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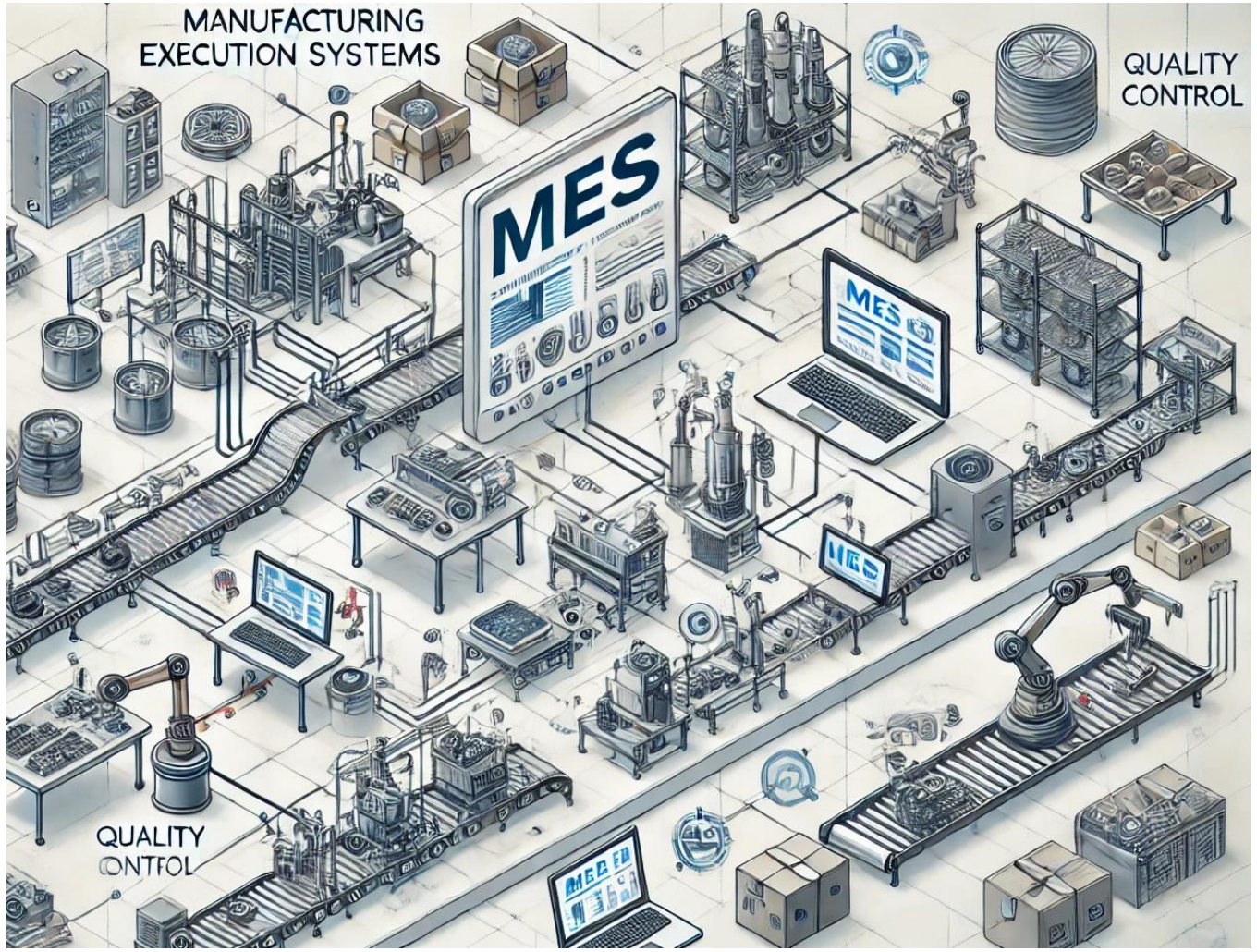
Speaker - Jakov Sidorov,
Managing director Softysol LLC

MES-SYSTEMS IN THE FOOD INDUSTRY IS THE KEY TO EFFICIENCY AND DIGITAL TRANSFORMATION

What is MES?

Manufacturing execution systems (MES) are a specialized class of manufacturing-oriented software that manages, tracks, and synchronizes the execution of real-time physical processes involved in converting raw materials into intermediate or finished products.



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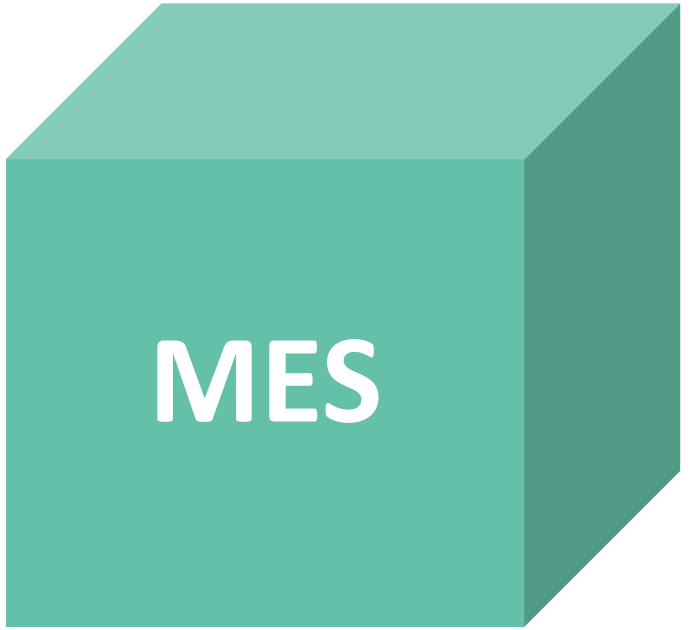
Challenges in the food processing industry and their solutions

- Rising raw material and energy costs
- Strict quality requirements
- High competition
- Changing consumer preferences



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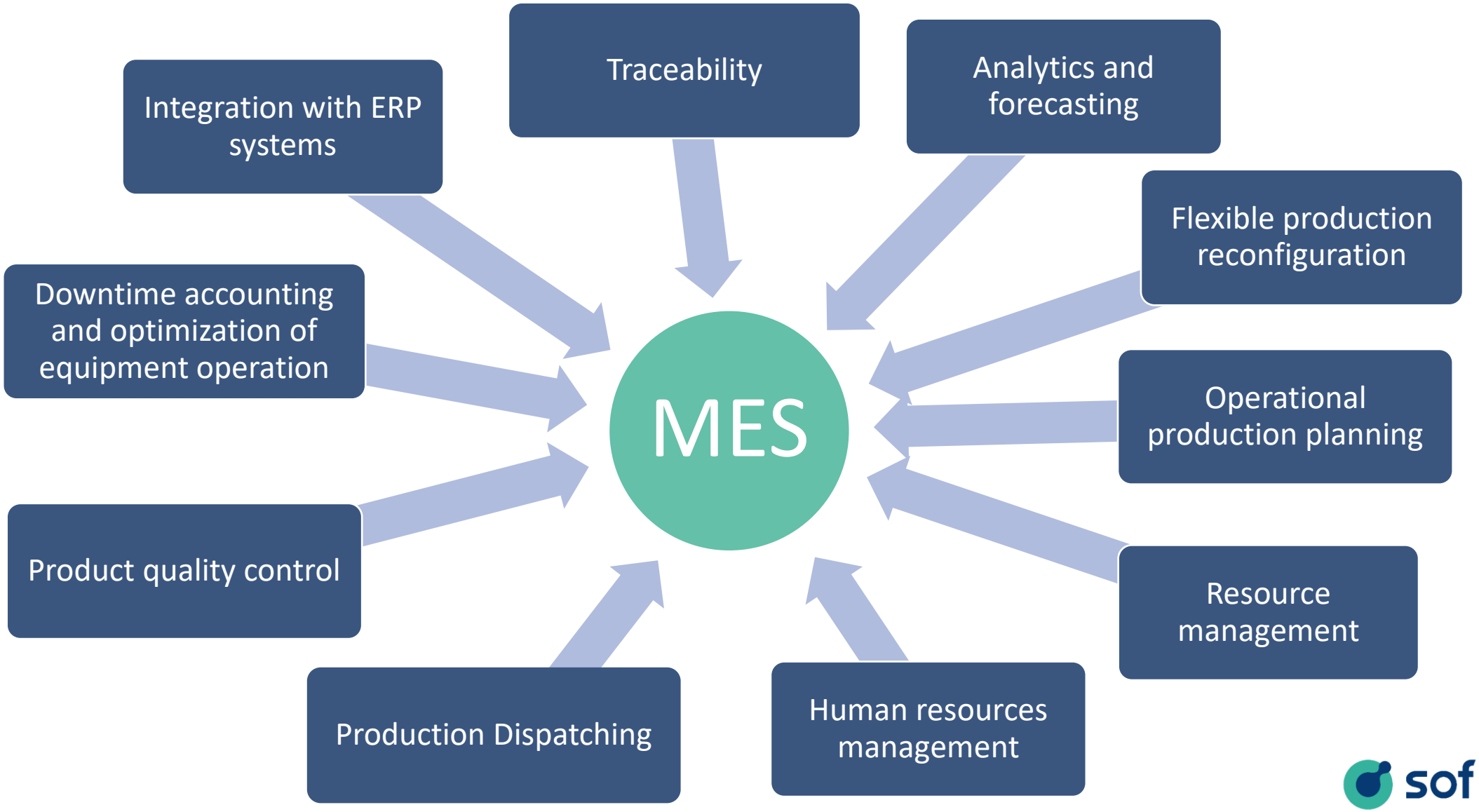
Main functions of MES systems in the food and beverages industry



