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MANCHESTER 1878

‘Intelligent Milling Technologies ’

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History of Industrial Development

18th century

Industry 1.0
Mechanisation in industry
(water and steam powered machines)

19th century

Industry 2.0
Mass production era requiring electrical energy
(Ford automotive production)

20th century

Industry 3.0
Automation and integration of IT in industry

2011 - Today

Industry 4.0
Digital conversion in industrial processes with advanced algorithms and web based communication platforms

Big Data, IoT, Virtual Reality, Cyber Security, 3D Printing, Artificial Intelligence etc.

Industry 4.0 have already brought ..

Big Data

- Customer and Consumer insight
  (interests, habits, preferences, purchasing behaviours etc.)
- Industrial data reprository
  (collected on IoT, sensors, ERP systems, databases to improve our systems)

IoT (Internet of Things)

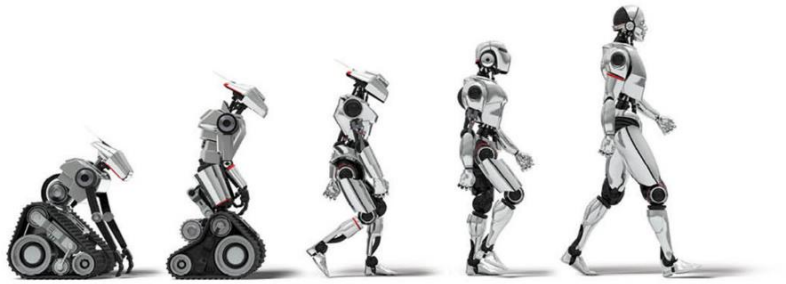
- Home Appliances (Smart Devices, safety tools etc.)
- Agriculture applications with controlled irrigation systems
- IIoT - industrial device's ability for long distance connection and error diagnosis

Artificial Intelligence

Software trying to mimic, and eventually supersede human behaviour and intelligence.

- 'Examation' Artificial Intelligence Software
- Robot production managers

'Robots are in evolution in order to take place in more autonomys and flexible duties.'



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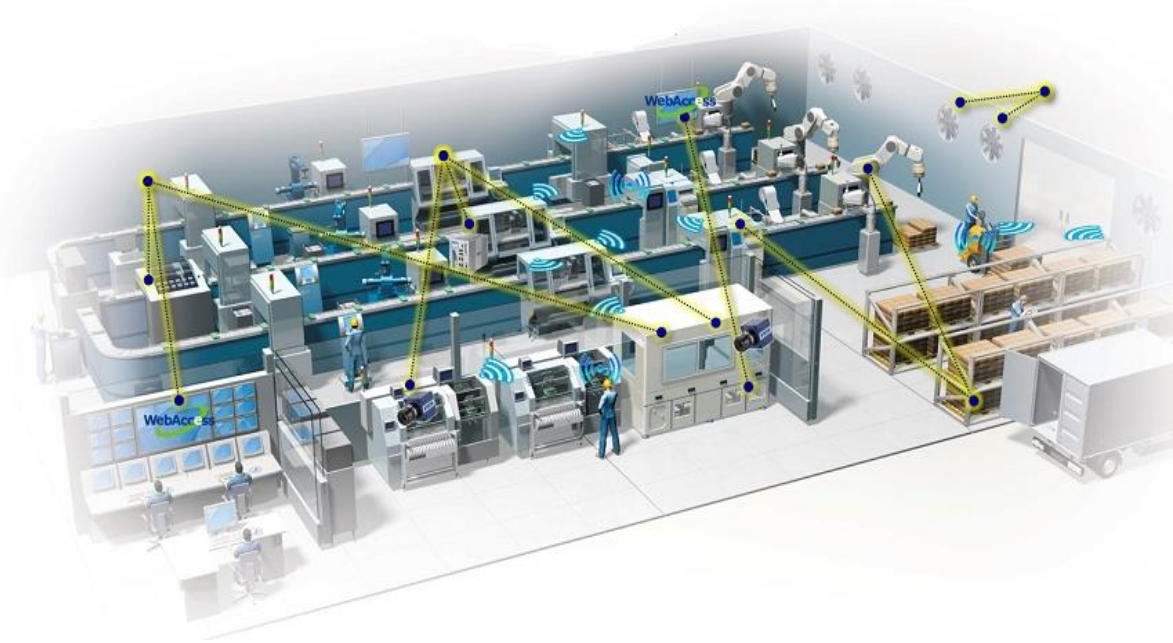
Lights Out Factories

A fully automated factory needs little or no human intervention.

