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AI Solutions

for industry

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Zyfra: multinational company that develops industrial digitalization technologies, and improves the IIoT and AI environment

290 enterprises

77 mines

15 countries

24 000 connected pieces of equipment

30 implemented AI projects

5 100 oil wells

84 partners

BUSINESS TRANSFORMATION AWARD
"Intelligent Mine – mine of the future"

Entrepreneurial Company of the Year in the AI-based Solutions for Process Industries

X2

THE TOP-10 BEST IOTWC
2 YEARS IN THE ROW
2018, 19. Heat Treatment AI, Artificial Lift

BUSINESS TRANSFORMATION AWARD 2019
"Intelligent Mine – mine of the future"

MEMBER OF INDUSTRIAL INTERNET CONSORTIUM

Our vision

Acquisition of strong companies operating in the IIoT market

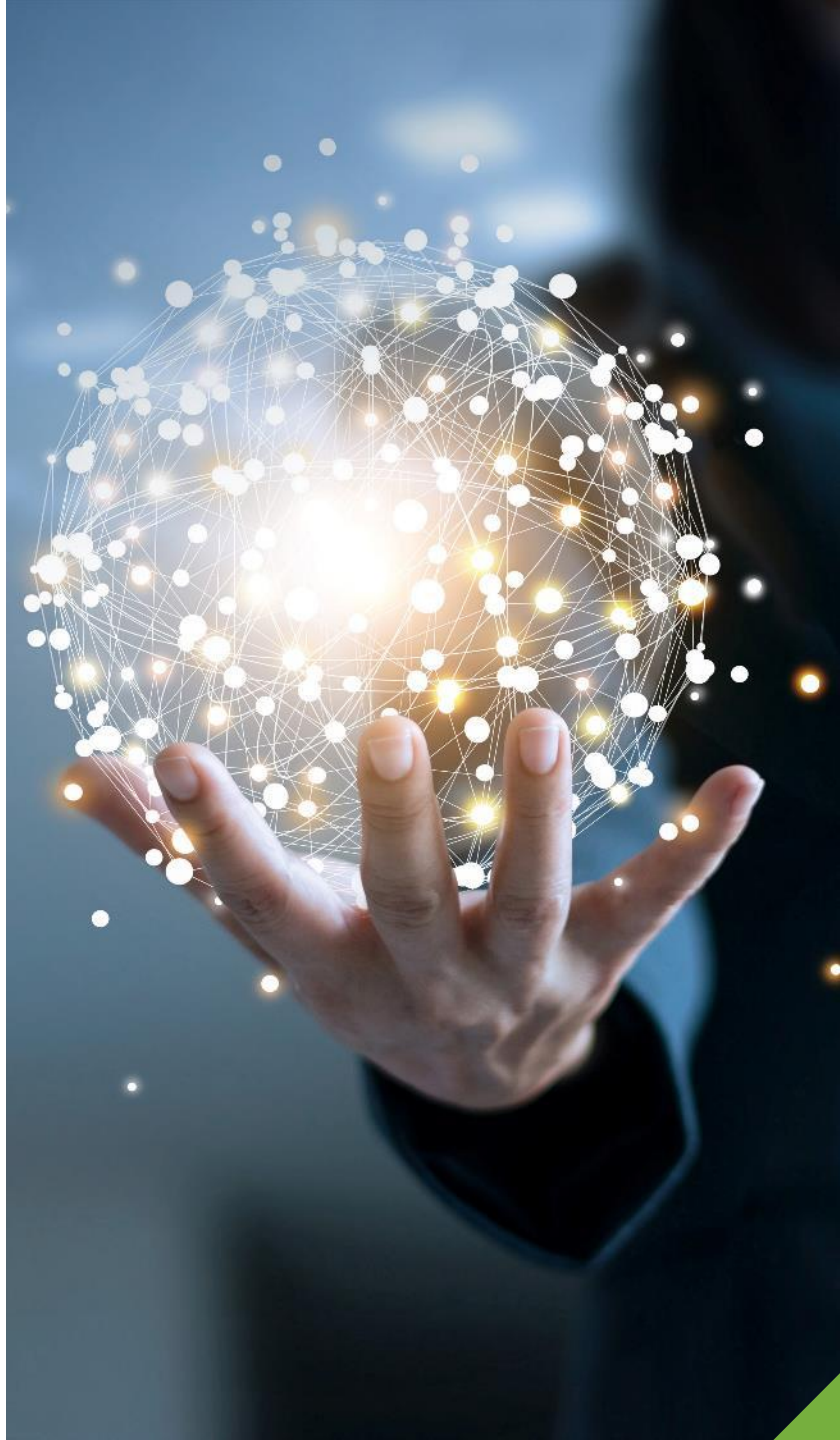
Developing the original Solutions in our own AI Labs

Synergy of products and technologies in operational production management services

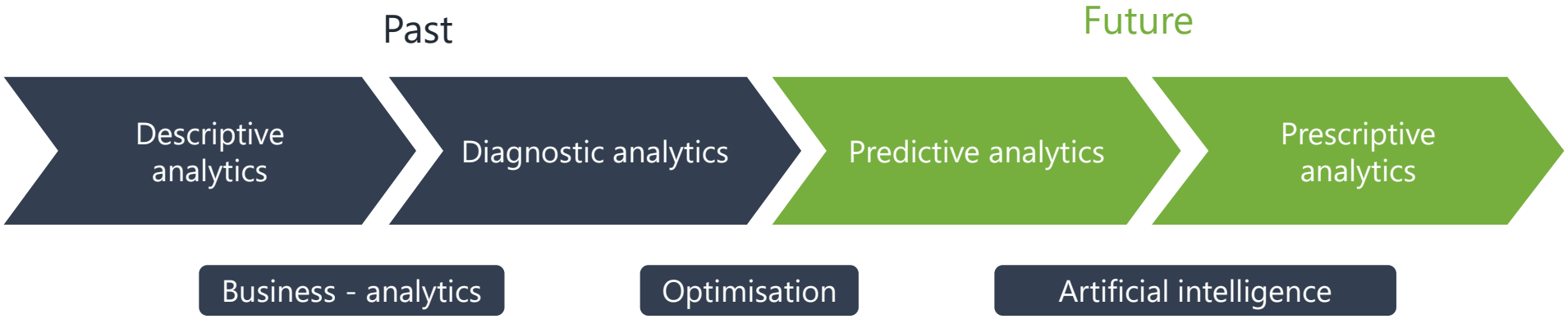
OUR STRATEGY

WE ARE INCREASING PRODUCTION EFFICIENCY, IMPLEMENTING DIGITAL TECHNOLOGIES

Global Customers



Our focus



Areas of expertise:

- Decision support systems
- Time series and anomalies detection
- Classical optimisation
- Computer vision

What do we do

High accuracy forecasting, real-time recommendations and decision process automation of the most difficult and costly industrial processes

- Decrease of material consumption
- Optimising production parameters
- Digital twins
- State/event forecasting
- Computer vision
- Supply chain management

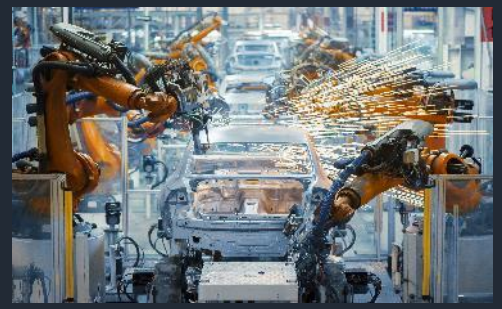
We develop end-to-end solutions in selected industry sectors

Discrete manufacturing

Monitoring

Industrial equipment data acquisition

Current machinery work load monitoring, performance improvement by 15%



Production management

Quality control, document workflow

Production management efficiency improvement

Logistics, sales management

Support services for released products

Tool control

Equipment deterioration predictive analytics

Breakdown forecasting ability, M&R period reduction

Industrial and occupational safety

Quality control

Mining and Metallurgy

Ore and Coal Mining

Drilling and explosive works automation
Drilling machines productivity increase by 10-25%

Transportation

Autonomous excavators and dump trucks
Personnel absence in hazardous areas, down time reduction by 20%

Ore dressing

Computer vision technology (artificial intelligence)
Optimization of crushing and dressing plant performance (teeth control)

Metallurgy

Digital advisor (artificial intelligence, machine learning)
EAF operating hours under current reduction

Industrial and occupational safety

Quality control

Metals Balance

Chemicals

Well drilling

Formation models development, drilling support
Oil recovery increase of up to 10 tons per day from each well

Operation

Oil pump operation mode optimization
2% debit gain due to AI based recommendations