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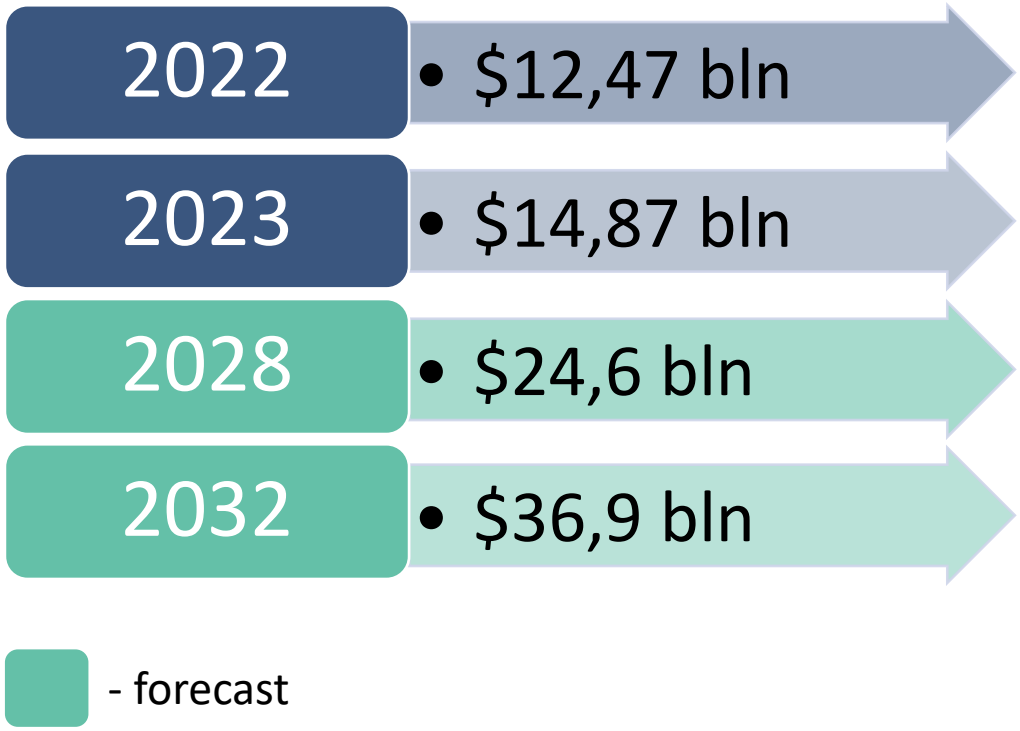
Statistics of MES implementation in the food industry

The global MES systems market is growing:



The compound annual growth rate (CAGR) ranges from 10.10% to 11.4% during different periods, demonstrating the rapid adoption of MES technology in the industry.

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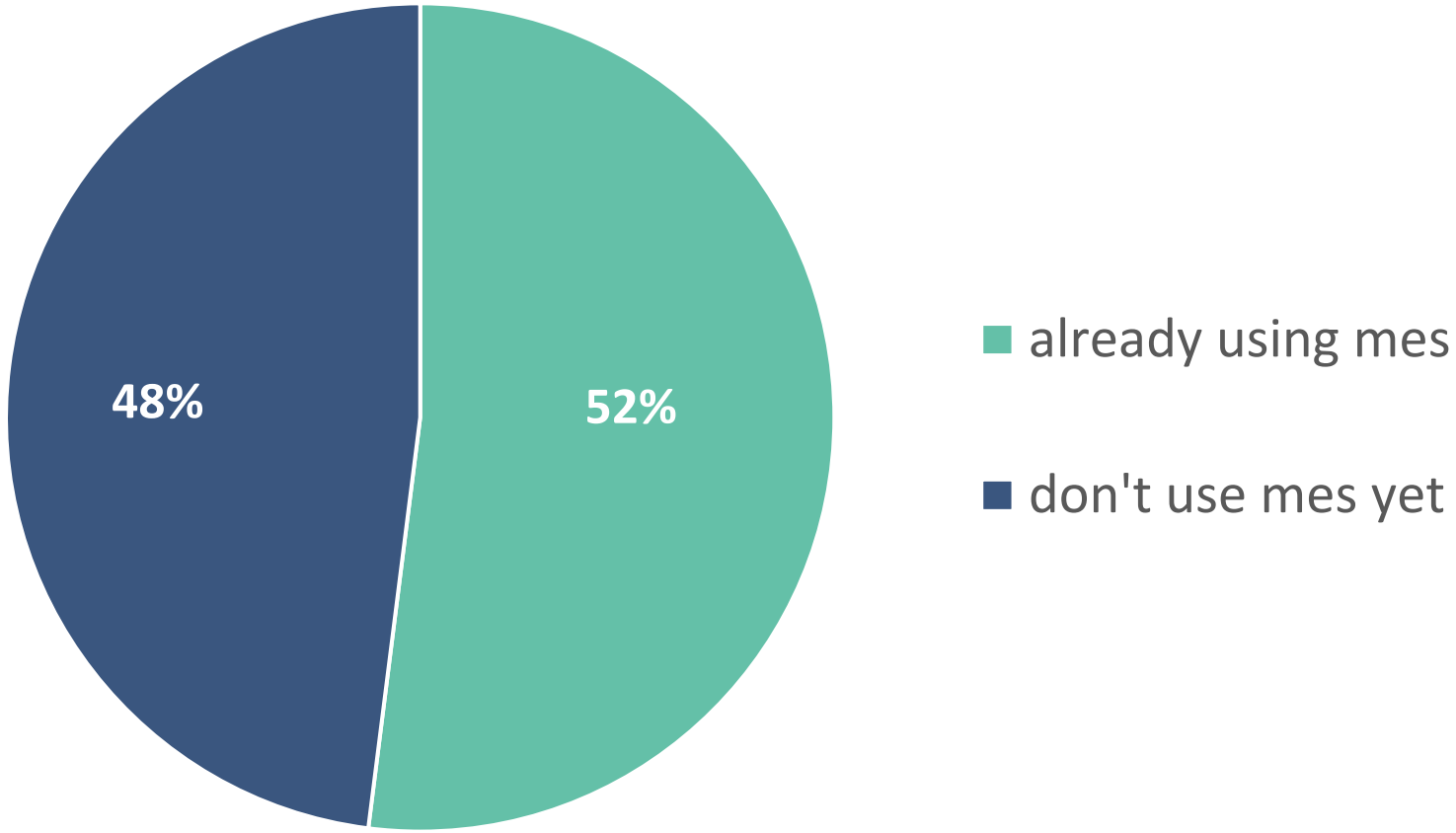
Статистика внедрения MES в пищевой промышленности



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MES in Russia today.
Successes and problems of development

TADVISER
Государство. Бизнес. Технологии

Sk Сколково

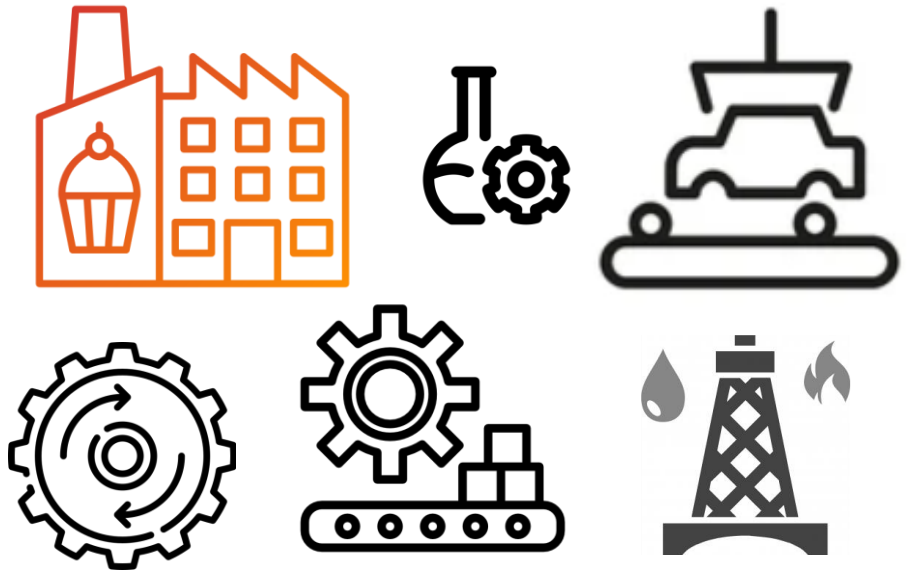
Stage 1 - in-depth interviews with customers of MES systems
Stage 2 - survey of MES system developers (initial assessment)
Stage 3 - demonstrations of MES systems (expert evaluation)

50 MES systems

MES systems

- Universal
- For continuous production
- For mixed production
- For discrete production

Branches:



Successes:

Active development and distribution of MES systems, understanding by customers of their purpose and necessity of implementation.
Diversity of MES products, including highly specialized ones.