Shortly, the industry of near future are expected to be an environment that:

- Machine communication on internet
- Digital data collection
- Highly sensitive and precise automation systems
- Industrial robots
- Fully Automated Production Lines



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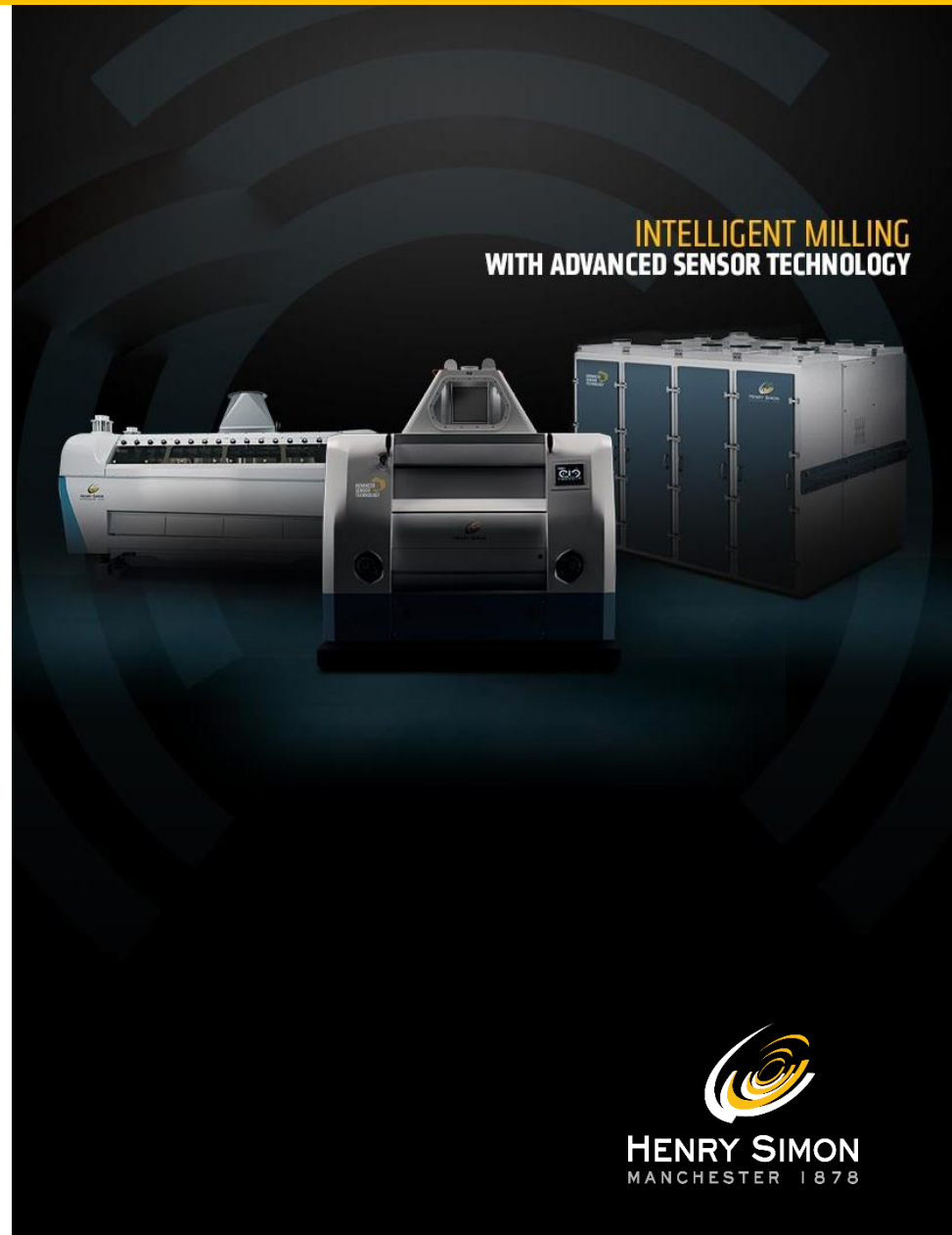
Henry Simon Intelligent Milling System

Henry Simon has ‘Intelligent Milling’ automation concept with the integration of :

- IoT - internet of things
- Big Data and Cloud platform
- Artificial Intelligence
- Machine learning technologies into milling processes.



