

# byteLAKE's Cognitive Services

AI for Manufacturing

Special version for Paper Industry

End User Guide

**byteLAKE**

*AI-assisted Visual Inspection and Big Data analytics.*

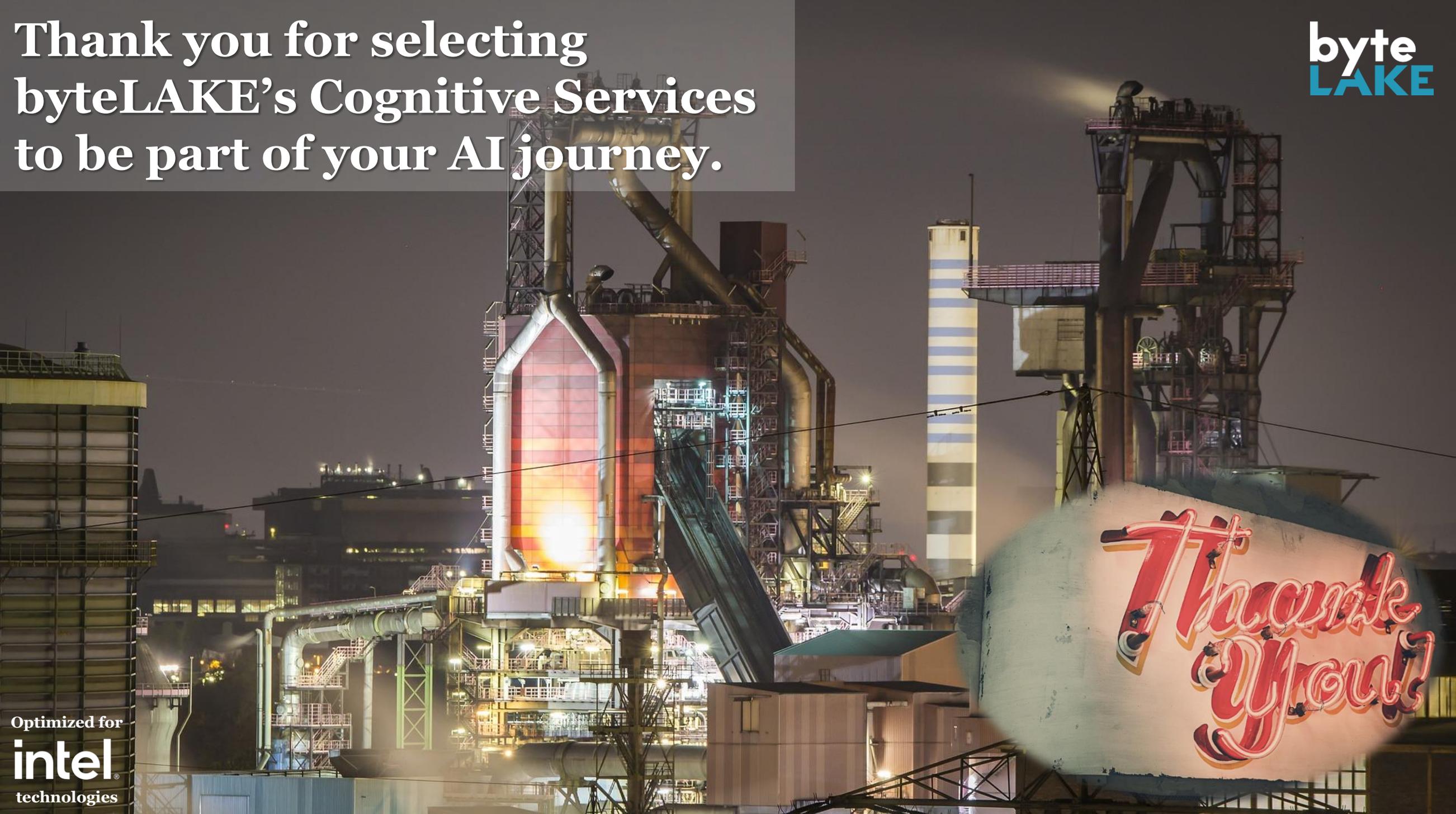
**byte  
LAKE**

Thank you for selecting  
byteLAKE's Cognitive Services  
to be part of your AI journey.

byte  
LAKE

Optimized for  
**intel**  
technologies

Thank you!