Problems:

Large customers lack platform-based, out-of-the-box and feature-rich MES solutions.

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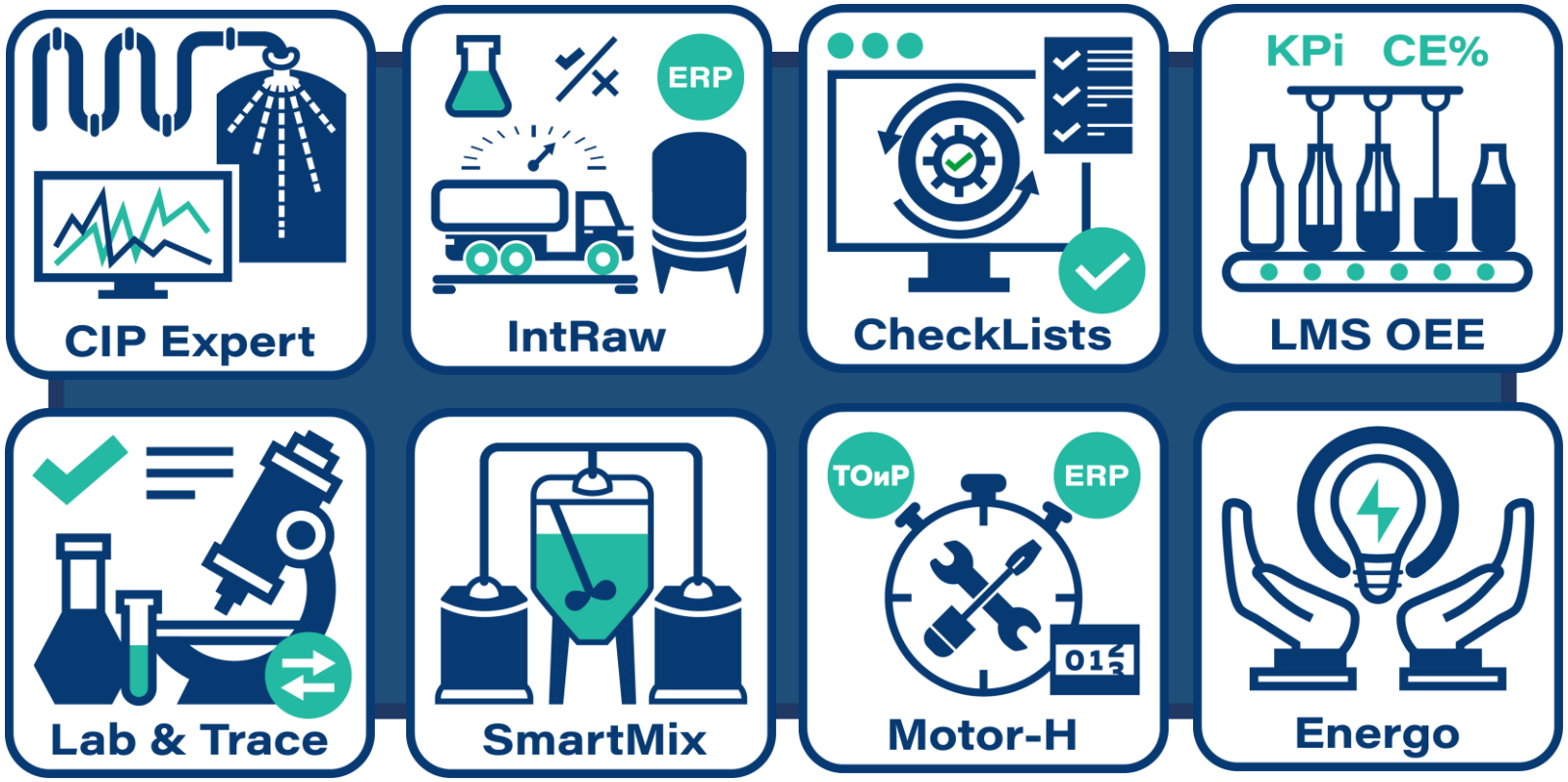
Common platform for solving different tasks

Quality control and accounting of raw materials at the Receiving Department

Condition control of process equipment during production

Monitoring and analytics of CIP-processes



Condition control of process equipment during production

Automated quality control and traceability of materials and processes at all stages of production

Energomanagement system

WEB calculator for beer mix creation

Accounting of equipment operating hours

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What is an OEE and why does an enterprise need one?

OEE (Overall Equipment Effectiveness) is a measure of overall equipment efficiency that helps businesses evaluate and improve the performance of production lines. OEE shows how efficiently equipment is used.OEE is measured in percentages.

OEE calculation formula =
Availability % x Productivity % x Quality %

Where:

- **Availability** - The amount of time the equipment is up and running without downtime.
- **Performance** - how fast the equipment is running compared to the maximum possible speed.
- **Quality** - the percentage of quality products without defects.

What is an OEE and why does an enterprise need one?

Availability Loss	Unplanned Stops	Equipment Failure
	Planned Stops	Setup and Adjustments
Performance Loss	Small Stops	Idling and Minor Stops
	Slow Cycles	Reduced Speed
Quality Loss	Production Rejects	Process Defects
	Startup Rejects	Reduced Yield
OEE	Fully Productive Time	Valuable Operating Time

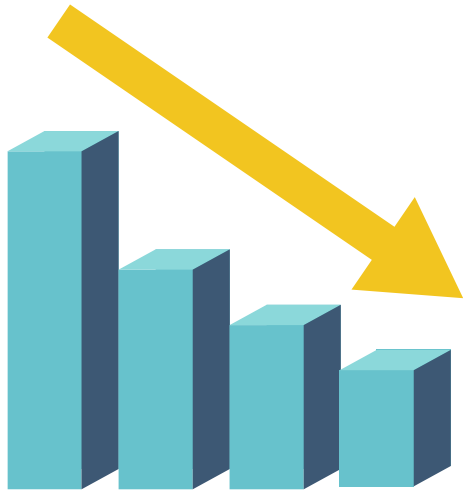
Average OEE by industry:

Automotive industry - 75-85%
Food industry - 50-80%
Pharmaceutical industry - 60-75%
Benchmark (World Class) - 85% and higher

OEE and its role in food processing

Typical causes of reduced OEE:

- Frequent unplanned downtime;
- Insufficient equipment loading;
- Reduced speed of production lines;
- Product rejects and defects.