Transportation

Pipeline repair predictive analytics, loading optimization

Processing

Material and energy balance
Raw material loss reduction, plans performance monitoring

Industrial and occupational safety

Quality control

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ArtLift:

ESP optimization

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Predict Fluid Flow Rate Using ML

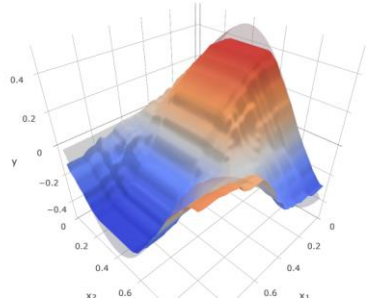
We manage
- Pump rotation speed
- The relationship between work and cost

We track
- Pressure
- Dynamic Level
- Water Cut
- Density
- Measured flow rate

Pump & Well

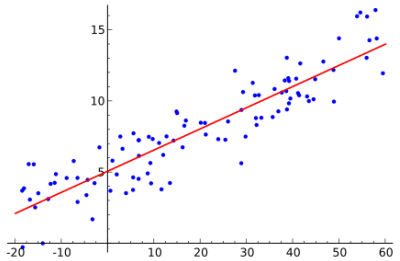
We predict
- Fluid flow rate
- Oil flow rate

We monitor
- Pump temperature
- Motor current
- Loading



Gradient boosting

Linear regression



Solution implementation results

The developed solution allows us to determine and establish a mode of operation that ensures maximum well flow rate from a predicted long-term perspective.

Outcome	$/year	%
Additional income due to an increase in well flow rate	1 700 000	1.48

1.5%

Average increase in oil flow by wells

Recommendations are issued and updated daily

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GEONAFT

Real - time drilling optimization

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Industry challenges and solutions

CHALLENGES	SOLUTIONS
$14b+ annual losses due to wellbore instability issues	Geomechanics and improved support during drilling and well construction can reduce NPT by 30%
Only 65% of reservoir pay-zone is drilled with horizontal section using conventional geosteering (loss in production)	Complex approach of using petrophysics and geosteering together can provide up to 30% improvement of wellplacement and rise oil production up to 20%
There is no a single tool for multidisciplinary team at pre-drill, RT-monitoring and post-drill phases	Geonaft is a uniform platform that provides solutions at all stages of the process to each member of the project
Up to 100 GB of data is generated per 1 well, and only 10% is utilized	BIG DATA, machine learning for predictive analytics may significantly speed up the all phases of the project

Geonaft Software Platform

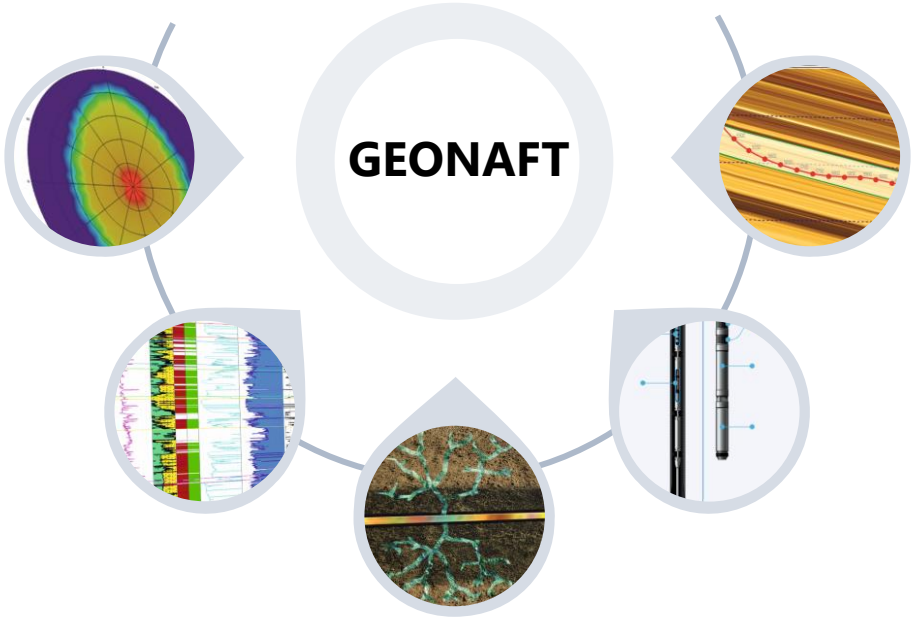
Single solution for geosteering, geomechanics, petrophysics and engineering

GEOMECHANICS

The first hybrid model – combination of statistics and physical modelling

PETROPHYSICS

Real-time petrophysical assessment



GEOSTEERING

Real-time geosteering

BIG DATA (MWD/LWD)

Any producer / service provider

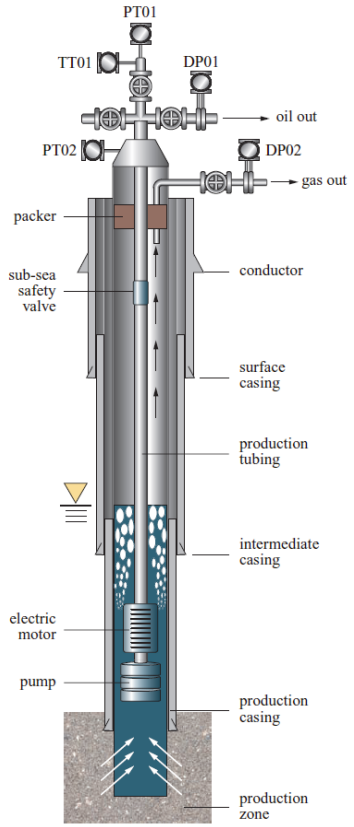
ENGINEERING*

Based on internal geomechanical and petrophysical calculations

*Trajectory and well construction, hydraulics calculations and Frac design

Virtual Flow Meter solution

Business Problem



Absence, rare or unreliable data of multiphase flow rates introduces inefficient operations:

- inefficient reservoir management
- inefficient operation of artificial lift equipment
- absence of online identification of flow assurance problems
- absence or ineffective daily production optimization

ML model is used to
estimate reservoir pressure each minute using measured values of other parameters

Zyfra Virtual Flow Meter

- Daily production optimization (3-5% production increase)
- Reliable data for reservoir management and optimization (4-7% production increase)
- Reduction of production losses due to the well testing and flow assurance challenges
- Identification of ESP failures, unplanned production stops and repairs
- Less unplanned repairs of multiphase flow meter / test separators

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Zyfra AI
for metallurgy

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Zyfra solutions for metallurgy

Machine learning solutions

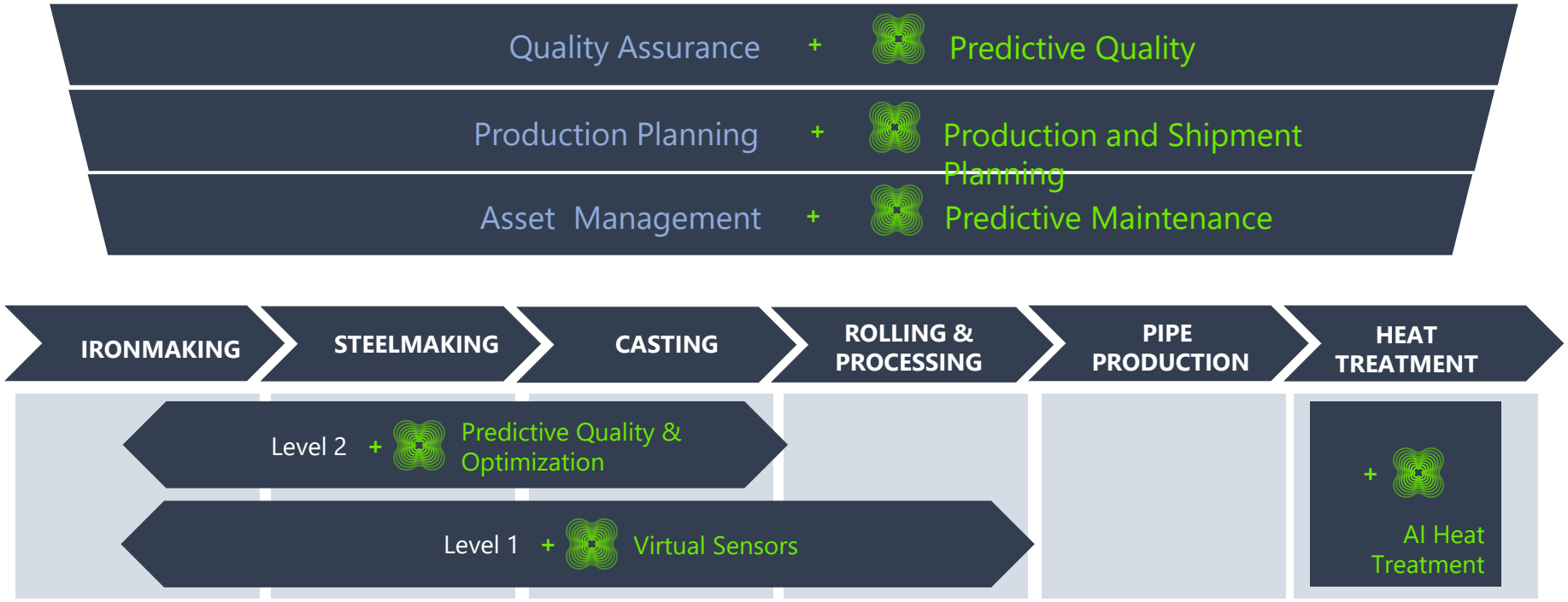
Solving complex (non-algorithmized) tasks using ML