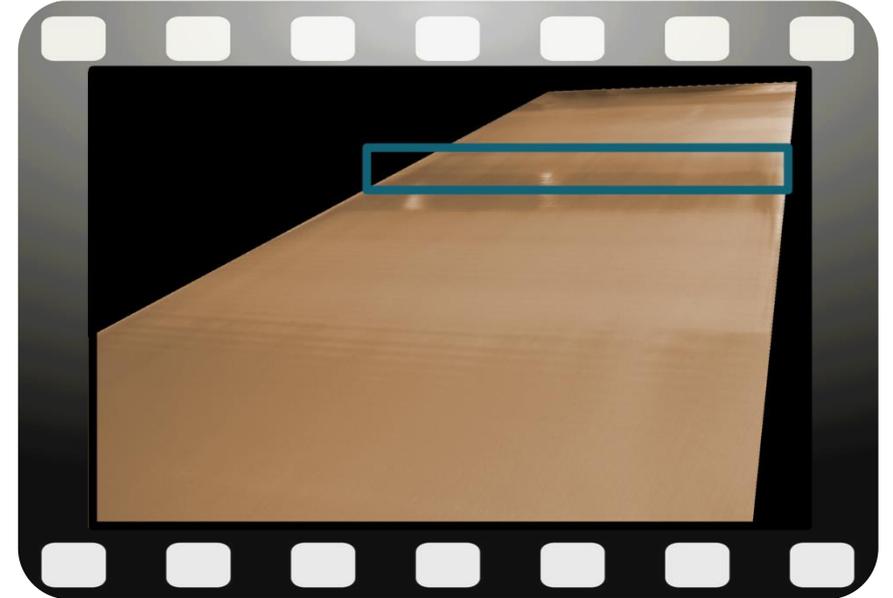


# Wet Line Detector

## What's included

- Camera
- Computing Unit with pre-installed Wet Line Detector
- Software has been trained and calibrated to your production line parameters
- Layout recommendations