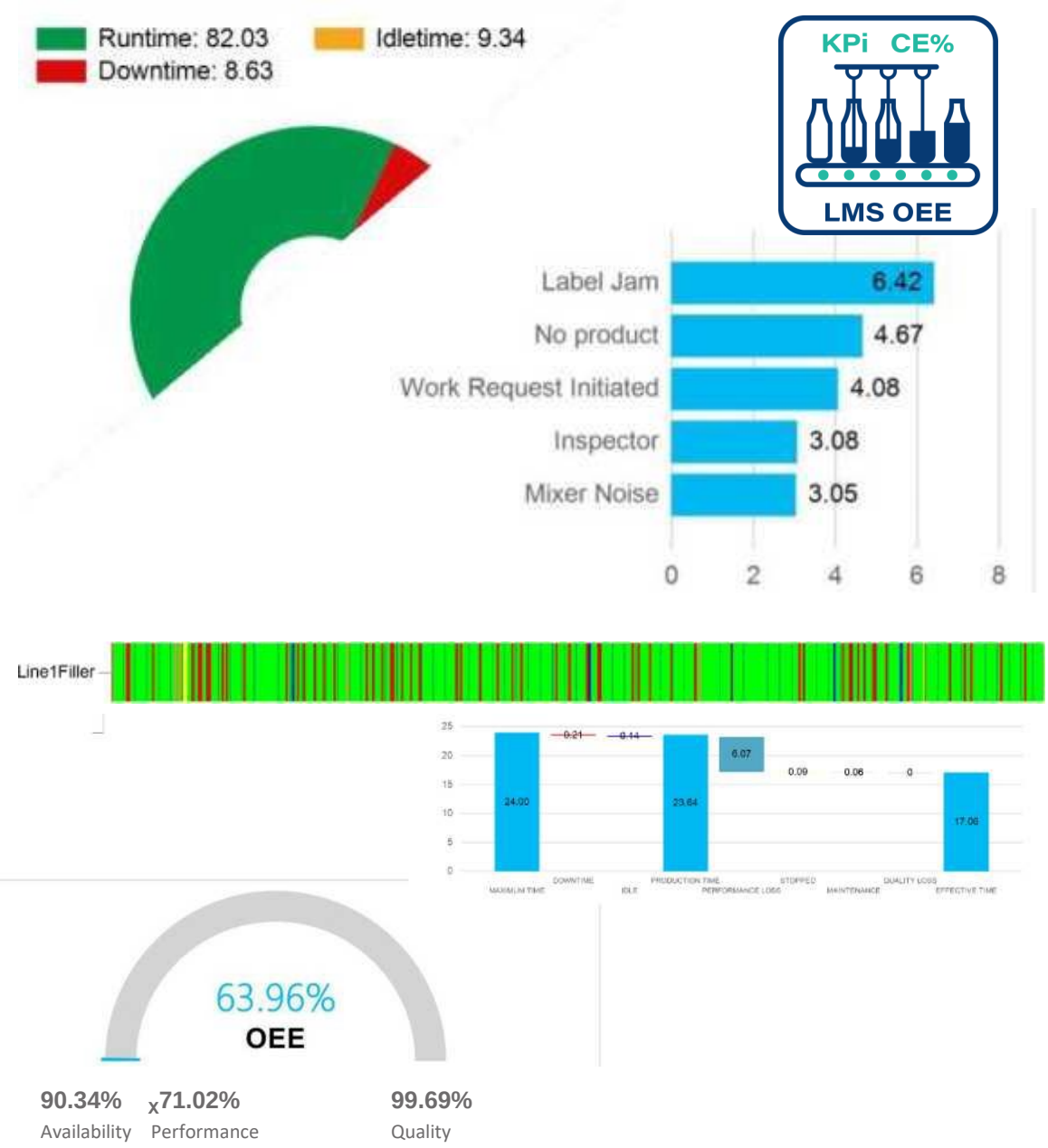


How does MES improve OEE?

- Automatic identification of the bottlenecks;
- Improved maintenance planning;
- Optimization of line loading;
- Smart management analytics.

8 reports for OEE and equipment analysis

Pepotrs	Функция
Анализ OEE	OEE factors and trends in processes
Dashboard on usage efficiency	For equipment: OEE (+MTBF, MTTR) Downtime (by reason/by number), Loading
Loading Analysis	Primary causes of production losses: downtime, in operation, not scheduled, time/team/group/cause loading
Equipment Loading	Product-related analysis / WO
Equipment Loading Chart	Load, reasons on the diagram line
Cascading Load Chart	Load, reasons on the line of the cascade diagram
Mean Time Between Failure (MTBF)	Detailed unplanned shutdowns (MTBF)
Mean Time To Repair (MTTR)	Productivity of maintenance and repairs(recovery time, repair time)



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Benefits for production

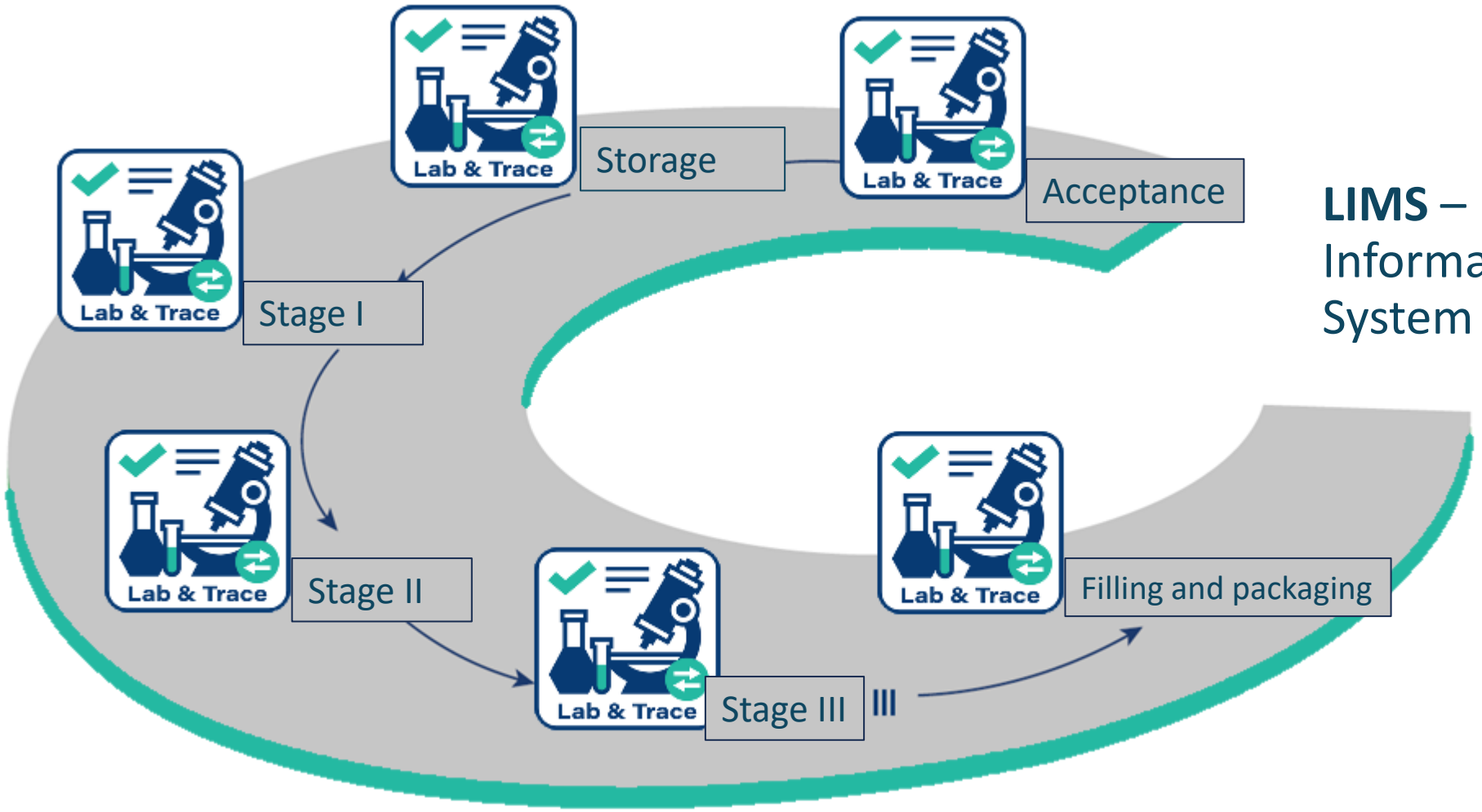
Before investing in new equipment (CAPEX), use OEE to realize the potential of existing lines.

Key metrics:

+5% overall efficiency (analytics and monitoring).
-40% downtime (Example: $X savings per hour).
+15% ROI (return on investment in current equipment).
+5% order fulfillment (customer satisfaction).

Equipment → Monitoring OEE → Optimization → Increase in capacity

LIMS for Dairy



LIMS – Laboratory Information Management System

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Quality control and traceability at all processing stages

What kind of problems does Lab&Trace solve?

Consolidation of electronic logs of different services

Laboratorians and WTP Engineers from different shops work in a common digital field;
Accessibility and fast data retrieval
Minimize errors

Quality assurance of the finished product and Reduction of quality losses

- Automation of quality control at the end of each process
- Control of compliance with recipes and specifications, detection of deviations
- Blocking of low-quality batches

Organization of end-to-end traceability of genealogy and movement of materials at different stages of processing;

- Forward and reverse traceability;
- By production tasks;
- By batch.

Integration with laboratory equipment and ERP-systems of the enterprise.

