

CREMA

Cloud-based Rapid Elastic MAnufacturing



Machinery Maintenance

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GOIZPER

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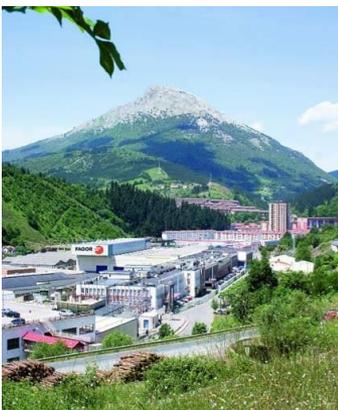
FAGOR 

FAGOR ARRASATE

Fagor Arrasate



- founder member of the **Mondragon Corporation**
- **world leader** in the design and manufacture of mechanical and hydraulic presses, complete stamping systems, transfer presses and many other machines
- **metal forming manufacturer with the world's largest product portfolio.**





Private research centre not-for-profit, oriented to public service



Member of the IK4 Research Alliance



Leader in transferring technology to industry

Electronics, Information and Communication Technologies

- Specialists in embedded HW/SW.
- Strongly committed to industrial dependability and industrial cyber security.
- 30 engineers with certification in dependable system's development.

Energy and Power Electronics

- Focussing on developing energy-efficient solutions.

Advanced Manufacturing

- Product design, reliability and associated services.
- Development of control, monitoring and smart maintenance solutions.

Industry 4.0 projects



Goizper



GOIZPER

- one of the **leading technology suppliers in power transmission components**: brakes, clutches, turning systems, gear boxes, cams, elevators, etc.
- **manufactures and supplies** customized power transmission components to meet market needs in sectors like metal forming, automotive, aeronautics, packaging, construction, marine, machine tools, etc.
- focused on the **design, manufacture and marketing** of manual sprayers and dusters for treatments in farming, gardening, industry, construction, cleaning, pest control and vector control.

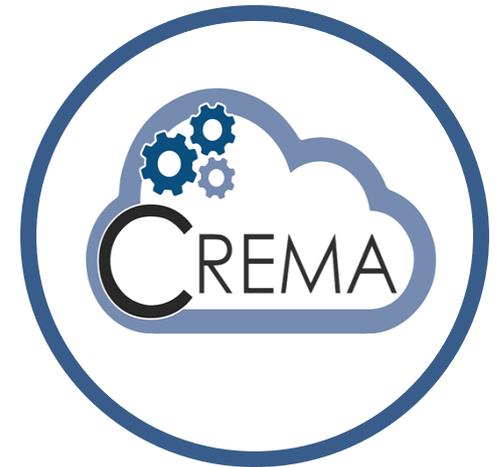


In this presentation



EXISTING PROBLEMS ON MACHINERY MAINTENANCE

HOW CREMA SOLVES THESE PROBLEMS



In this presentation



EXISTING PROBLEMS ON MACHINERY MAINTENANCE



CONTEXT



**EXISTING
PROBLEMS**



**POSSIBLE
SOLUTIONS**

Machinery Maintenance



CONTEXT



**EXISTING
PROBLEMS**



**POSSIBLE
SOLUTIONS**

Machinery Maintenance: Context



Mechanic Press machine:



A machine that accumulates energy by means of a flywheel and transmits it through a Clutch Brake and a Crankshaft to a die.

Clutch brake:

GOIZPER

A Clutch Brake is a mechanical device that engages and disengages the power transmission, especially from driving to driven shaft. Clutches are used whenever the transmission of power or motion must be controlled.



Machinery Maintenance: Context



Clutch brake break → Press Machine **Stopped**



Press Machine DOWNTIME

- operators stopped, customer parts deliveries in risk, ...

Press machine stopped

TAS team travel

Analyse clutch brake

Order supply

TAS team travel

Installation & Setup

Machinery Maintenance: Context



Fagor and Goizper TAS teams urgently travel to the customer's plant



Problems and delays:

- Visa, special tools, weather, spare parts delivery issues, ...

Press machine stopped

TAS team travel

Analyse clutch brake

Order supply

TAS team travel

Installation & Setup

Machinery Maintenance: Context



Analysis of the clutch brake at the customers plant



Sometimes TAS teams can fix the problem, but others not ...

Press machine stopped

TAS team travel

Analyse clutch brake

Order supply

TAS team travel

Installation & Setup

Machinery Maintenance: Context



New clutch brake required:

- order manufacturing to the supplier.
- designed specifically for each press machine
- usually there is not stock for this part



**Time required → Press machine
downtime increase**



Press machine stopped

TAS team travel

Analyse clutch brake

Order supply

TAS team travel

Installation & Setup

Machinery Maintenance: Context



TAS teams travel to the customer's plant and the new clutch brake is delivered



Press machine stopped

TAS team travel

Analyse clutch brake

Order supply

TAS team travel

Installation & Setup

Machinery Maintenance: Context



When TAS teams and supply are at the customers plant, clutch brake installation and set up is performed.



Press machine stopped

TAS team travel

Analyse clutch brake

Order supply

TAS team travel

Installation & Setup

Machinery Maintenance



CONTEXT



**EXISTING
PROBLEMS**



POSSIBLE
SOLUTIONS

Machinery Maintenance: Problems



Now

The machinery monitoring and maintenance is reactive and manual.

Data is not collected continuously.

The customer directly reports the errors.

Specialized teams connect remotely to perform teleservice.

No planning on the maintenance service assistances.



High Costs!!

- lack of clutch brake data monitoring
- lack of a fast and reliable spare parts management



Downtime losses!

- Need to minimize downtime when a clutch break failure occurs.