Follow steps from next pages to install  
Wet Line Detector in your factory



# Wet Line Detector

## typical deployment

Data Acquisition

Data Processing

Data Analytics & Process Automation

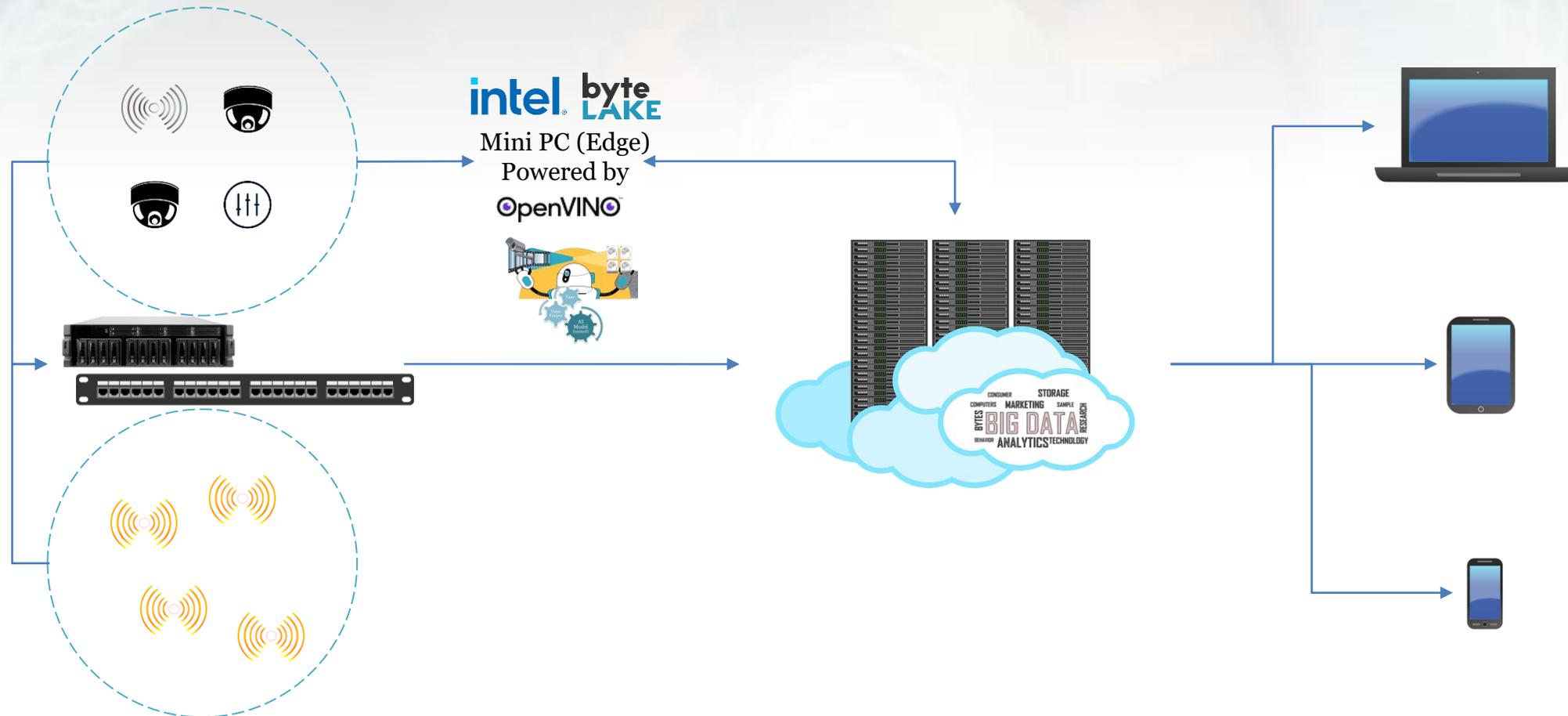
byteLAKE's Cognitive Services

Edge Components / Data Sources

Edge Computing / Edge AI

On-premise / Cloud Infrastructure

Automation Software



# From Edge Components to Decisions

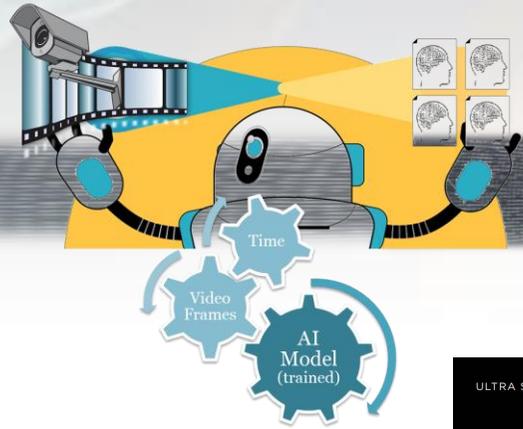
end-to-end monitoring automation



Data Acquisition

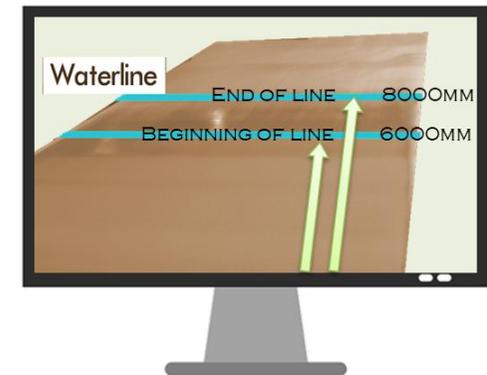
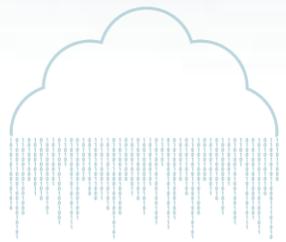
Data Processing

Data Analytics & Process Automation



Visual Inspection

Big Data Analytics



Edge Components

byteLAKE's Cognitive Services

Manufacturing Software

Automation

Edge Computing

On-premise / Cloud Infrastructure

# (1) Unbox your hardware components

REMARKABLY TINY.  
REMARKABLY POWERFUL.