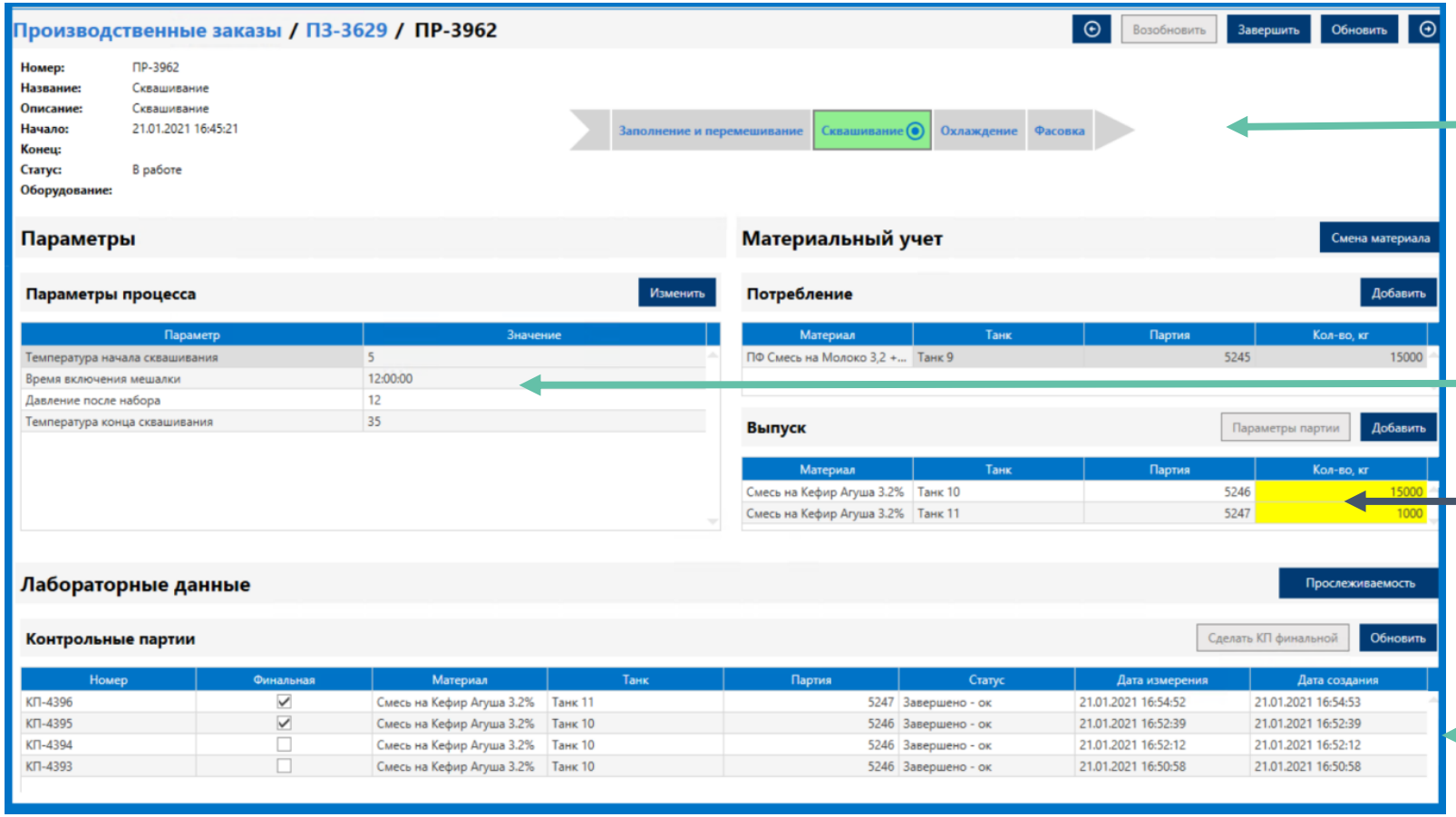
Sending data to ERP/SAP/1C directly from the L&T system.

Material accounting

In-depth reporting

Quality control and traceability at all processing stages

Lab & Trace



The production order consists of 4 processes, is in the current phase of process #2 Fermentation;

Process parameters

Material accounting

Control samples

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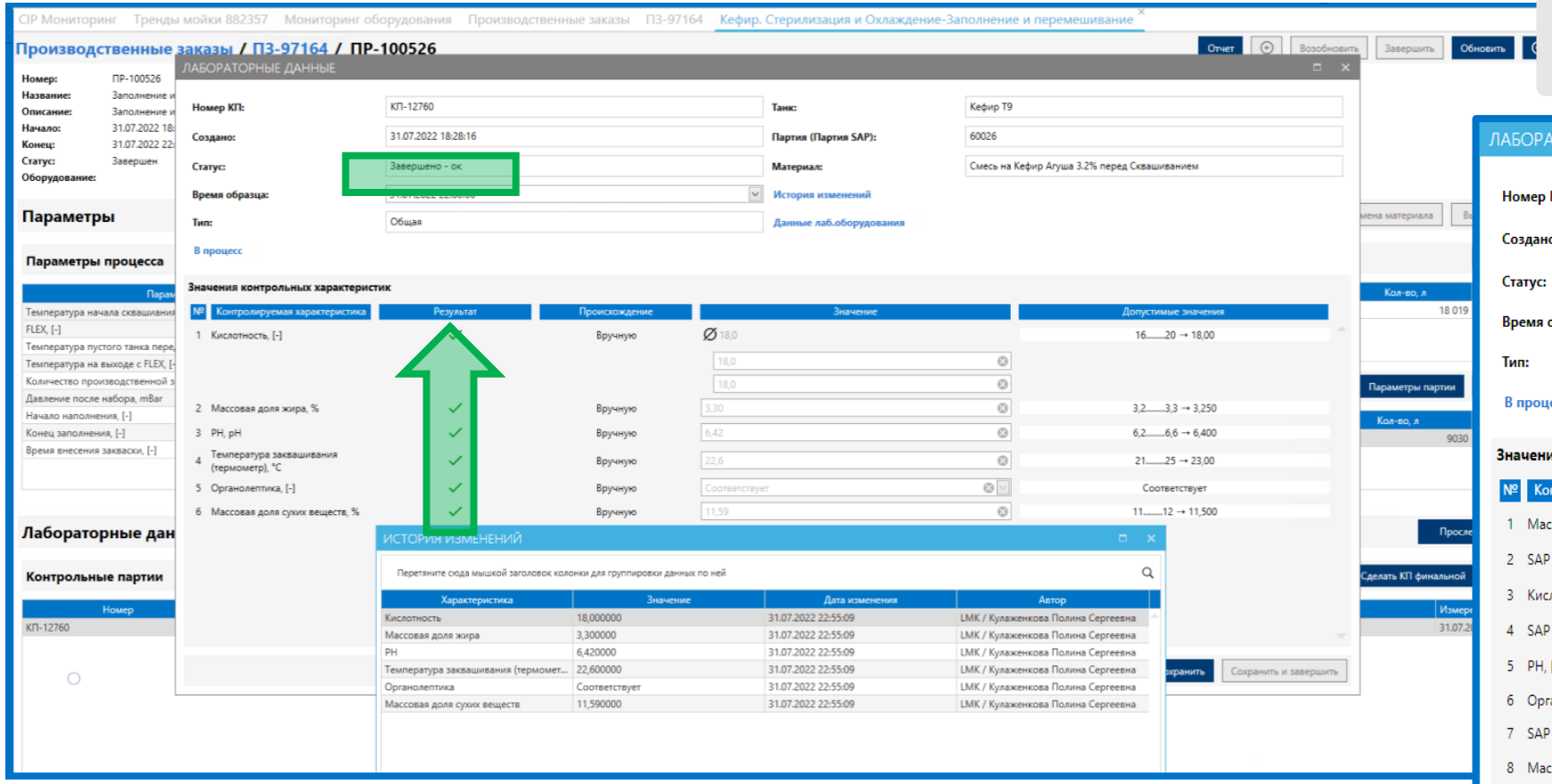
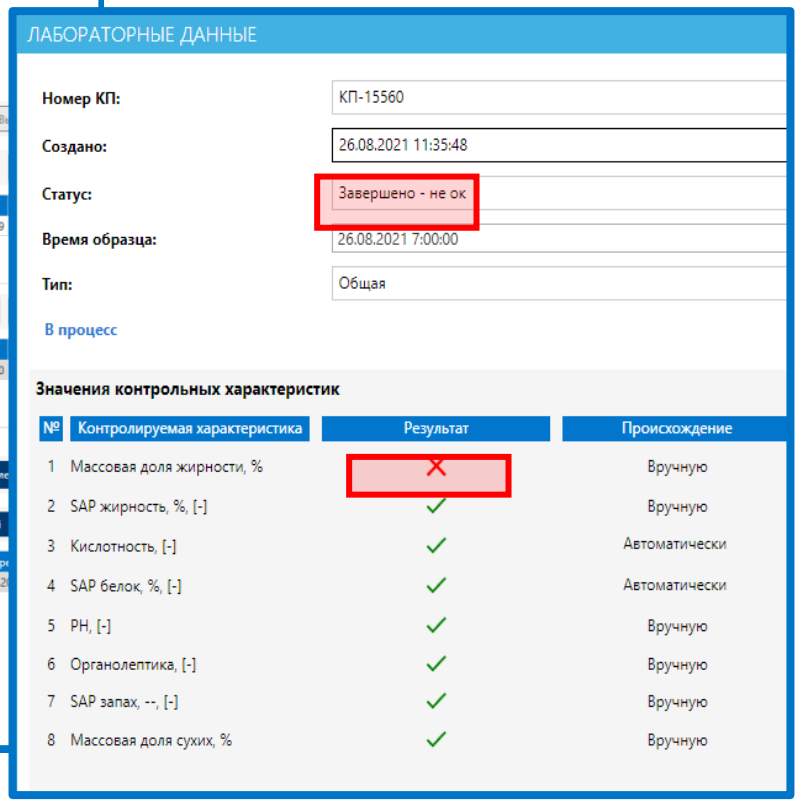
Screen for entering and validating quality indicators