End-to end digital solutions

Optimization of the business processes

Zyfra Industrial Framework

A single digital environment of the enterprise



Decision support system for steel-making

Optimization of electricity consumption and Power-On Time reduction

% of costs cutting

About 5%

Optimization of ferroalloys consumption

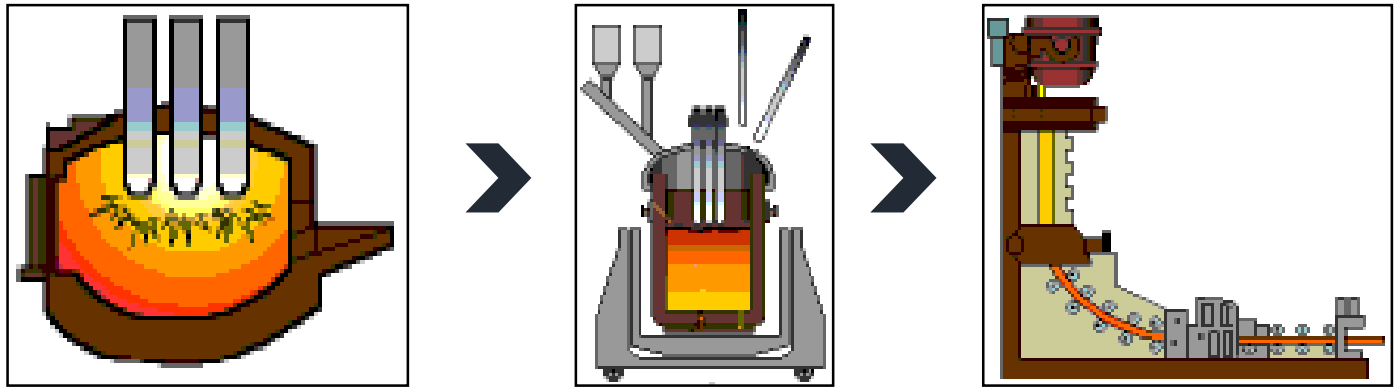
% of costs cutting

Up to 10%

Prediction of slab quality

% of costs cutting

5% loss reduction



Reduce costs of EAF steel production

While maintaining the steel quality!

Optimization of ferroalloys consumption

Optimization of electricity consumption

ROI 130%

2-3%

reduction in the cost of the semi-products

Ferroalloys Consumption Optimization

Scope: 2 EAF lines, steel production ~2MTPA

Process description: steel is mixed with ferroalloys in LF to achieve steel grade requirements

Customer's problem: excessive consumption of ferroalloys.

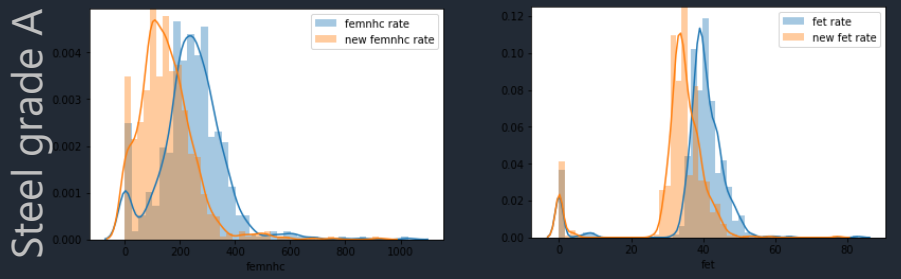
Steel melter adds more ferroalloys than necessary to produce steel of required grade. Sometimes ferroalloys are added on LF stage even if required composition was already achieved

Task: to provide absolute amount of ferroalloys to be "dumped" into a cast to get desired steel quality with minimal costs

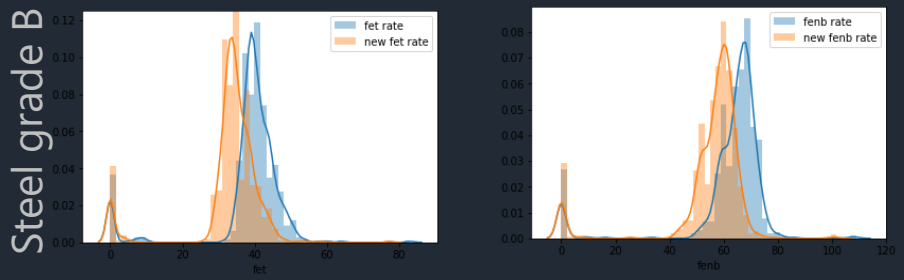
Project: machine learning model is based on data

- Additives at the stage of the arc furnace
- Tap weight at the EAF stage
- Additives on the LF stage
- The resulting mass of the melt that has reached CCM
- The target variable is the percentage of chemical element in steel

Total potential of savings p.a: $283K

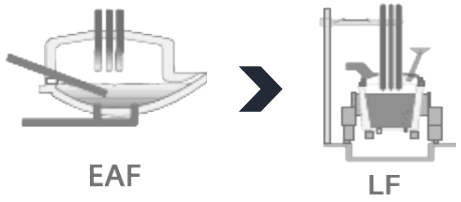


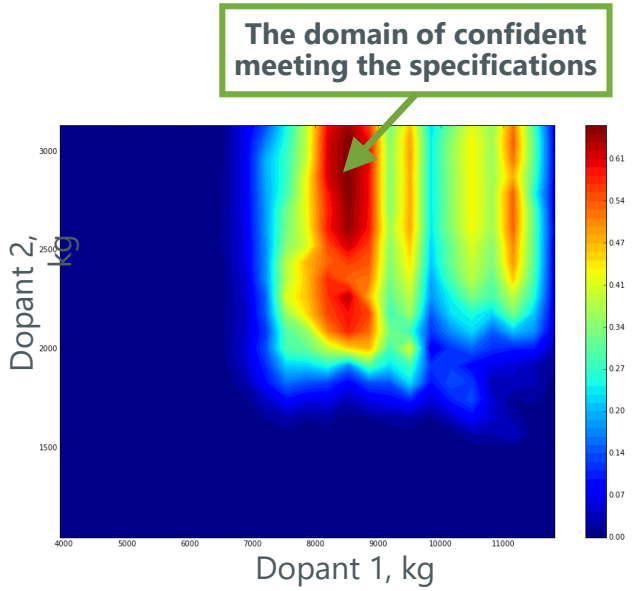
Total potential of savings p.a.: $353K



$700K
cost reduction on 1 EAF line per year
due to ferroalloys consumption optimization

Robust Predictive Quality for Steel Making and Casting Process





Predict quality of produced steel:

- chemical composition of the steel

Considering:

- Mass of scrap and crude iron
- Steel grades specifications
- Technical parameters of the EAF, oxygen-conversion & refining stages
- Results of chemical analyses
- Chemical composition requirements and standards for ferroalloy use

Our learnings: to control risks we need to predict probability distributions

HADEED - Saudi Iron & Steel Company
1st fully integrated steel producer in Saudi Arabia

$2.5M

Capacity:
6 MTPA

Applied model could possibly save per year

TMK is Russia's largest producer of steel pipes and one of the three leaders in the global pipe business. For the second year in a row it has ranked first in the world by volume of pipes shipped.

