14 NENT SENERATION



Hasan Duman Area Sales Executive, Alapala





🖉 Alapala

2

The journey through Industry 5.0

1800's

Industry 1.0

Industry 2.0

Mechanisation (Water and Steam Power)

1900's

2000's

2011

2100's

Industry 3.0

Automation (Computerizing)

Serial Production (Electric Power)

Industry 4.0 Digitalisation (Internet Technologies) and Artificial Intelligence

Industry 5.0 Unmanned Technologies









I4: The Milling Technology of Next Generations

Alapala presents I4 – Next Generation Milling Systems, which provides the ability for machines to operate self-dependent and error proof without any human interaction.

We developed the world's next generation milling technology which provides:

Consistent Quality High Reliability Process Optimization Energy Efficiency Need for Less or No Human Intervention

all together in the grain milling process.





Technology

I4 Next Generation Milling

1. IIoT (Industrial Internet of Things)

enables machines, systems, and even plants to connect and communicate with each other

2. Sensorization

Higher reliability of machines and closer control on process parameters

3. Algorithms

Autonomous Operation with a 'Reactive to Adaptive' Automation System

I4 NEXT GENERATION MILLING SYSTEMS





I4 Next Generation Milling

Automation System

Implementing the **Jidoka** (intelligent automation) approach into flour milling, we have developed a semi- autonomous system based on function blocks and sequential processes.

The automation system itself is self-decision, which is able to:

Separate human from machine work Machines detect/prevent abnormalities "Stop the Line" authority in Operation

Reactive to Adaptive

I4 NEXT GENERATION MILLING SYSTEMS



Automation System

Reactive to Adaptive

For this approach, the plant automation system is programmed by using defined **Abnormality Cause Effect Classification** according to Severity and Effect degrees (case-reaction) by using many years experience and know-how of Alapala.

🖉 Alapala

It has special algorithms to detect and react critical operating conditions, such as:

I4 NEXT GENERATION MILLING SYSTEMS



touch is necessary



Principles



We have used IIOT TECHNOLOGY including sensors that are our eyes on process monitoring and reacting for machines /equipments paramaters, process parameters and product parameters; and achieved to have **I4 Milling System** which operates without human touch.



Machine Parameters -

I4 Next Generation Milling

High Temperature Detection for Rolls

Effect: Safety risk, wearing roll surface, unbalanced granulation, extra Energy consumption, ash value

Actions: Check the roll gap alignment, product feeding flow rate, scraper position

High Vibration Detection for Rolls

Effect: Safety risk, wearing roll surface , damaging machine parts including electronics

Actions: Check the roll gap alignment, product feeding flow rate and distribution, running hours and greasing period (MMS)



Temperature and Vibration Monitoring Flow Monitoring (sensors at inlet-outlet) Half Automatic Roll Gap Adjustment System



Process Parameters

In process we used special sensors to ensure the high reliability and consistent performance of the system.

Rotation, outlet sleeves position, and hanging position control sensors

in plansifters

Particle size distribution measurement

with flow meters

Clogging sensors

(Impact detachers, injectors, inlet/outlet of roller mills and plansifters, etc.)



Product Parameters

- 1. Recipe Management (Flow balancers)
- Raw/Finished Product Quality
 (Protein, Moisture, Ash, Gluten, etc) measured by online NIR devices at:
 - . Reception
 - . In Process
 - . Finished Product
- 3. Yield Control

Flour Ash Value out of specifications (NIR)

<u>Effect:</u> Poor quality of flour and customer claim <u>Actions:</u> Check humidity ,roll gap, roll temperature, sieves





I4 Next Generation Milling

I4 Next Generation Milling

Digital Services

Alapala Plant Management System (APS) includes:

MIS (Management Information System) with SCADA

Receipt and Storage Management Recipe Management Yield Monitoring Temperature and Vibration Monitoring Energy Monitoring OEE Traceability

MMS (Maintenance Management System)

Planned/Unplanned maintenance, instructions, spare parts

Downtime Monitoring

Remote Monitoring





What is waiting for us in the near future?

In the next step, we will use the combination of sensors, controllers, and actuators in our machines to develop a 'fully automated milling plant', with the abilities of:

- . Self Management
- . Process Optimization
- . Standardization





A Miller Can Not Be Replaced!

To conclude, it is always important for us to know what millers require to automate your milling facilities. For this reason, we humbly request you to advice us of your requirements. This will enable us to design, engineer and provide a system tailor-made to your specific needs.



Thank You _



2

🖉 Alapala

Further Questions: marketing@alapala.com

alapala.com