Lab& Trace serves: Physicochemical laboratory, raw material receiving laboratory, ingredients, packaging materials, microbiological laboratory, tasting.

- Operational control of process parameters
- Operational control of all laboratory parameters of products
- Recipe control and adherence to specifications





Benefits for production

1. **Cost analysis**
    1. Daily calculation of material costs for each batch
    2. Comparison with master recipe norms
    3. Identification of losses (5-7% at production stages)

2. **Forecasting and profitability**
    1. Automatic calculation of forecast cost
    2. Estimation of planned product profitability
    3. Increasing the efficiency of financial departments

3. **Laboratory control**
    1. Planning of sampling and analysis recording of results at each stage:
    2. Raw intake → Production → Finished product
    3. data input: manual + automatic from equipment

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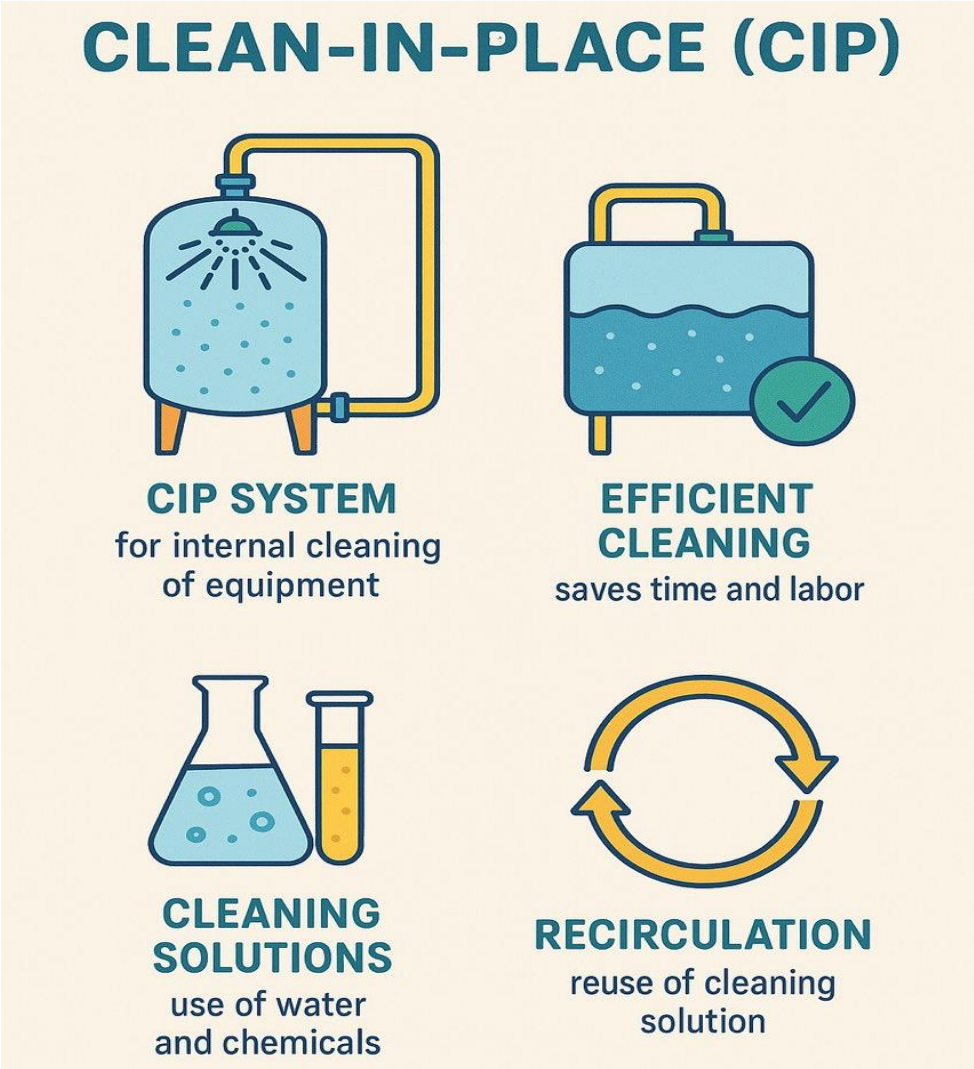
What is CIP?

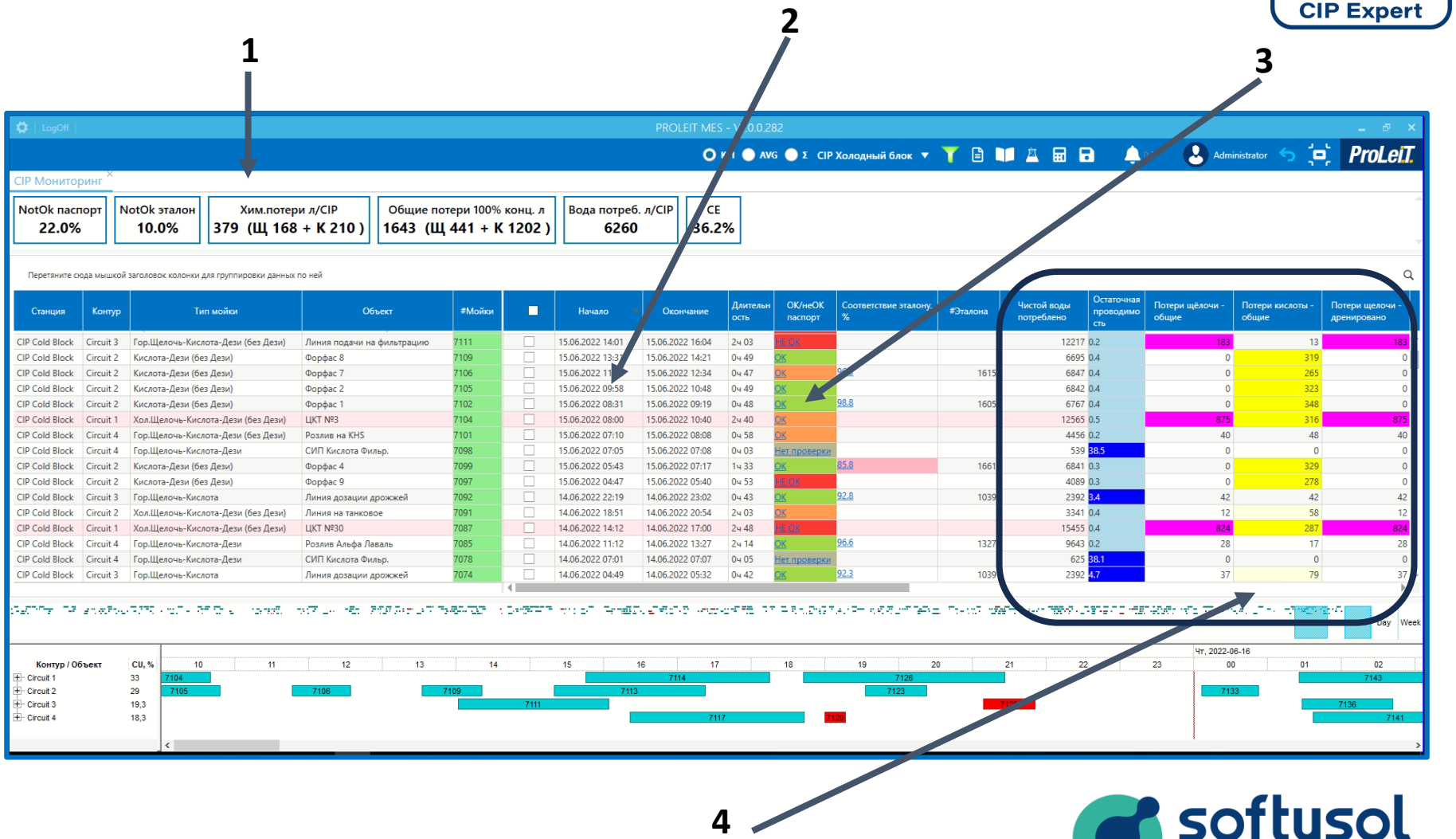


CIP (Clean-in-Place) is an automated cleaning system used to clean the inside of equipment without disassembling it.