Machinery Maintenance: Solution



Now	Ideally
The machinery monitoring and maintenance is reactive.	Automatic monitoring of the machine with local persistence.
Data is not collected continuously.	Send data continuously to the cloud.
The customer reacts to machine errors.	Anticipate to the machine errors defining some KPIs and alarms.
Specialize teams connect remotely to perform the service.	Availability of these data through some kind of application.
No planning of the maintenance service assistance.	An optimal assistance plan.



Machinery Maintenance



CONTEXT



**EXISTING
PROBLEMS**



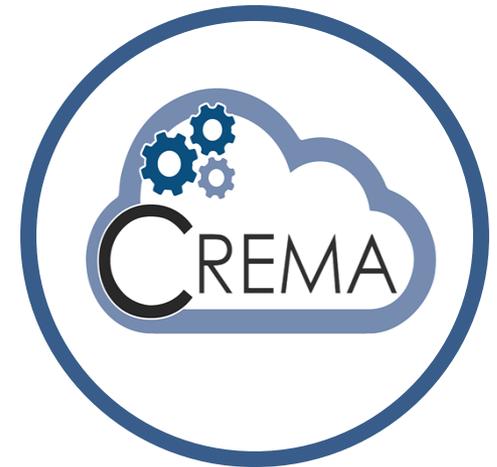
**POSSIBLE
SOLUTIONS**

In this presentation