10% **Reduction in Power-On Time**

3-5% **Reduction in ferroalloys usage (projected)**

Magnitogorsk Iron and Steel Works
$7.9B in revenue
30th largest steel company in the world

5% **average decrease of ferroalloys consumption**

>$4.3m **annual economic effect**

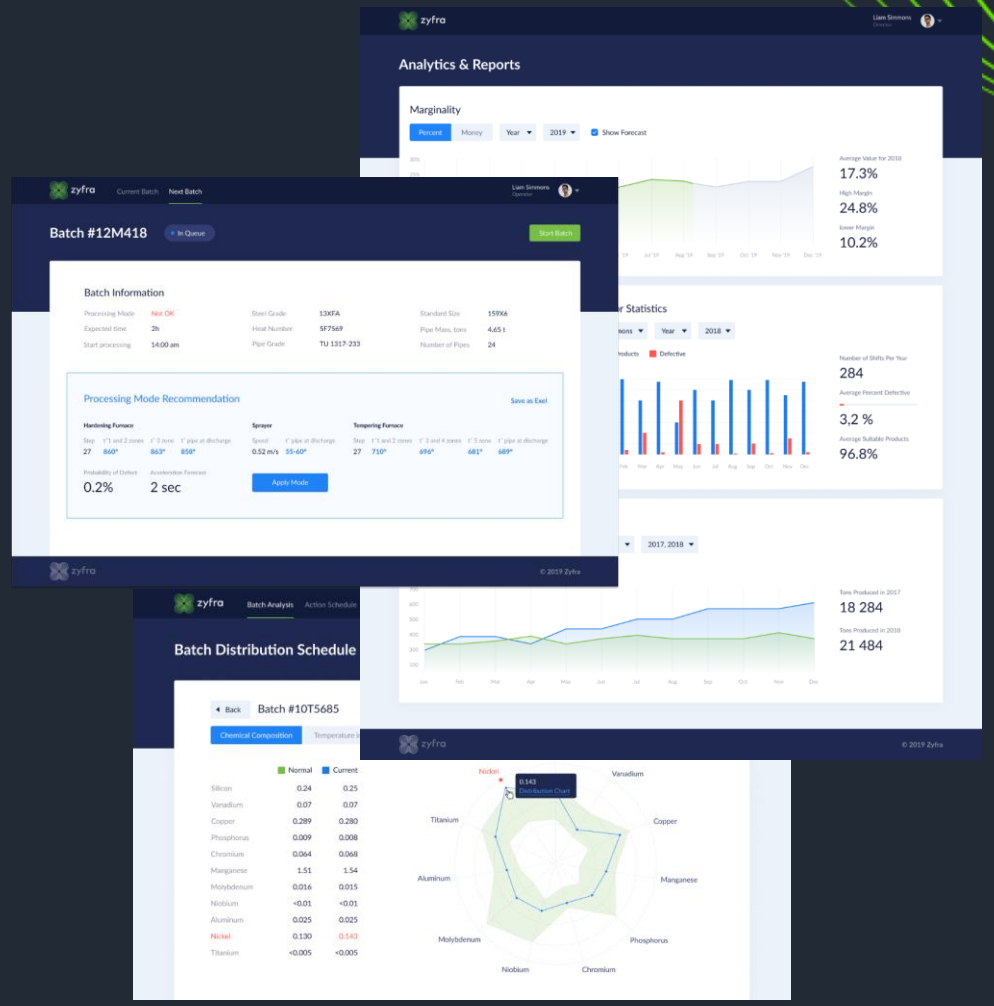
Zyfra HeatTreatment

Use optimal settings to achieve optimal results

- Recommended furnace temperatures, speed
- Predicted quality with pre-defined risk level
- Generate settings for new products
- Cheaper steel making while maintaining quality

Integrated ASP, DSS and BI solution for all heat treatment needs

- Advanced Planning and Scheduling
- Decision Support System
- Business & Technology Intelligence
- MES, SCADA, LIMS integration



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for mining

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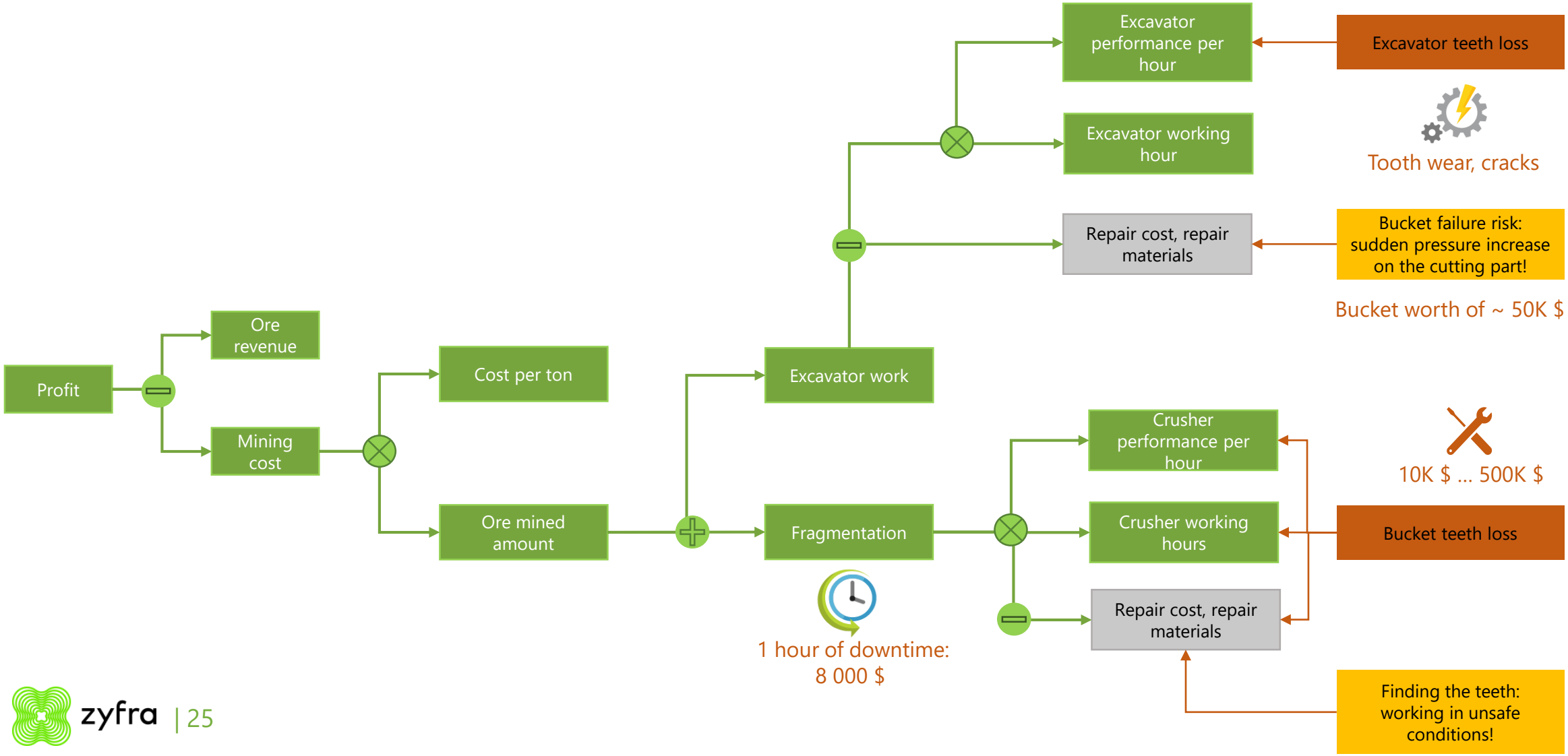
ZM BucketControl

Mining shovel teeth control system

Komatsu PC-3000 excavator

- Online detection of excavator bucket teeth presence or absence
- Deterioration estimation
- Alarming the machine operator in case of teeth loss/failure
- Notifying via dispatcher system