CIP Expert. Electronic CIP- logbook. Monitoring and dispatching of CIP processes

What tasks does CIP Expert solve?

- Saving of water, solutions, concentrates, energy, time.
- Guarantee of equipment cleanliness - guarantee of product quality



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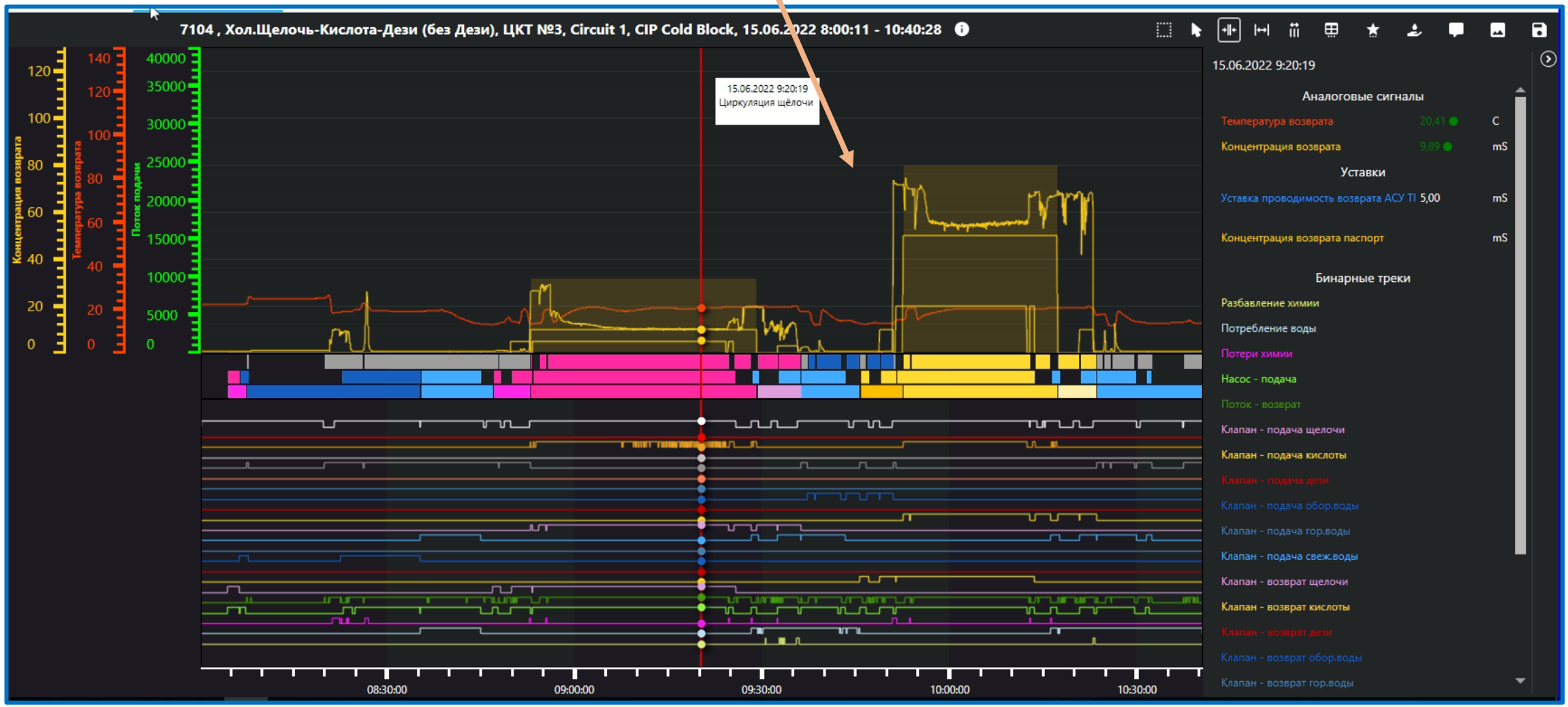
Analysis of cleaning graphics.
Example - control of cleaning regulation

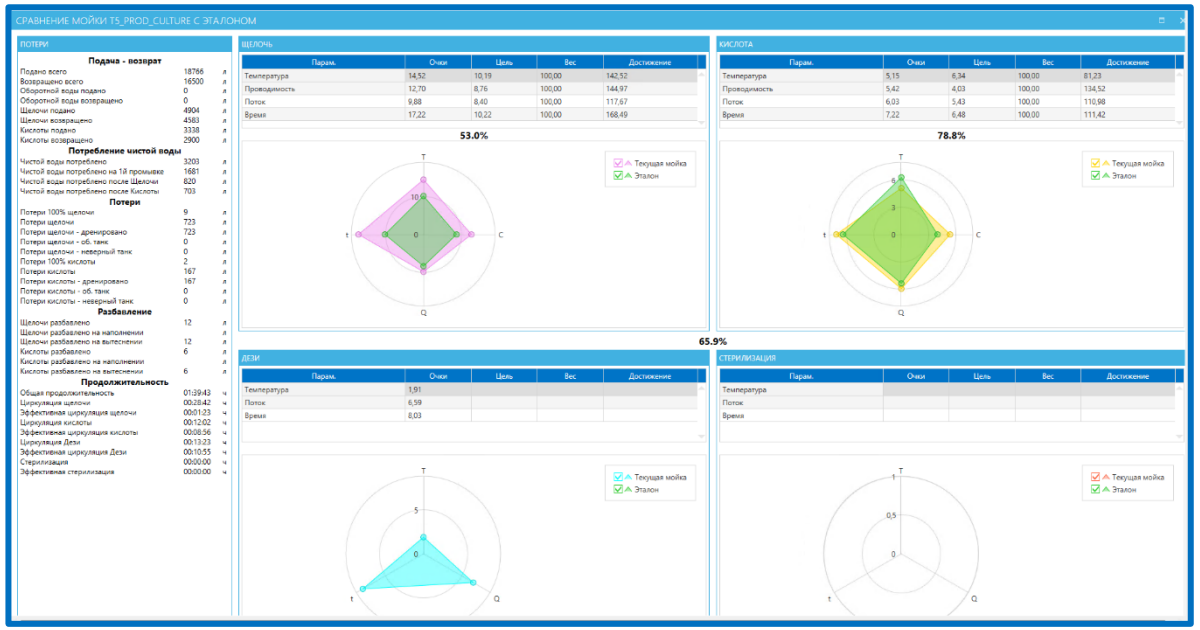
Control for compliance with the passport (regulation) of conductivity limits

Passport set point

PCS set point (too low (!)



MES for CIP in the dairy industry



Page Report
CIP-Отчёт (страничное представление)
05.10.2022 13:17:14

Работа мойки:	919799
Дата и время:	14.09.2022 21:13:37 - 23:10:52
Продолжительность:	01:57:15
Станция мойки:	OKV
Контур:	TSR_K
Объект:	Стеританк ALSAFE2
Тип мойки:	Щелочь Кислота
Инциденты:	2 Без листа проблем: 2
Статус мойки:	НЕ ОК

Проверка наличия сред

Щ	К	Д	С

Проверка параметров

Циркуляция кислоты
Эффективное время

Переход в тренды | Переход в Cip Мониторинг

Шаг мойки	Начало	Оконча-ние	Длитель-ность	Статус
Циркуляция свежей водой	21:14:01	21:43:41	00:29:40	
Параметр / Установочное значение / Минимальное значение / Среднее значение / Максимальное значение / Статус				
Поток подачи, л/ч	13 500,00	0,00	14 787,95	23 220,00	Нет ошибки
Циркуляция щёлочи	21:45:05	22:21:01	00:35:56	
Температура возврата, t°	75,00	38,90	80,07	84,60	Нет ошибки
Поток подачи, л/ч	13 500,00	0,00	15 067,27	23 350,00	Нет ошибки
Проводимость, mS	54,00	16,35	76,41	95,40	Нет ошибки
Эффективное время	00:30:00		00:29:31		Нет ошибки
Циркуляция свежей водой	22:22:49	22:30:01	00:07:12	
Поток подачи, л/ч	13 500,00	8 380,00	14 703,48	21 480,00	Нет ошибки
Циркуляция кислоты	22:31:23	22:56:37	00:25:14	
Температура возврата, t°	65,00	30,50	64,69	70,00	Нет ошибки
Поток подачи, л/ч	13 500,00	0,00	15 146,95	23 030,00	Нет ошибки
Проводимость, mS	45,00	12,55	69,26	83,40	Нет ошибки
Эффективное время	00:20:00		00:17:14		Значение меньше установленного
Циркуляция свежей водой	22:58:05	23:10:52	00:12:47	