Development Approach for Intelligent Milling

Phase 1

High Reliability

ADVANCED SENSOR TECHNOLOGY

Monitoring the operational status of equipment and devices

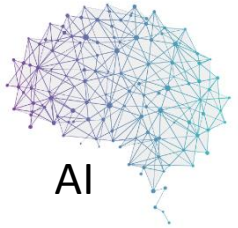
Phase 2

Autonomous Mill Operation

The combination of advanced process control equipment with sensors

Phase 3

Mill Automation and AI

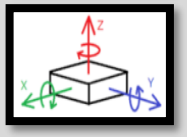


Optimal operation of flour mill plant by AI

HENRY SIMON MANCHESTER 1867

Phase I - Advanced Sensor Technology ™

ADVANCED SENSOR TECHNOLOGY



- Human Detection Sensor
- Ambient Sensor
- Vibration Sensor (PMD)
- Timing Belt Temperature Sensor
- Motor Load Sensor
- Stock Level Sensor
- Feed Roll Rotation Sensor
- Main Roll Rotation Sensor
- Main Roll Position Sensor
- Main Roll Temperature Sensor
- Air Pressure Sensor
- Hopper Clog Sensor

- Human Detection Sensor
- Ambient Sensor
- Vibration Sensor (PMD)
- Belt Temperature Sensor
- Motor Load Sensor
- Slip Sensor

- Human Detection Sensor
- Ambient Sensor
- Vibration Sensor (PMD)
- Motor Load Sensor
- Digital Manometer

‘We equipped our machines with Advanced Sensor Technology offering a higher level in reliability, operational safety and process optimization.’

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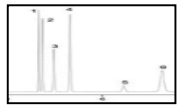
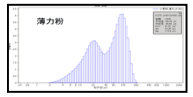
Phase II - Autonomous Mill Operation

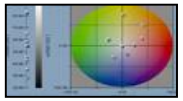
NIR Ingredient analyzer



Granularity and MoistureSensors

Color chromaticity meter



Speck Monitoring System


Flow meter


Digitizing of the process data :

Machine operating information
by sensors

Product specifications
by sampling and further analysis devices

Real-Time
Process Monitoring System



Wireless Networking System

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Phase III - Mill Automation and AI

Henry Simon Intelligent Milling System' will be designed with special process algorithms that allows software applications to become more accurate in predicting outcomes without being explicitly programmed.

The basic premise of the system is to ;

- Build algorithms that can receive input data and use statistical analysis to predict an output while updating outputs as new data becomes available.

- With data collected and statistical analysis from the system it is possible to formulate the algorithms to have ''**a thinking milling system** ''.

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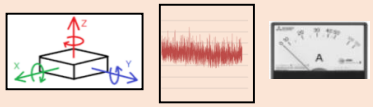
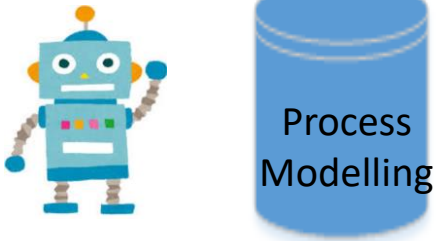
Phase III - Mill Automation and AI

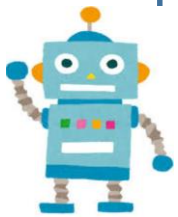
Digitization of the machine operating conditions (load current, rotational speed, vibration, temperature).



Digitizing of the environmental conditions (temperature, humidity, atmospheric pressure, sound, vibration, brightness).

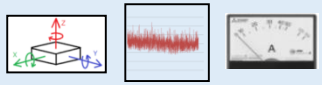
AI learns the operating data and the environmental data and models it.





Current conditions

Operating conditions



Environmental conditions

AI detects any slight change in operating conditions, and advises for the maintenance point such as adjustment, lubrication, part exchange etc.

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Phase III - Mill Automation and AI

AI operates flour mill plant ideally !!

① Order the product
(the raw material and ingredients).

② AI simulates the processes

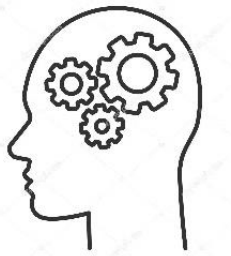
Plan A： Shortest processing time,
large energy consumption

Plan B：Shortest energy consumption,
long processing time

Plan C：Excellent product quality,
middle processing time,
middle energy consumption

③ Choose the most
suitable plan and order start.

HS Mill Plant AI



④ AI operates
flour mill plant.

Flour mill plant

- Better efficiency with optimized working conditions
- Product standardisation with pre-defined recipes, formulas and production parameters

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Flow Monitoring System

The In-Line Flow Meter is a device that is used to recognize any change of material and machine conditions in milling processes.