ThinkCentre M920 Tiny

ULTRA SMALL, ULTRA POWERFUL

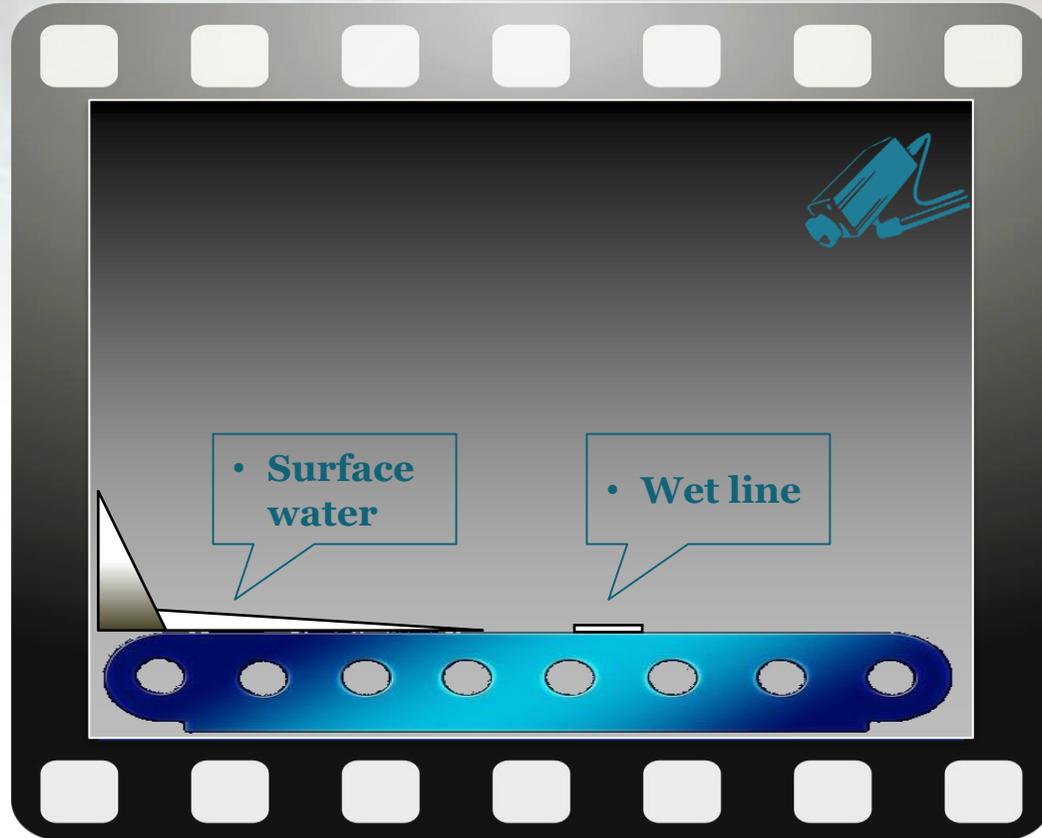


ThinkCentre M720 Tiny



Computing Unit and camera might vary based on your choices

## (2) Mount hardware at production line



- ✓ Camera mounted at acute angle
- ✓ Computing unit mounted close to the production line