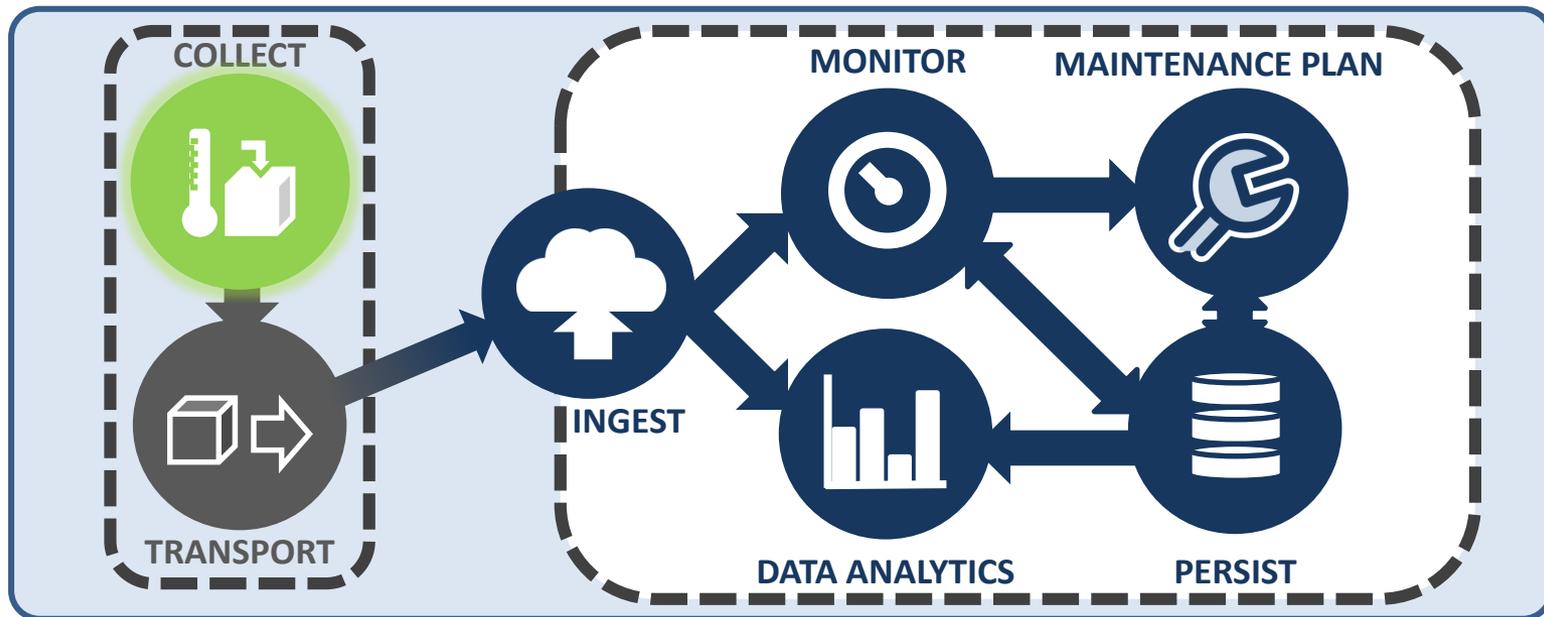


EXISTING PROBLEMS
ON MACHINERY
MAINTENANCE

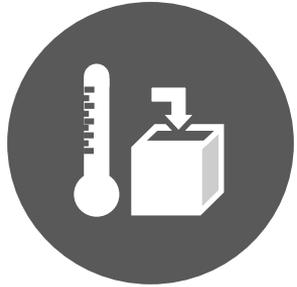
**HOW CREMA SOLVES
THESE PROBLEMS**



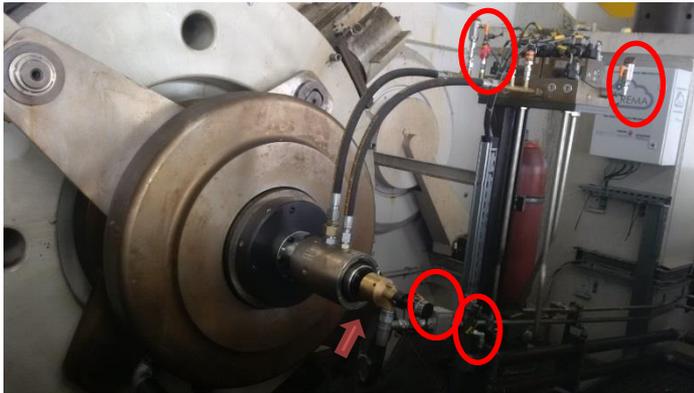
How CREMA solves problems



How CREMA will solve problems



Collect data of each stroke from press machine & clutch brake sensors



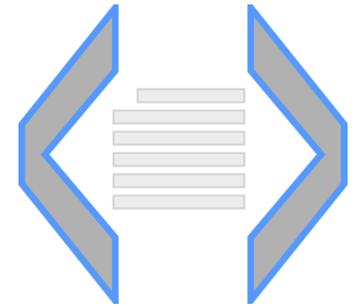
■ sensor signals
→



■ bus →

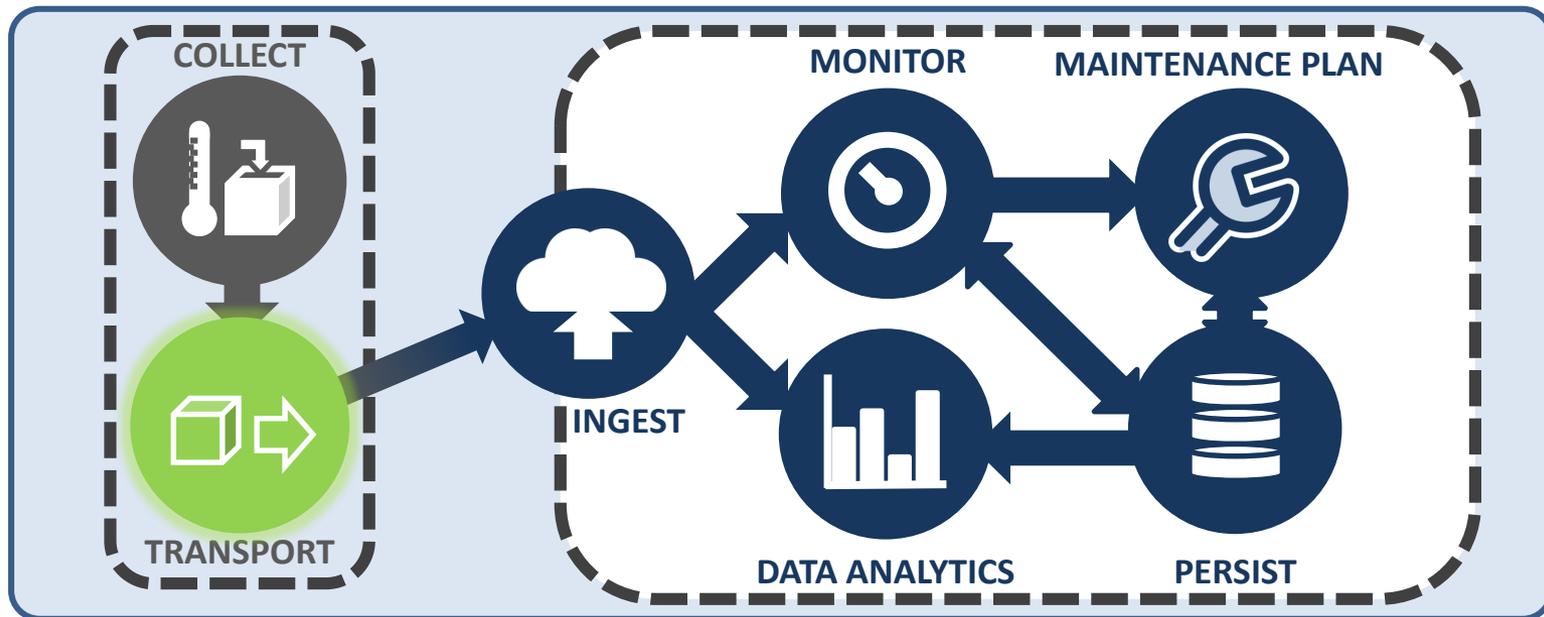


→
persist
■

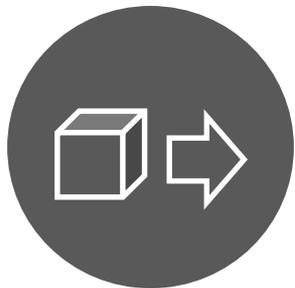


**LOCAL
DATA FILE**

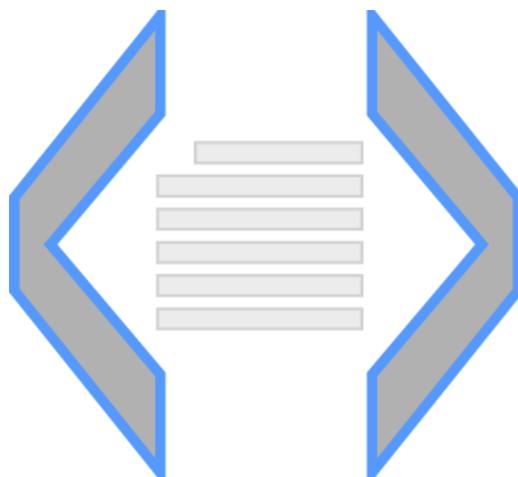
How CREMA solves problems



How CREMA solves problems



Get data from datalogger and **transport** to CREMA.