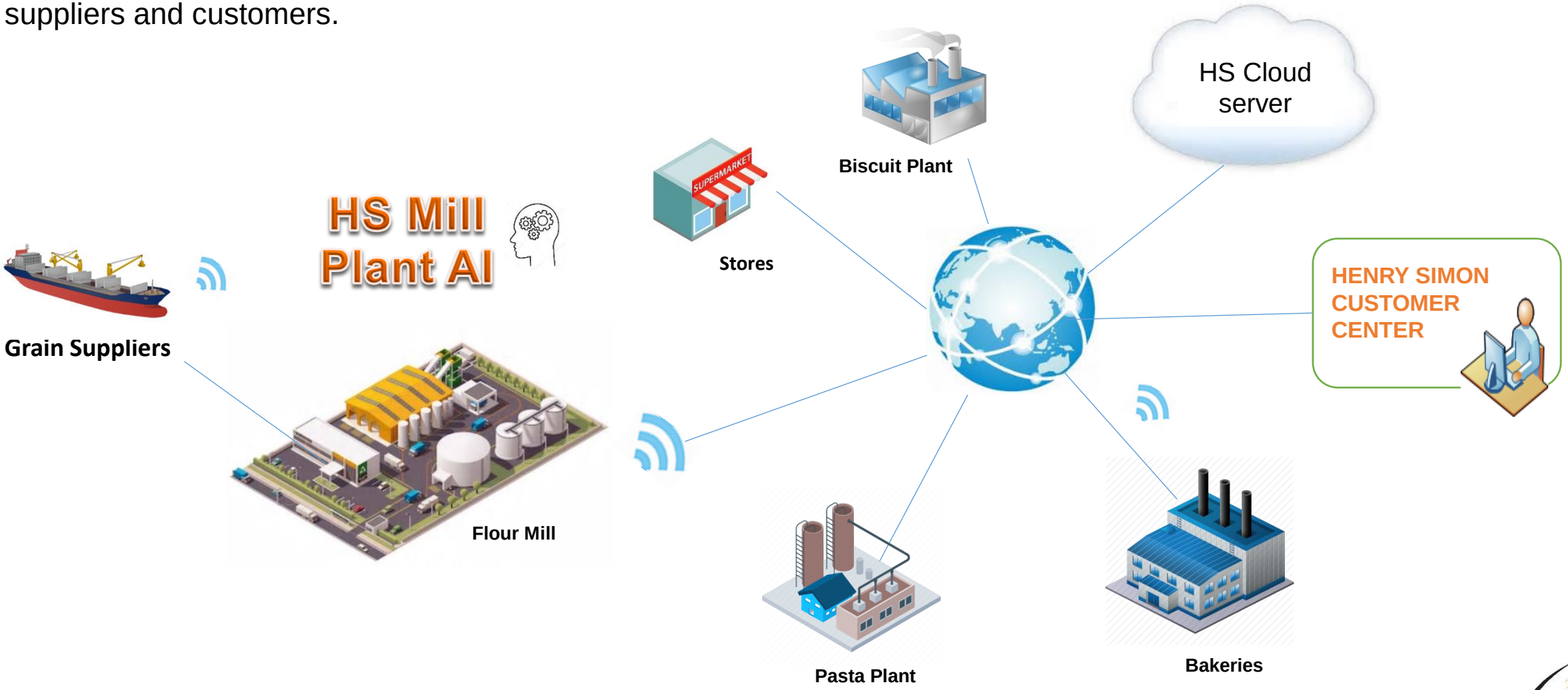
The main functioning principle of the device is based on monitoring the flow rate of gravity-fed stock in spouting, and detecting any fluctuation in product flow.

- Visualization of the flour milling process at various stages
- Reduce production loss
- Optimal Operation
- AI Support

HSIFM
Inline Flow Meter

AI Communication Network

Creating a wide communication platform i.e. between suppliers and customers.



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Conclusion

Briefly, the ‘Intelligent Milling System’ will bring these advantages for milling operations :

- Fully automated mill management
- High level of product standardization
- Increasing productivity with lowering production costs and minimizing the losses
- Higher reliability with data monitoring and reporting
- Order Processing Management
- Prevention of a machine trouble and maintenance by AI
- Effective management of planned, preventive and predictive maintenance tools
- Excellent ability of process control and traceability
- Even creating a wide communication platform i.e. between suppliers and customers for order processing management

‘’The miller cannot be replaced.”

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THANK YOU FOR YOUR ATTENTION

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