**Follow recommendations you received after consultancy session with byteLAKE**

# (3) Start Wet Line Detector

- Turn on your computing unit
- Go to terminal and enter: `python path-to-main.py`  
example: `C:\Wet Line Detector\ python ./main.py`
- Wet Line Detector will start
  - All its modules will be initialized
  - You will see the following on the screen:

```
Hello Wet Line Detector
...
Grabbing Mode: Camera
...
Try to load cfg <list of modules>
...
Done!
...
```

## Software requirements:

- Python interpreter (3.8.5)
- arena-api (>= 2.0.1)
- numpy (>= 1.19.1)
- opencv-python (>= 4.3)
- pymssql (>= 2.1.4)

## (4) Integration with factory management software

- In most of the cases, Wet Line Detector will already be compatible with your factory management software.
- It might happen, that some configuration steps are necessary. In that case, please contact your IT department.
- In any other case, contact byteLAKE.



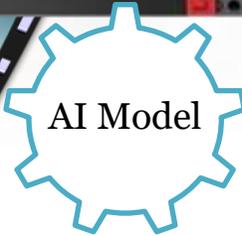
# (5) Enjoy your Wet Line Detector in action!

Paper Mill 4.0 – end to end solution



## byte LAKE's Wet Line Detector

- Detects the line
- Measures the line
- OpenVINO accelerated



Sends results



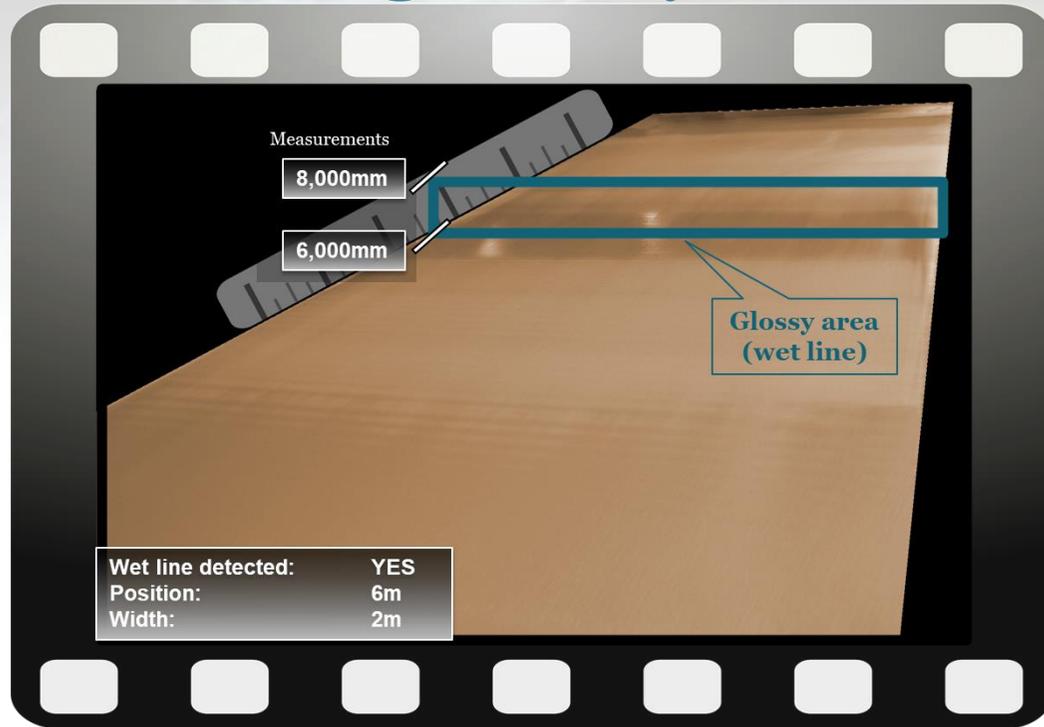
Integrates with paper mill's system

Trigger an alarm



# Paper production monitoring with AI

## Image Analytics



AI-assisted monitoring  
of the papermaking process.