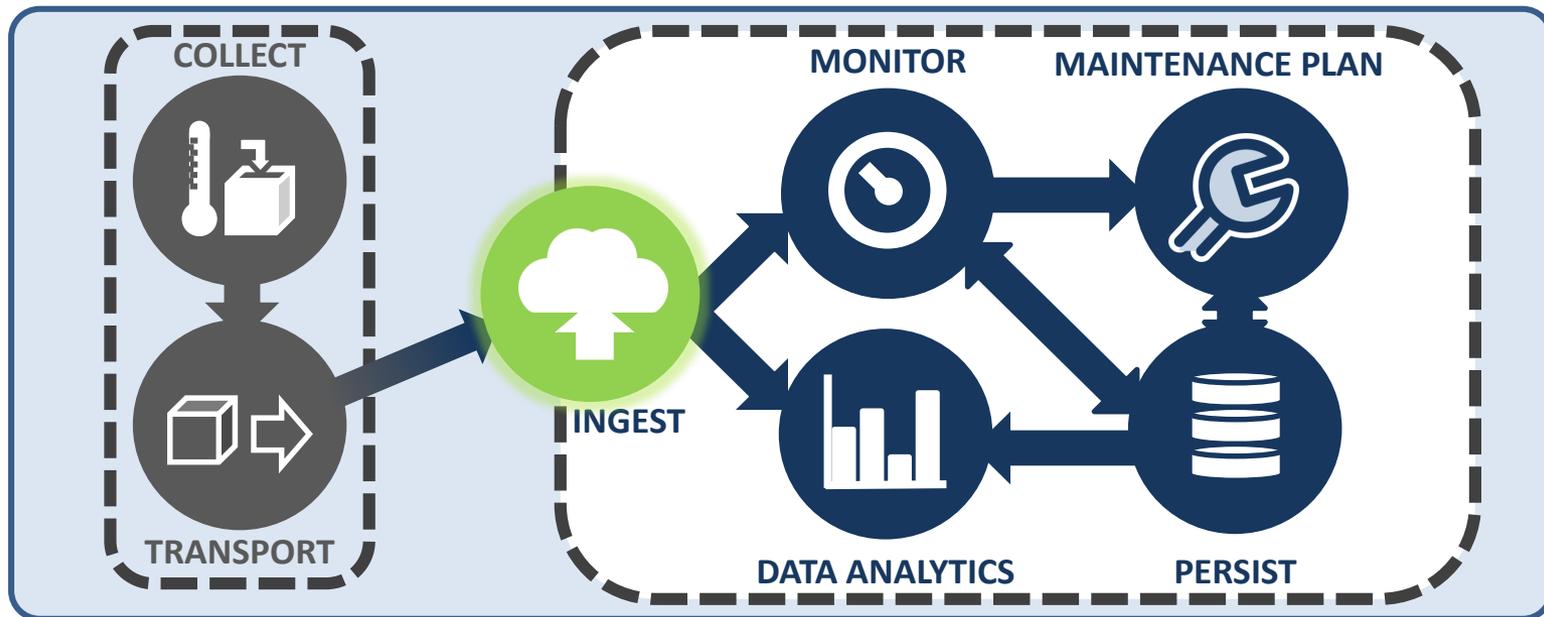


**LOCAL DATA
FILE**



**SEND TO
CREMA**

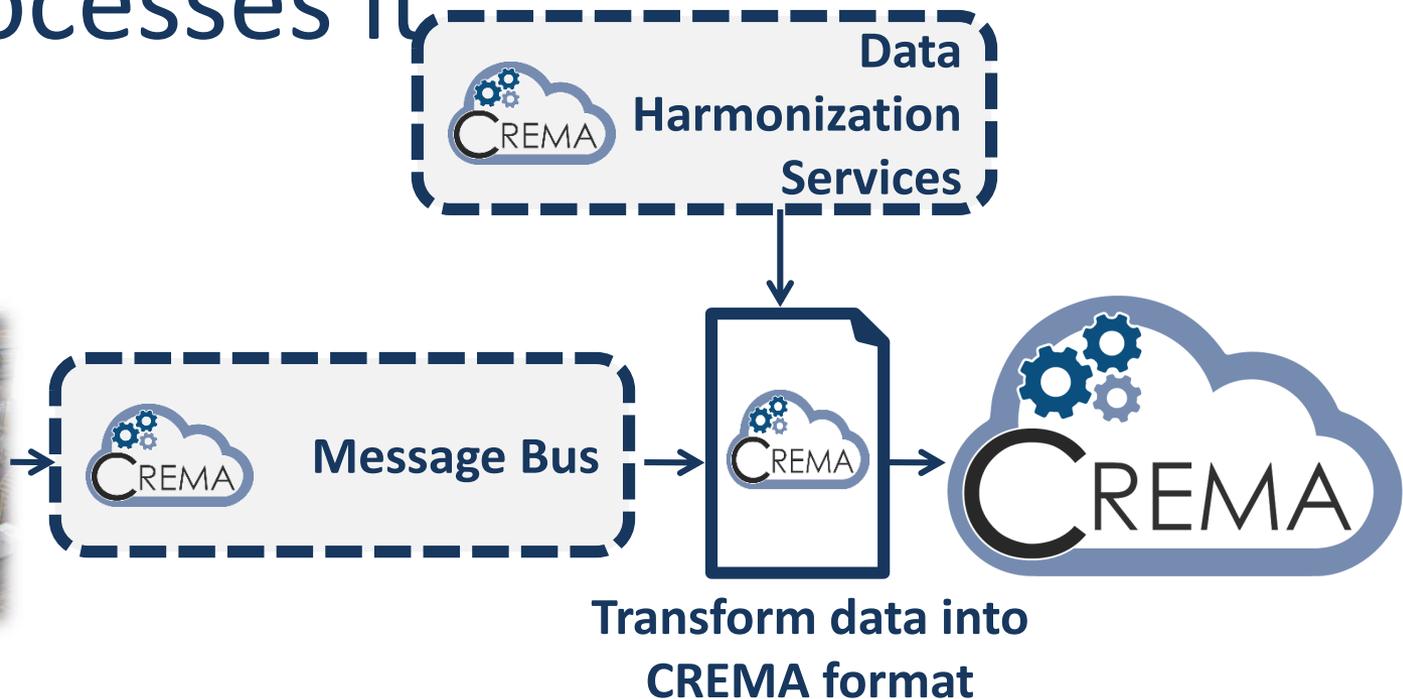
How CREMA solves problems



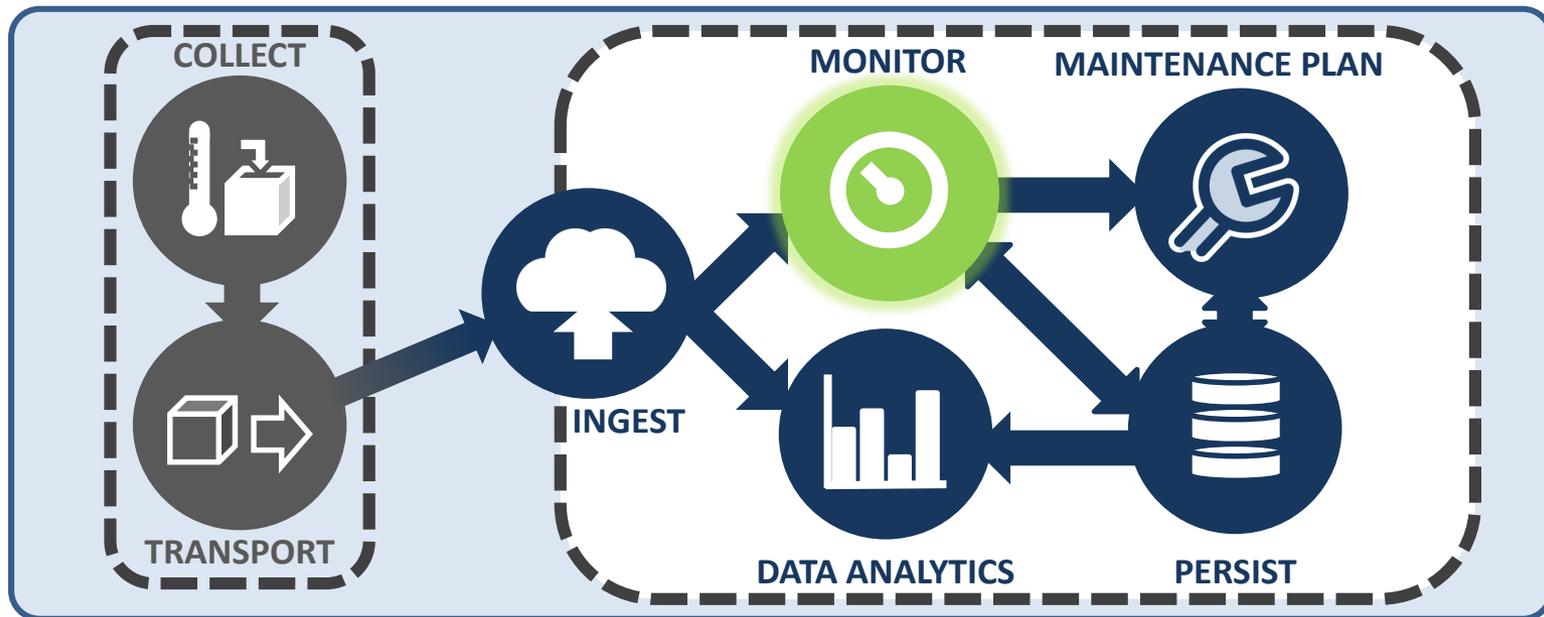
How CREMA solves problems



Ingests data from the press machine and clutch brake, and processes it



How CREMA solves problems



How CREMA solves problems



Monitor ingested press machine & clutch brake data.

Data is monitored and alarms are triggered based on the previously defined business rules & thresholds.