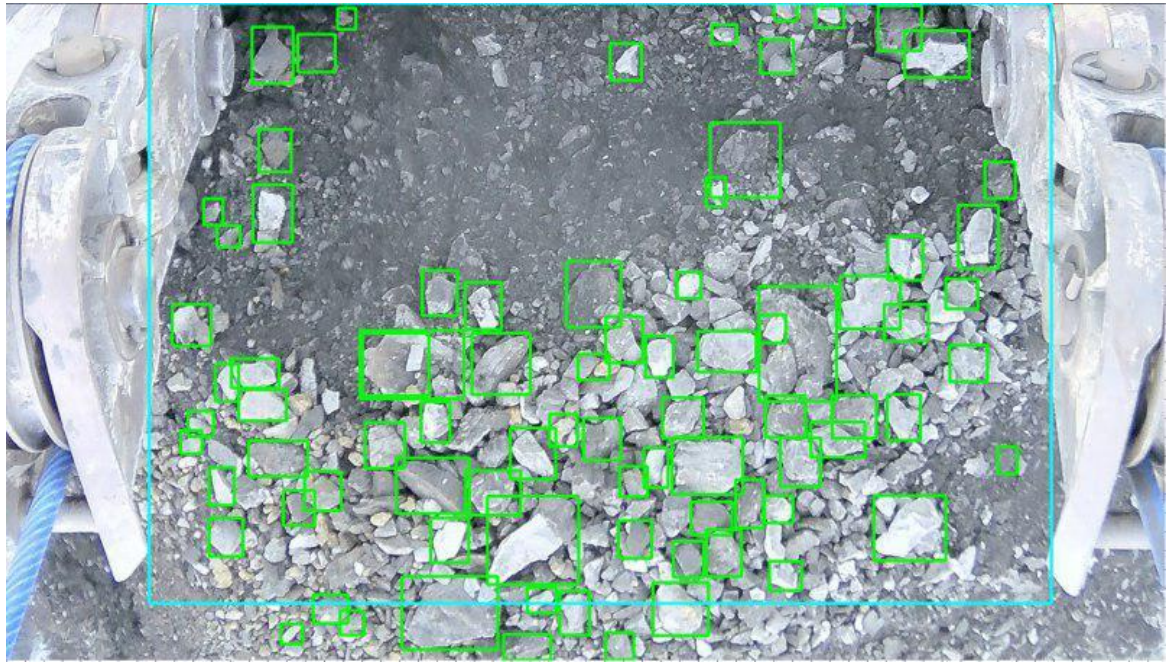
Teeth loss effect estimate, based on ore mining process



ZM Fragmentation

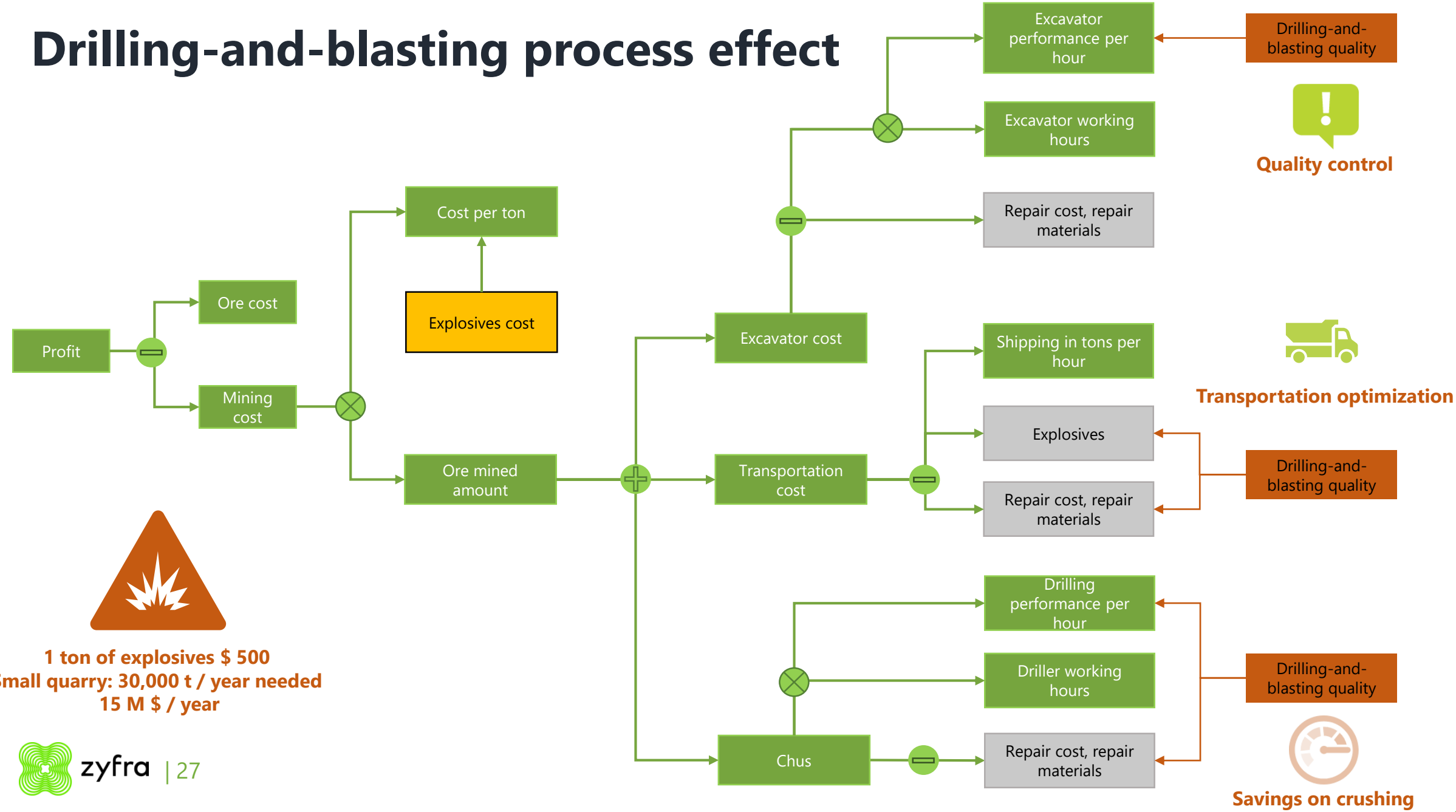
Optical granulometry detection solution

Bucyrus HD495 excavator



- Detecting the grains in the bucket after blasting
- Measuring the grain sizes, based on a photograph
- Building the distribution the grain sizes

Drilling-and-blasting process effect



1 ton of explosives $ 500
Small quarry: 30,000 t / year needed
15 M $ / year

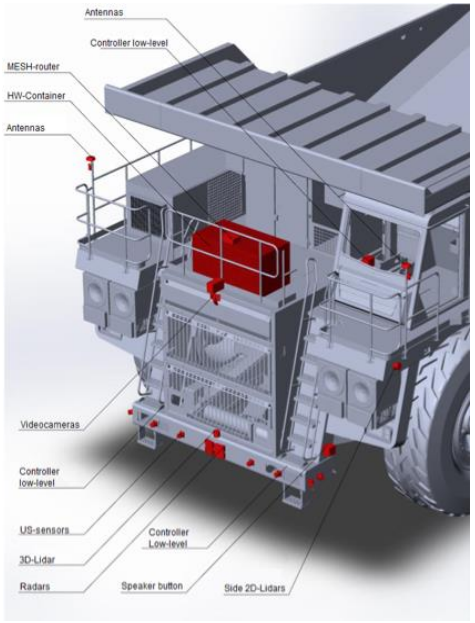
VG LoadPro: OEM solution

We monitor
Loading and sticking
Exploitation quality control

We track
Number of trips
Fuel level
Downtime
Mileage and working hours

We get
Autonomous haul trucks
Vehicles remote control
Automation of routine tasks

We visualize
Percentage of load of truck body to the operator of a shovel
Augment reality to provide additional information for operator