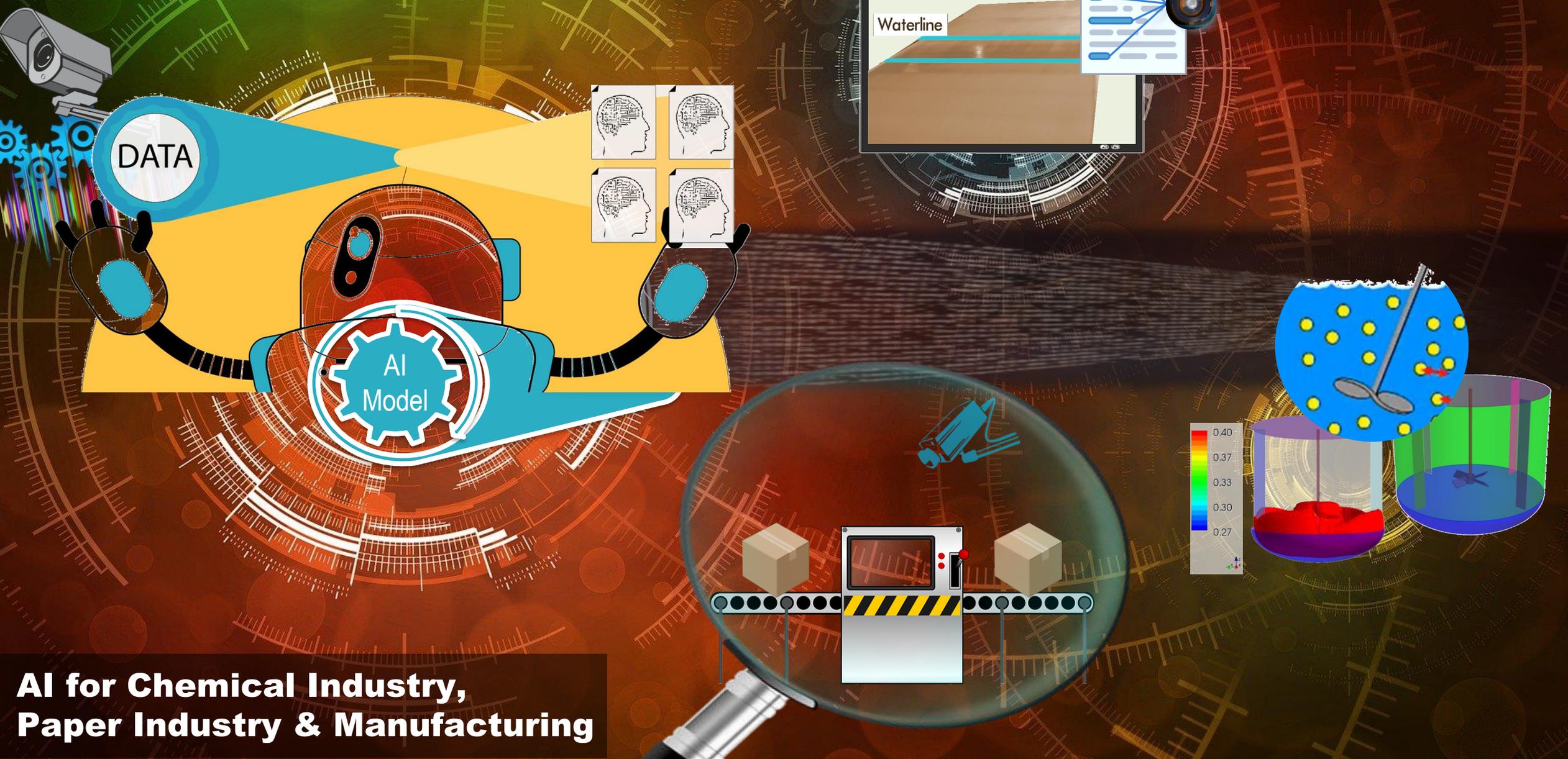
- Multi-phase process
- A natural phenomenon called “wet line” is observed
- “Wet Line” can be efficiently monitored by AI

**24/7/365**

The average cost of an unplanned downtime is USD \$220,000 a day for a paper or pulp plant.