MONITORING & ALERTING COMPONENT

Home

Business Rules

Thresholds

Process Status

Alarms

Alarms

2 3



Filter by date



Start date



End date

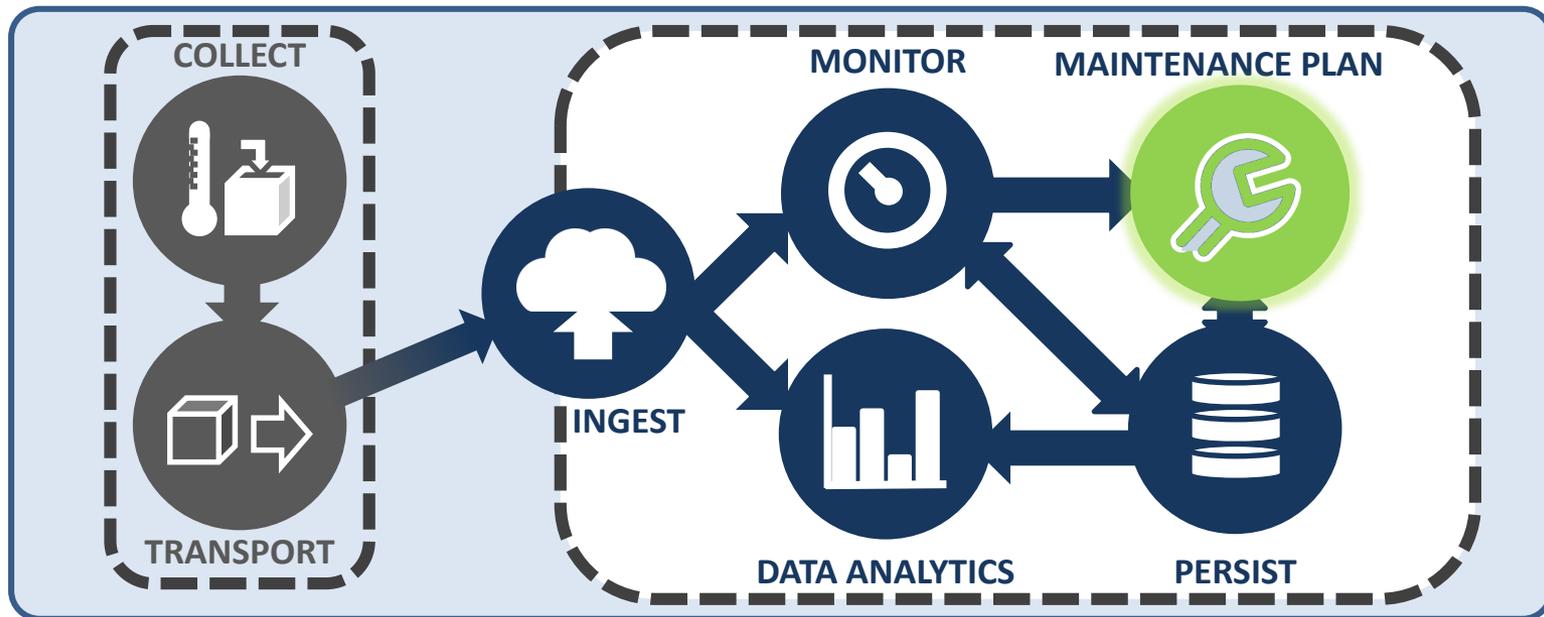


Update results

Name	Category	Process ID	Machine ID	Date (Start)	Date (End)	Active	
Pressure_Alarm_Critically_Low_Error	Critical	10987	Press1	2016-11-9 11:40:21	2016-11-9 11:40:21	✓	Maintain
Insufficient_Cooling_Oil_Flow_Warning	Warning	10987	Press1	2016-11-9 11:40:21	2016-11-9 11:40:21	✓	
Braking_Angle_Control_Of_Clutch_Brake	Critical	10987	Press1	2016-11-9 11:40:21	2016-11-9 11:40:21	✓	
Pressure_Alarm_Low_Warning	Warning	10987	Press1	2016-11-9 11:40:21	2016-11-9 11:40:21	✗	
Clutch_Brake_Over_Temperature_Warning	Warning	10987	Press1	2016-11-9 11:40:21	2016-11-9 11:40:30	✗	



How CREMA solves problems



How CREMA solves problems

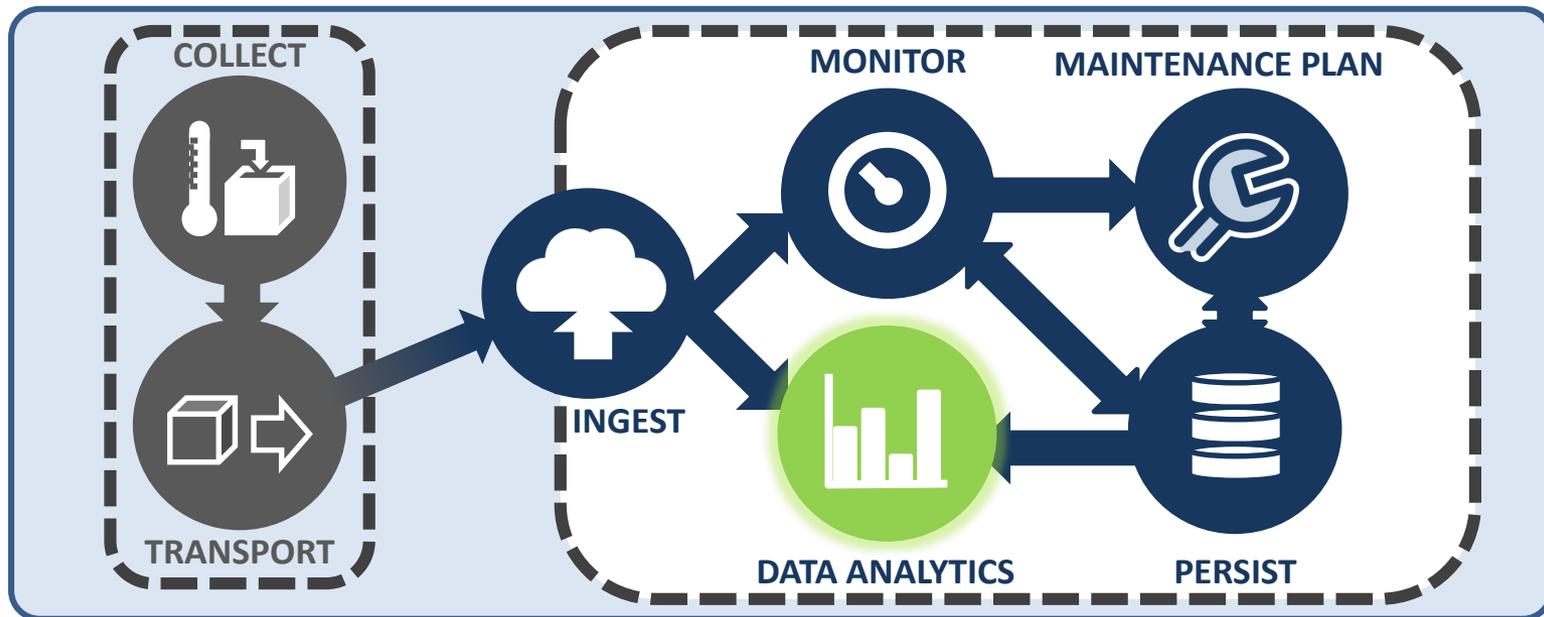


CREMA automatically plans maintenance based on alarms (monitor) and analysed data.

Decrease machine **downtime** and maintenance **cost**.