* Demo video is available here

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Zyfra ZIF:
IoT platform

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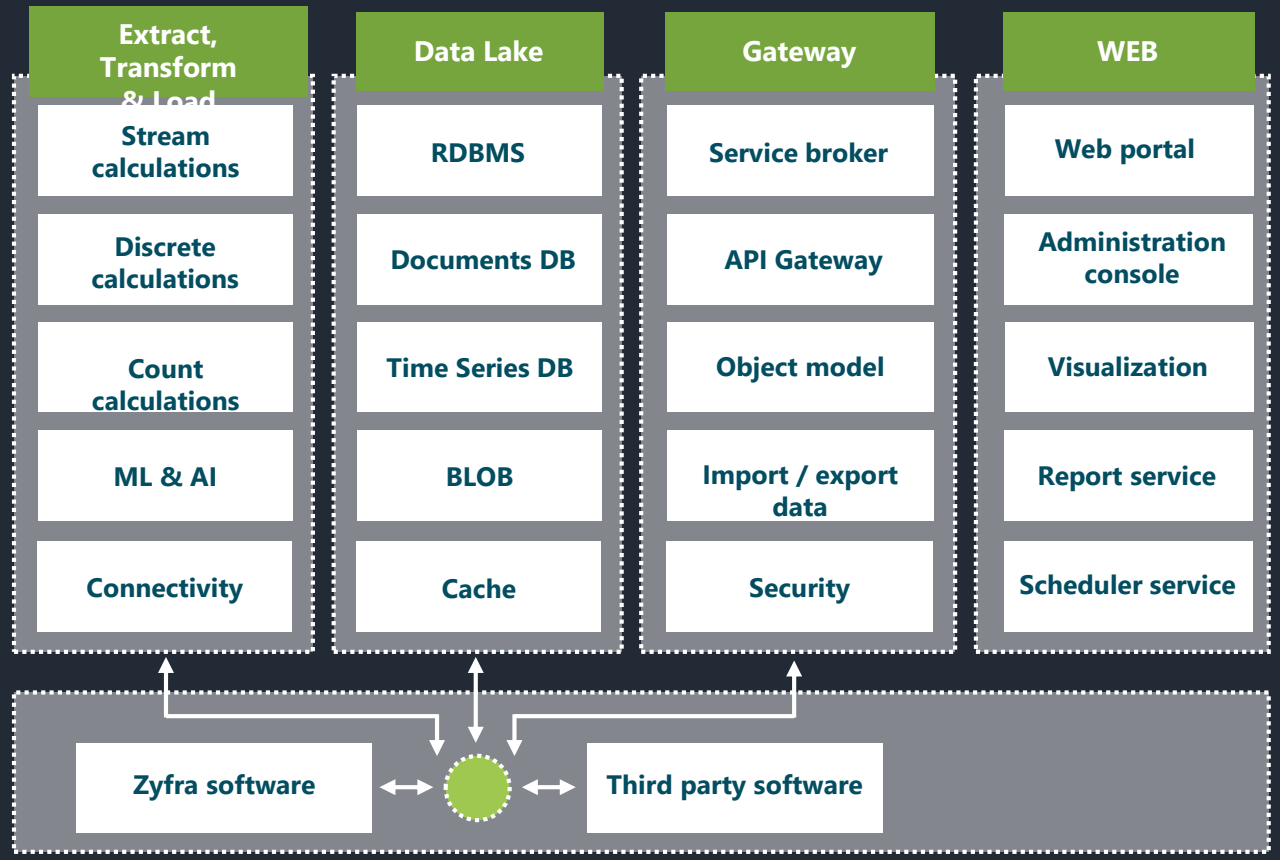
Zyfra industrial framework for recommendation systems and integration with automation and IT systems

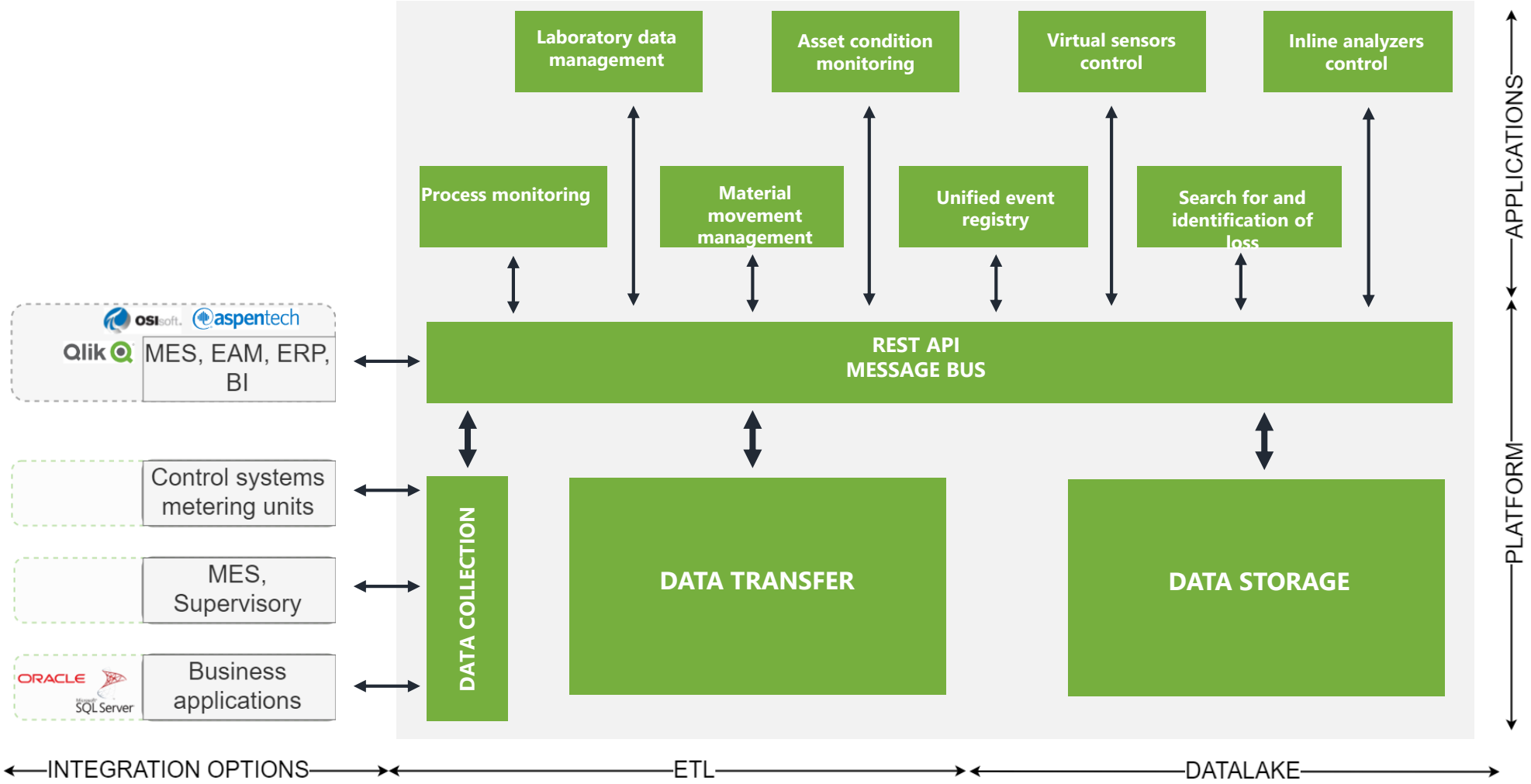
Key functions:

- Real-time data collection
- Data preprocessing, compression and normalization
- Data storage and archiving
- Unified data model & access for ML models and intellectual apps
- Built-in analytical apps
- Advanced visualization

On-premises or in cloud deployment



Zyfra industrial framework integration



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Production and shipping planning

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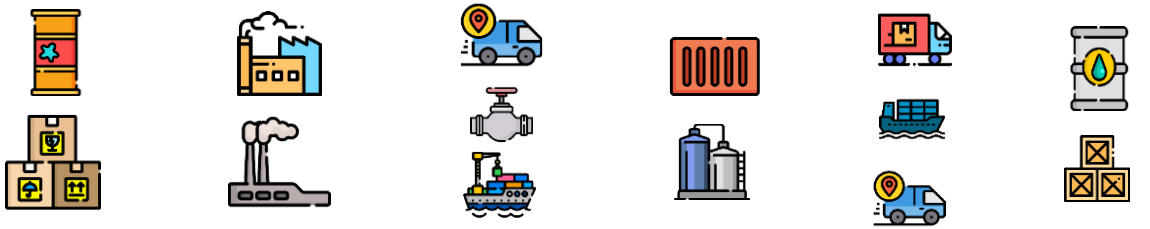
Production and shipping planning

Optimal planning

- Measuring manufacturing efficiency on every step
- Accounting and inventory management
- Multi scenario planning
- Funding bottlenecks
- Optimal work performance

Automatic order management

- Online feasibility calculation
- Recommendations for scheduled activities deferral
- Margin maximisation



Purchase | Production | Shipment | Storage | Delivery | Selling

Planning of full production and shipping cycle

- Automates the decision-making process where possible
- Identifies statistically significant factors and model constraints for scheduling
- Considers key task dependencies, priorities and constraints
- Machine learning model proposes an optimal scenario for each situation
- About 50 scenarios are assessed to choose 1 to maximize margin
- Regular recommendations on plan execution and process improvement
- Plan adjustment is done on-the-go after any change

Production and shipping planning optimization case study

Business Problem

- Strict deadlines in company's contracts
- Significant penalties due to the delivery delays
- Planning was done by 20 people once a month
- Plan was outdated by the next day
- Internal models did calculations 5 hours
- More frequent plan adjustment was required

Company decided to increase the storage of the product, which resulted in an asset turnover drop.

Constraints

1000 events, influencing the plan
60 products to manage

Zyfra PSP solution

- Amount of penalties decreased 4 times, which accounted for 1% of the final product cost (5% before the project).
- Overproduction decreased, warehouse assets were released and used for production later.
- All tasks are attached to business performance indicators. Client understands the cost for all interconnected tasks.
- Each plan recalculation is done in 50 sec.
- Daily precise planning for the next 30 days.
- Each 10 days planning for the next 90 days.