International Journal of Strategic Engineering Asset Management

We constantly update Cognitive Services by following the suggestions from our clients. Visit our website or contact us directly as what you need might already be available.



**AI for Chemical Industry,  
Paper Industry & Manufacturing**

# Learn more about the product



## Blog post series

[bytelake.com/en/CognitiveServices-toc](https://bytelake.com/en/CognitiveServices-toc)

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  - [Direct link to a video](#)
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5. [AI-accelerated Computational Fluid Dynamics \(CFD\) simulations \(blog post series\)](#)

## Website:

[bytelake.com/en/CognitiveServices](https://bytelake.com/en/CognitiveServices)

## LinkedIn Showcase

[linkedin.com/showcase/cognitiveservices/](https://linkedin.com/showcase/cognitiveservices/)

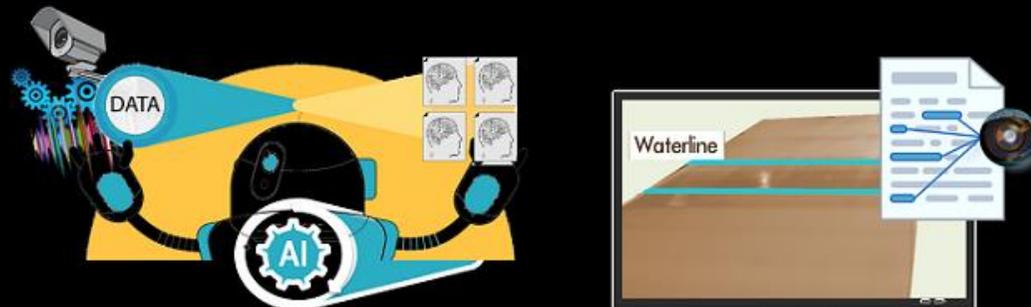
## Contact us

[CognitiveServices@byteLAKE.com](mailto:CognitiveServices@byteLAKE.com)

## End-user guide



Thank you for selecting byteLAKE's Cognitive Services to be part of your AI journey.



## Cognitive Services

AI for Paper Industry & Manufacturing  
Visual Inspection. Big Data Analytics.  
[bytelake.com/en/CognitiveServices](https://bytelake.com/en/CognitiveServices)

# Appendix

# Wet Line Detector (configuration)

- To stop the software: press CTRL+C on your keyboard
- Configuration parameters in file: config.py
  - Application name:  
APP\_NAME – stores app name
  - Wet Line Detection process:  
USE\_CAMERA – True = grabs images directly from camera; False = grabs images from a directory.  
  
CAMERA\_SERIAL\_NUMBER – serial number of a camera that is to be used (requires: USE\_CAMERA=True).  
  
IMAGES\_DIR – path to a directory from which the images are taken for analysis (requires: USE\_CAMERA=False).

# Wet Line Detector (configuration), cont.

- Configuration parameters in file: config.py, cont.

- Wet Line Detection process:

- GRAB\_IMAGE\_EVERY – delay (in seconds) determining how often camera frames should be analyzed.

- SAVE\_RESULTS – True=store results in file; False=do not store the results.

- RESULTS\_DIR – path to a directory where results are to be stored (requires: SAVE\_RESULTS=True).