Работа мойки: 923221
Дата и время: 18.09.2022 18:03:30 - 20:20:21
Продолжительность: 02:16:51
Станция мойки: OKV
Контур: TSR_O
Объект: Автомат розлива TBA7
Тип мойки: Щелочь Кислота
Инциденты: 0
Статус мойки: OK

Проверка наличия сред

Щ	К	Д	С

Проверка параметров

Переход в тренды | Переход в Cip Мониторинг

Шаг мойки	Начало	Оконча-ние	Длитель-ность	Статус
Циркуляция свежей водой	18:04:00	18:24:02	00:20:02	
Параметр / Установочное значение / Минимальное значение / Среднее значение / Максимальное значение / Статус				
Поток подачи, л/ч	8 100,00	530,00	8 930,07	15 190,00	Нет ошибки
Циркуляция щёлочи	18:40:10	19:11:36	00:31:26	
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Эффективное время	00:30:00		00:30:37		Нет ошибки
Циркуляция свежей водой	19:15:58	19:29:16	00:13:18	
Поток подачи, л/ч	8 100,00	8 060,00	8 989,47	9 830,00	Нет ошибки
Циркуляция кислоты	19:32:22	19:53:50	00:21:28	
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Проводимость, mS	60,00	69,10	70,15	97,60	Нет ошибки
Эффективное время	00:20:00		00:21:04		Нет ошибки
Циркуляция свежей водой	19:58:02	20:20:21	00:22:19	
Поток подачи, л/ч	8 100,00	0,00	9 026,25	16 560,00	Нет ошибки

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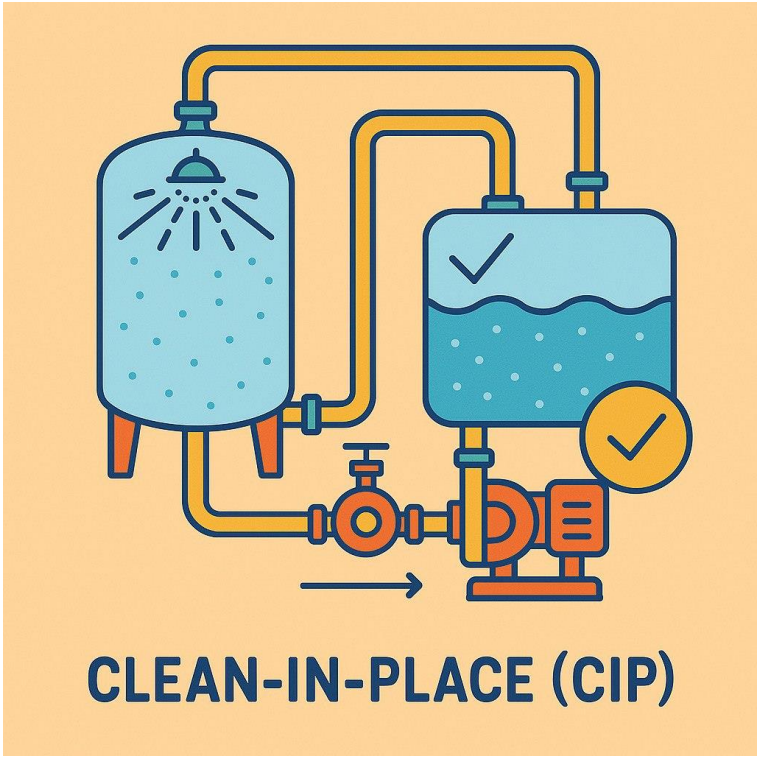
Benefits for production

50+ CIP circuits? Reduce costs and time with the digital module CIP Expert.



Benefits:

-7-10% of cost (acid, alkaline, water).

-15% of washing time.

Reduced environmental impact.

Real-time data + predictive analytics.

Payback period: 18 months (tested on dairies).

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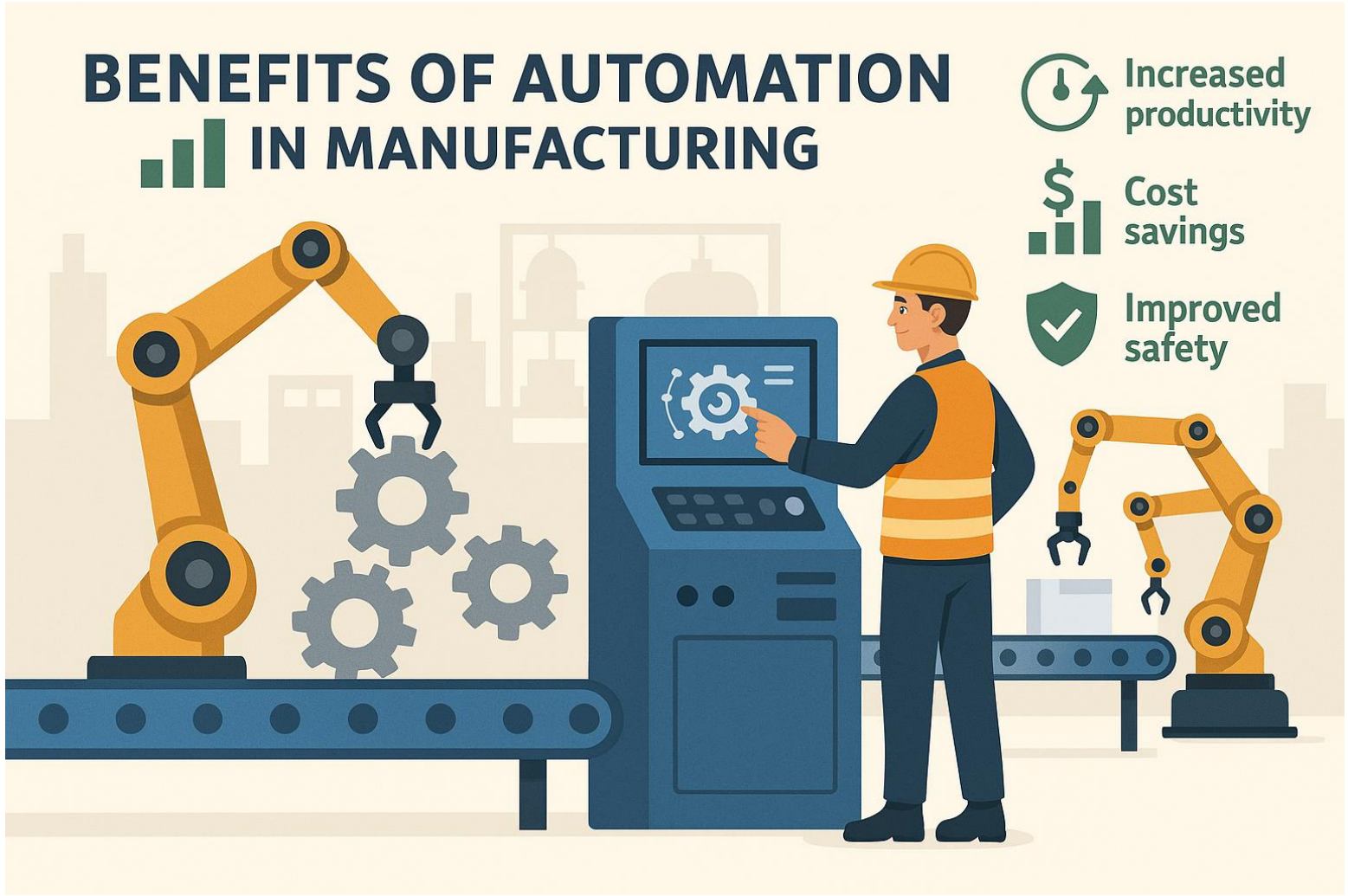
MES of Softysol

Summary

Companies that implement MES today get a significant competitive advantage and set the foundation for sustainable growth in the future.



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Thank you for your attention!

Softysol integration LLC FE

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