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PdM Tool Life:

Predictive maintenance for CNC machinery

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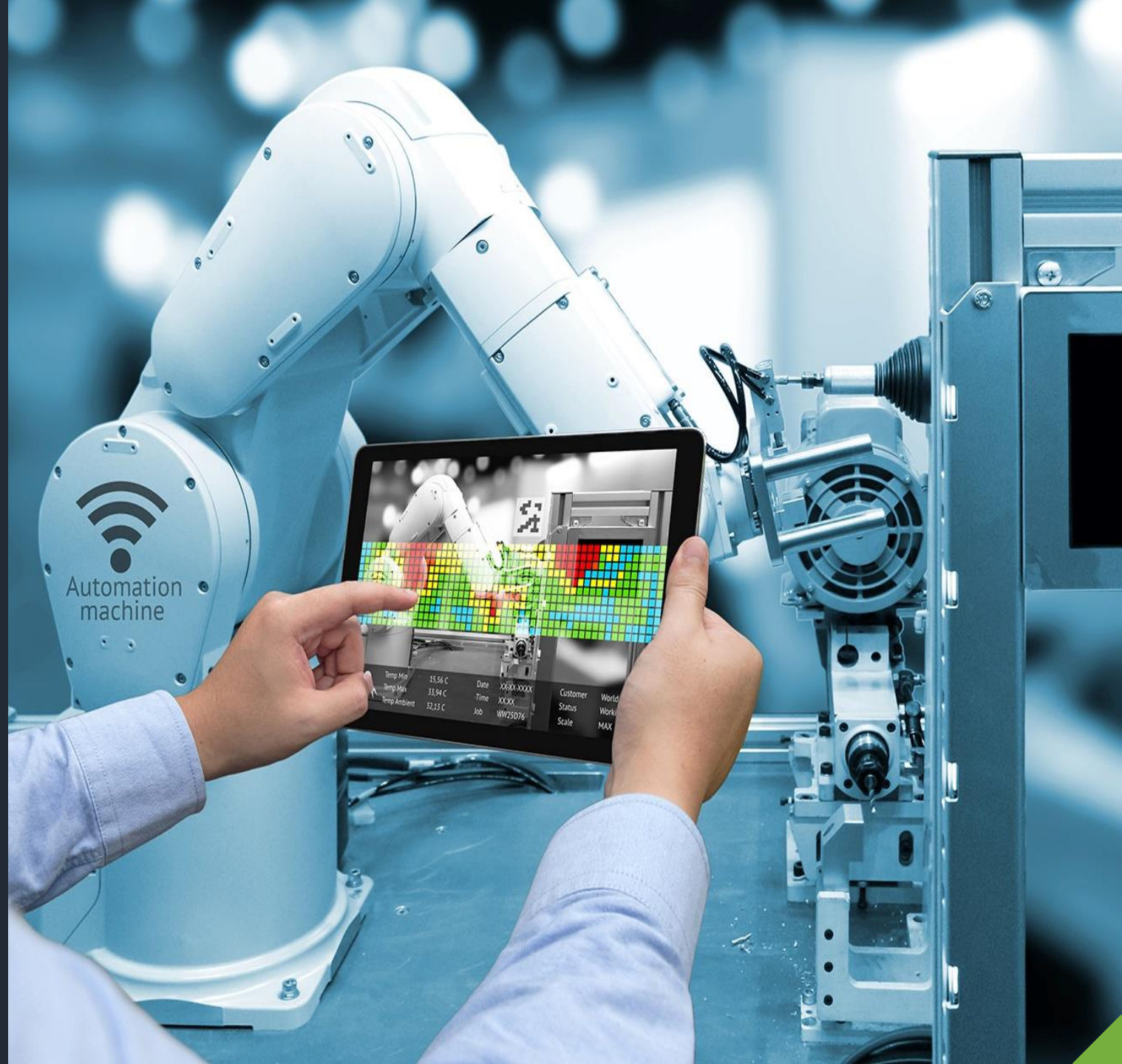


Zyfra Predictive maintenance solution

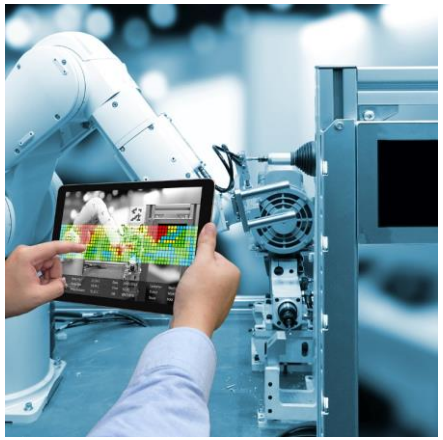
Combining and monitoring of material / energy balances

- Identification and accounting of imbalances (losses) on the site
- Control of specific norms (including dynamic)
- Monitoring the status of accounting systems

Process monitoring

- Process degradation prediction
- Detection of “freezing / shutting down” instrumentation and automation
- Monitoring and analysis of personnel actions

Equipment predictive maintenance



- Predictive maintenance of dynamic equipment
- Monitoring the status of tools for metalworking machines

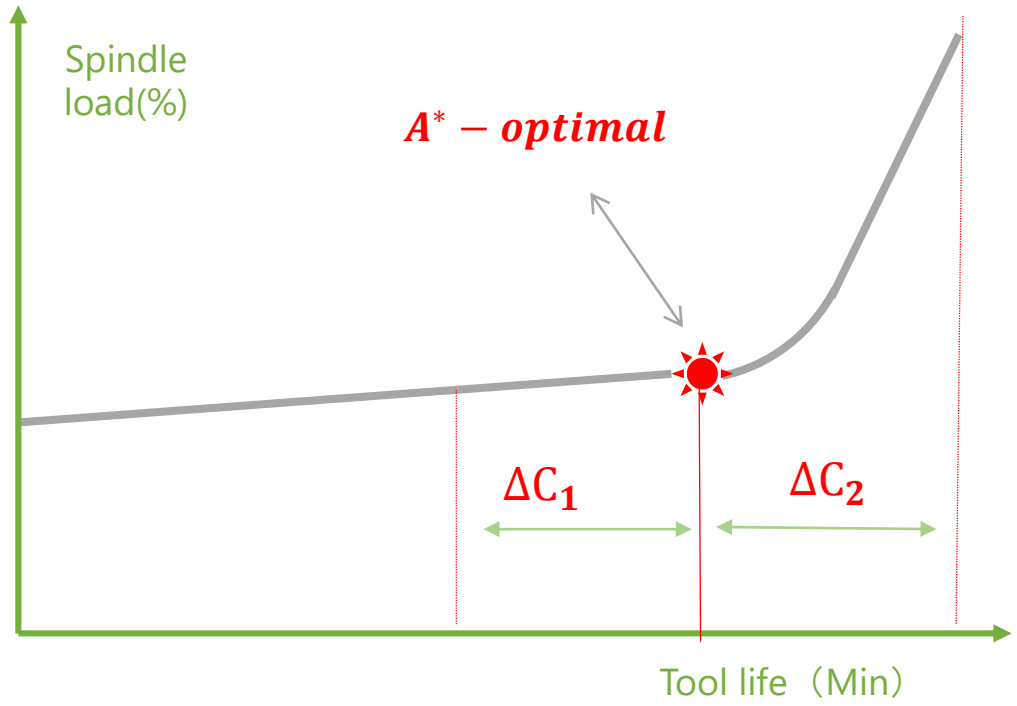
Potential effect from applying the solution:

- 1-5% increase in production
- 5-10% reduction of production costs
- Reducing the level of injuries and the number of accidents at work
- Reduction of product losses
- Improving the overall equipment effectiveness

CNC machines parameter monitoring to reduce asset downtime and improve product quality

AI Predictive Maintenance will let you know the optimal time for equipment change and notify your maintenance manager when an anomaly is detected that could lead to a breakdown.

This ability can prevent thousands of dollars of equipment replacement costs and days of downtime.