- SAVE\_RESULTS\_EVERY – determines how often the results are to be stored (in seconds)

# Wet Line Detector (configuration), cont.

- Configuration parameters in file: config.py, cont.
  - AI module configuration (preconfigured):
    - AI\_DATA\_DIR – path to AI modules
    - AI\_MODEL\_FILE – name of the file that contains AI model
    - AI\_WEIGHTS\_FILE – name of the file that contains AI model's weights
    - AI\_META\_FILE – name of the file that contains AI model's metadata
    - AI\_NAMES\_FILE – name of the file that contains names of the classes to be recognized
  - Database connectivity (preconfigured):
    - DB\_HOST – IP address of the database server
    - DB\_USER – username
    - DB\_PASSWD – password
    - DB\_NAME – name of the database
    - DB\_TABLE – table name where the results are to be stored

# Wet Line Detector (configuration), cont.

- Configuration parameters in file: config.py, cont.
  - Wet Line measurement related (pre-calibrated):  
M\_CONFIG\_FILE – path to a file that contains calibration data for wet line measurements (calibrated by byteLAKE)
  - Logging options:  
LOGGING\_TO\_FILE – True=enable logging to file; False=disable logging.  
LOGGING\_TO\_CONSOLE – True=display logs in console; False=disable logs.

# Wet Line Detector (files structure)

- data – AI model's files (neural network configuration)
- libs – dll libraries required by Wet Line Detector
- logs – logs when logging enabled
- main.py – main module launching Wet Line Detector
- config.py – configuration file
- database\_controller.py – database management
- dnn.py – AI module loading dll libraries
- file\_parser.py – reads calibration data from pixels\_to\_meters.ini (pre-calibrated by byteLAKE)
- image\_grabber.py – module grabbing images for analysis
- waterline\_detector.py – module detecting a wet line and performing measurements
- pixels\_to\_meters.ini – calibration file used for measurements (pre-calibrated by byteLAKE)

# Meet byteLAKE

Artificial Intelligence for Chemical Industry, Paper Industry and Manufacturing.

## Our products

- AI-accelerated CFD for the chemical industry.
- AI-assisted process monitoring for the paper industry, and manufacturing.

## Custom AI software

- Text, images, videos, sound, and time-series data analytics.

[www.byteLAKE.com](http://www.byteLAKE.com)

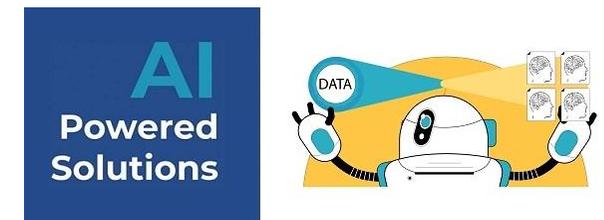
**byte**  
**LAKE**



Learn more:



**CFD Suite**  
CFD Acceleration  
for Chemical Industry



**Cognitive Services**  
AI for Paper Industry  
and Manufacturing

# Artificial Intelligence for Industries



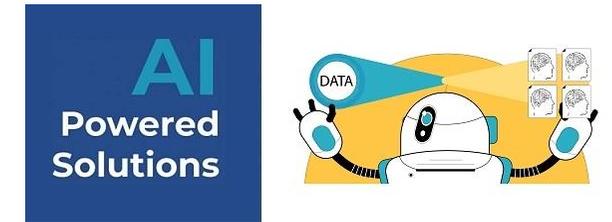
## Products



**CFD Suite**  
CFD Acceleration  
for Chemical Industry.



**AI for Paper Industry**  
AI-assisted monitoring  
of the papermaking process.



**Cognitive Services**  
AI for Manufacturing. Visual  
Inspection and Big Data analytics.

## Incubation



**AI for Restaurants**  
Visual analytics and billing  
process automation with AI.



**Brainello**  
OCR for invoices, AI-powered.  
Works without templates.



**Ewa Guard**  
AI for Drones.  
Large areas visual analytics.

## Custom AI Software Development



**Edge AI**



**Cognitive Automation**



**HPC**

# Cognitive Automation

## Complete Solutions Hardware + Software

- **Complex or repetitive tasks automation**  
(extracting information from documents, scans, e-mails etc.)
- **Industry 4.0 automation**  
(intelligent cameras for visual inspections, sensors data analytics etc.)
- **Enabling data-driven, proactive operations**  
(finding answers hidden in the data like why something happened? What will likely happen? What are the trends?)

*Custom made solutions  
with the ability to self-improve over time*