How CREMA solves problems

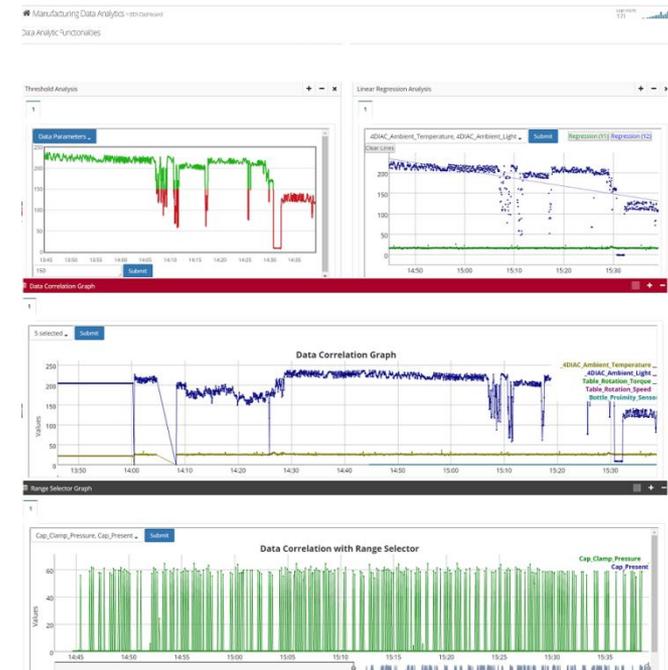


How CREMA solves problems

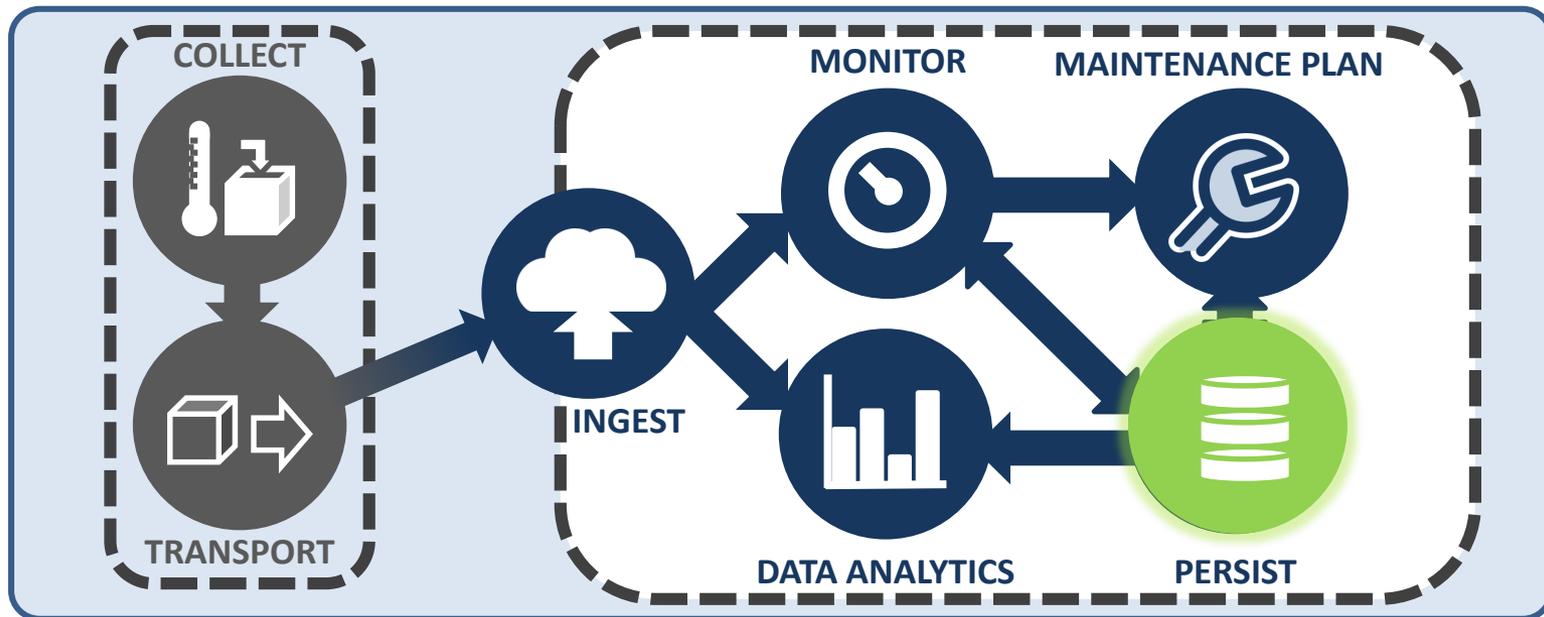


CREMA provides mechanisms to **analyze** press machine & clutch brake data

Press machine & clutch brake data



How CREMA solves problems

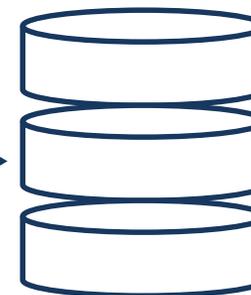


How CREMA solves problems



Persist data ingested by CREMA into a database.