Economical effect

Tool Budget optimization

$\Delta C_1 \rightarrow 0$ + less purchase

$\Delta C_2 \rightarrow 0$ + less electricity usage

Decrease in the number of defective equipment

$\Delta C_2 \rightarrow 0$ + less spoiled instruments + less defects increase

Zyfra Predictive maintenance solution

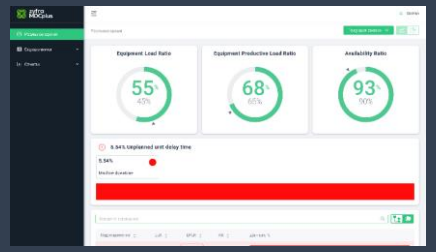
CNC data

1 0 0 1
1 0 1 1
0 1 0 0

Vibration-based data

Machine tools analysis module

- Main machine parameters reading
- Real working time



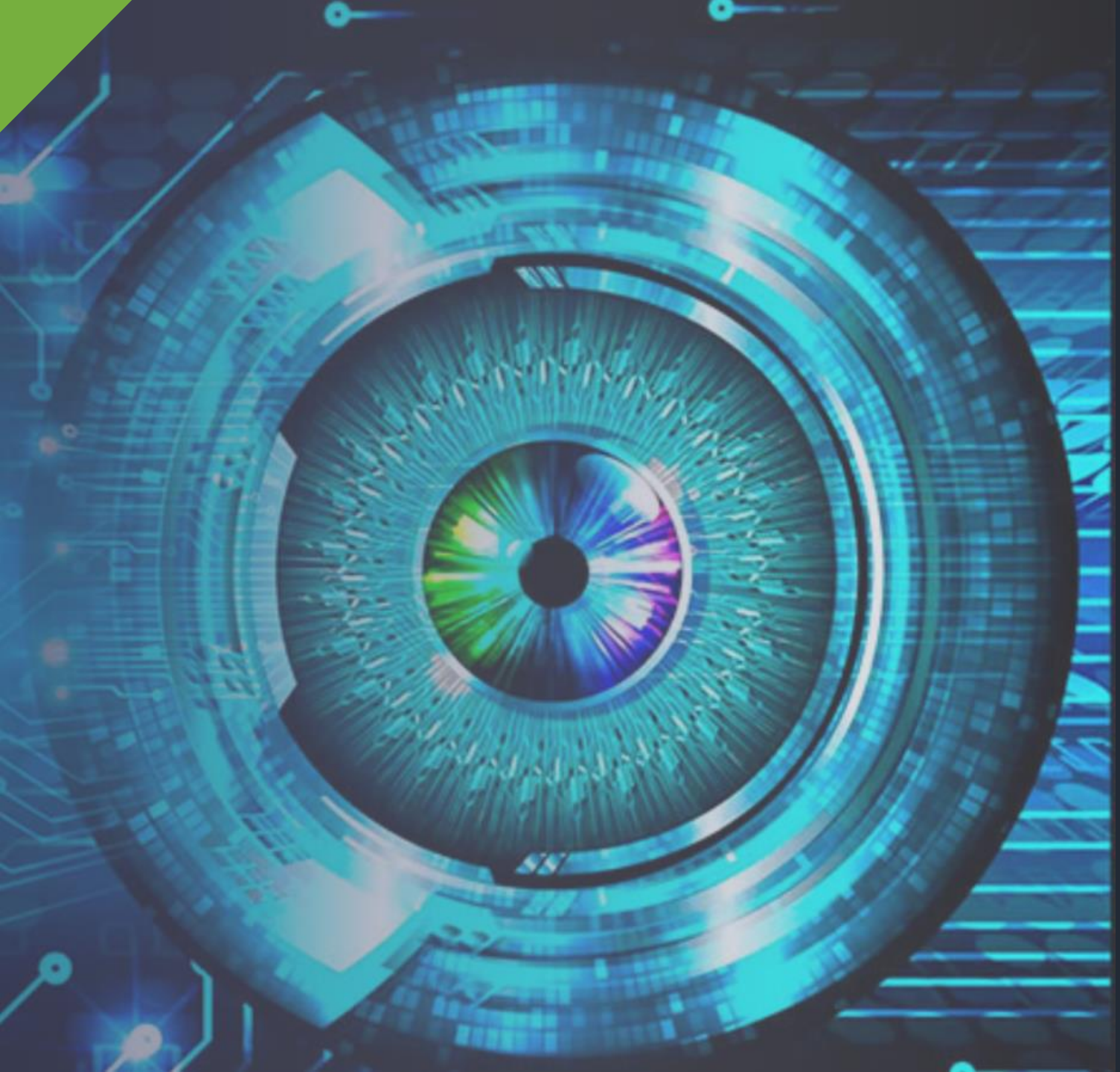
Predictive models module

Model 1

Model 2

Reference information module

- Tool class information
- Casting class information



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Computer vision industrial applications

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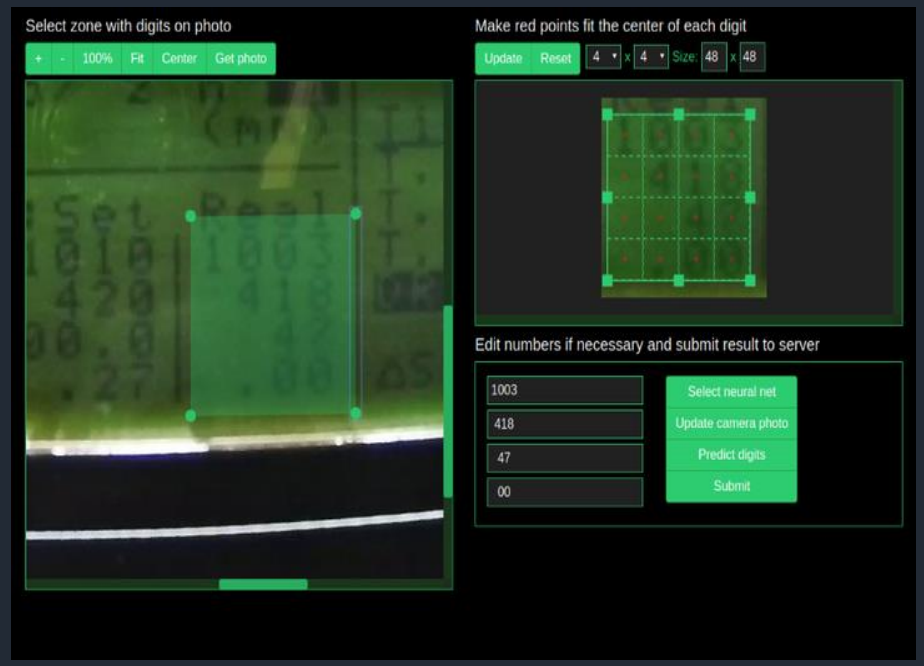
Zyfra Eye: reading dashboard equipment

Recognition settings



Recognition in action

- 5 times integration costs reduction
- Integration time reduction from 6 to 1 month

Counting the number of pipes through the application

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Zyfra Eye Safety:

AI for industrial safety

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What do we have now

Incident reporting problems:

- Reporting of small incidents takes time
- People do tend to forget doing reporting
- Not enough motivation to do reporting / out of scope
- Reporting colleagues' misconduct is uncomfortable
- Real-time monitoring of small incidents is difficult for alarm dispatchers from all camera streams

Result: only small part of accidents without consequences is reported.

Lack of information about preconditions and absence of instrument for informing the workers in real-time lead to the inability to organize proper policies and taking actions for further accidents with a different influence consequences.

Zyfra Eye Safety

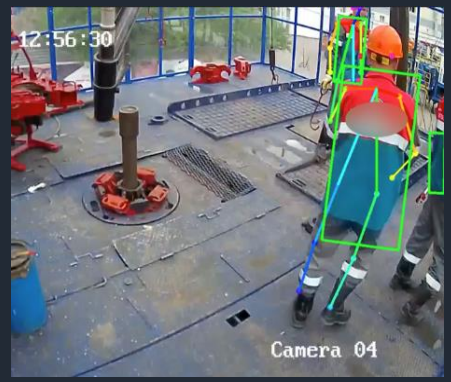
A comprehensive solution for detection of industrial safety standards violations based on Computer Vision

Checking the wearing of a proper personal protective equipment
Reducing non-productive time

- Ability to adapt safety policies
- Creating safe working habits via feedback and work analysis
- Decrease LTIFR, TRIFR, repetitive violations by 40%

Counting workers, checking approved access, identifying people in a danger zone

- Reducing non-productive time
- Access control and notifications
- Ability to adapt safety policies
- Decrease LTIFR, TRIFR, repetitive violations by 40%



Monitoring the pose of the worker: identifying falling

- Reducing non-productive time
- Alarm system integration
- LTIFR, TRIFR decline

Identifying people, standing on a dangerous surface or in a danger zone

- Reducing non-productive time
- Control of working zones
- Safety issues notification
- Ability to adapt safety policies
- Creating safe working habits via feedback and work analysis
- Decrease LTIFR, TRIFR, repetitive violations by 40%

Prospective use cases

01

Breaking the rules:

- Smoking people
- Checking fall protection equipment
- Absence of safety vest
- People talking on the phone

02

Accidents:

- Falling overboard
- Falling from height
- Fatigue detection

03

Environment tracking:

- Smoke and fire detector
- Identifying spoils
- Fall of ground
- Vehicle detection and localization

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