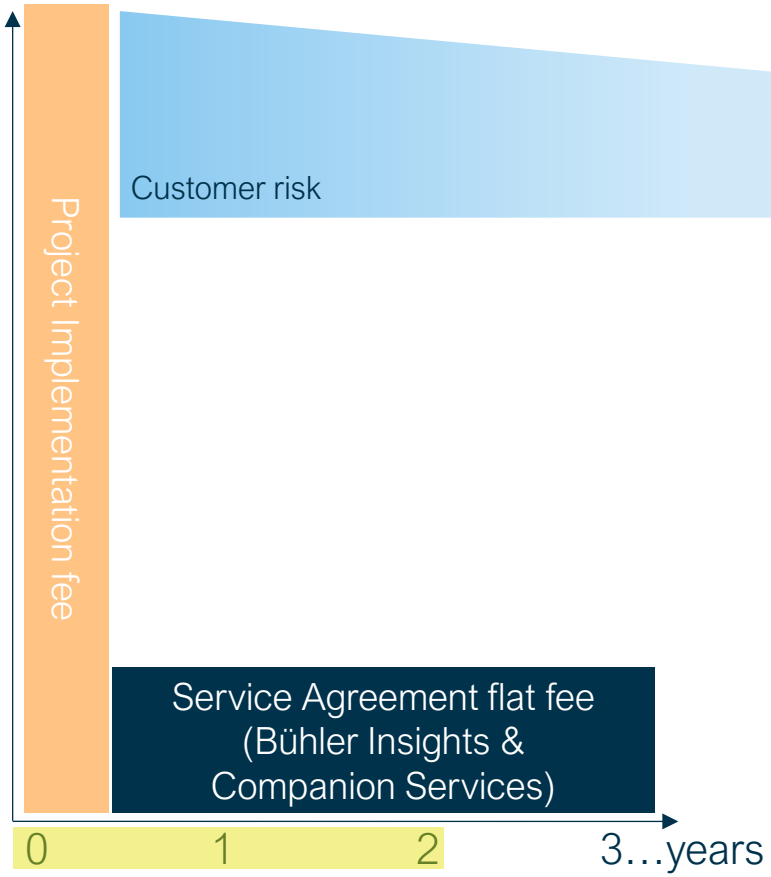

flour


bran

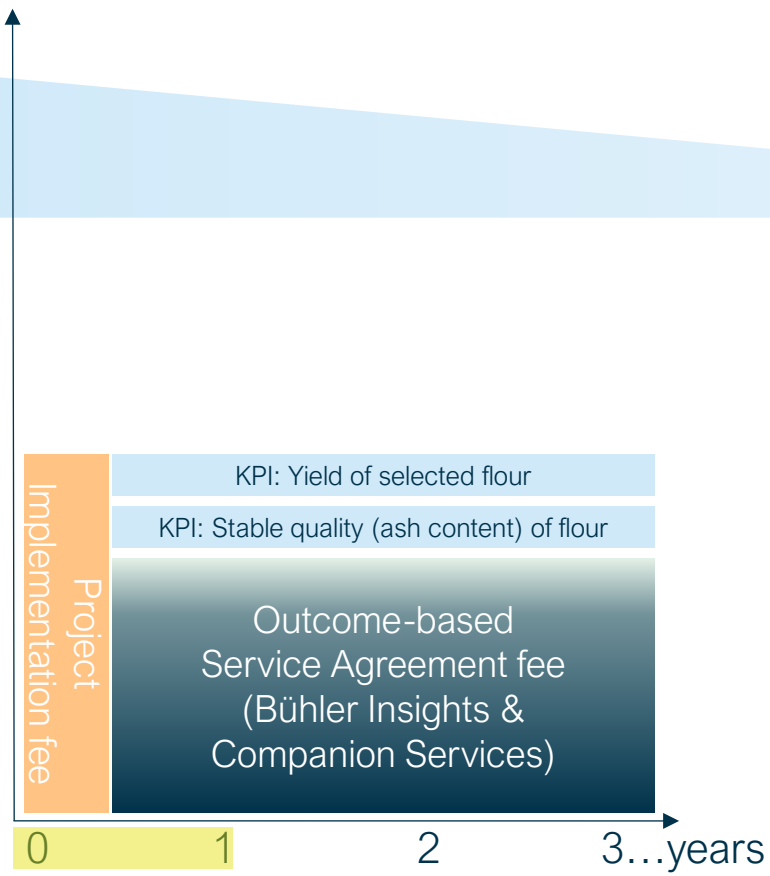
Commercial model options

Project solution and service support ensure Ash Loop best performance 24/7

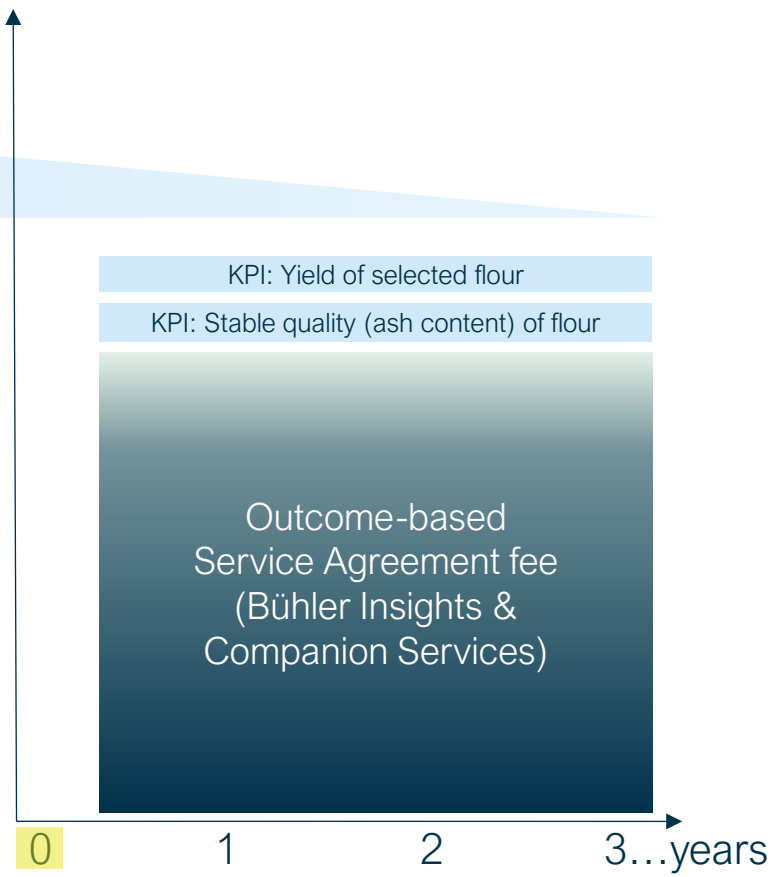
Traditional pricing



50% Outcome-based pricing



100% Outcome-based pricing



Return on investment

03

Performance Assessment Workshop with Tailored Solution

Performance Assessment Workshop (PAW)

We listen, work and act together with you for the best plant performance

Individualized goals
Based on your targets and pain points, our experienced experts will conduct detailed analysis for your mill.

Structured assessment
All production relevant factors are analysed to show any potential for improvement.

Actionable Concept
Get a comprehensive concept for implementing the identified improvements. Based on quantified impacts and estimated costs.

Proposal for Partnership
Let's find together a fitting long-term plan on how we can actualize all the worthwhile improvements.

From holistic assessment
to direct action

Pre-assessment
Interviews / Questionnaire /
Data from digital services

Reporting and presentation
Summarizing findings and recommendations for improvement

Actions and implementation
Customer decides about scope of improvement

Scope of assessment | Reporting | Implementation

On-site assessment and analysis*
Assessment of the plant status by Bühler experts an technologists.

Concept
Bundled measures with time-line and commercial options where applicable

*The duration depends on the scope (approx. 5 days on-site for a 500t mill)

The PAW takes a structured and holistic approach, from detailed pre-assessment up until action and implementation


Let’s work together to unlock
your full potential!
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INNOVATIONS FOR A BETTER WORLD