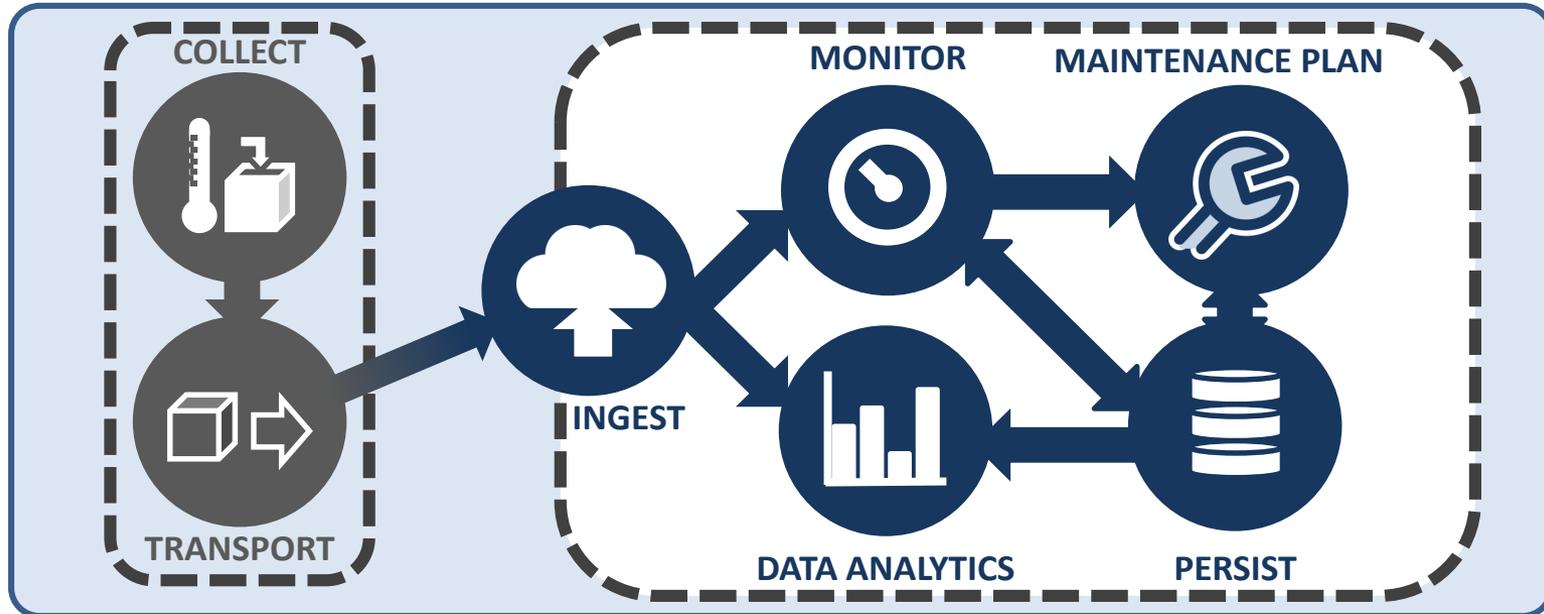
Press machine
& clutch brake
data



MACHINERY MAINTENANCE: BENEFITS FROM CREMA

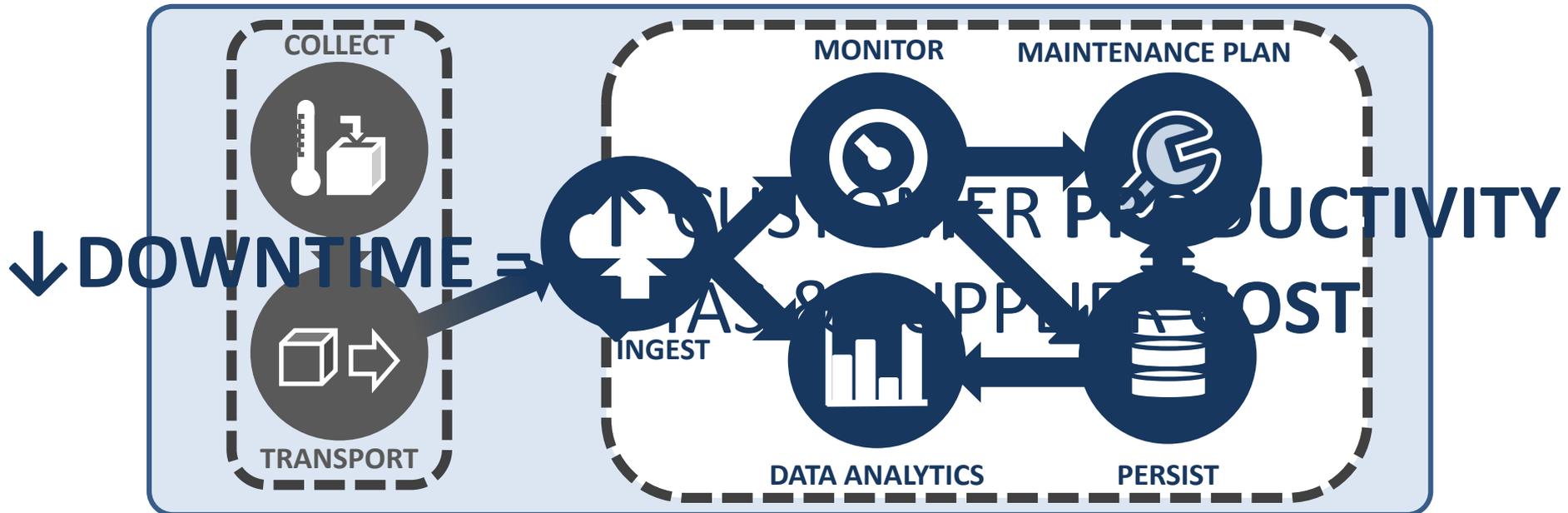


Machinery Maintenance: CREMA Benefits



- CREMA provides mechanisms to
- Automatic monitoring of the press machine.
 - **minimize the production downtimes** of the press machine and its components.
 - **Predictive maintenance:** Anticipate to the machine errors and automatically schedule maintenance.

Machinery Maintenance: CREMA Benefits



CREMA provides mechanisms to **minimize the production downtimes** of the press machine and its components.

Machinery Maintenance: CREMA Benefits



Expected impact of applying CREMA on machinery maintenance:

↓ unscheduled machine downtimes

↓ time of machine downtime

↓ intervention time

↓ intervention costs



CREMA

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Machinery Maintenance

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