

INTELLIGENT GRAIN LEVEL MEASUREMENT

SENUVOL



Introduction



Engineering



Software
development



Production



Consulting



EPC-contractor



Commissioning



Outsourcing



Servicing



Assembling

About Company



- License holder SIEMENS AG
- SIEMENS SOLUTION PARTNER
Status of International Partner
PCS7, Drive & Motion, Automation
- SENUMAC and LEFFOL
Patented Technologies
- 600 projects since 2007

- Company staff 210+ employees
Includes 165+ engineers
- OHSAS 18001:2007
Occupational Health and Safety Management System
- ISO 14001:2015, ISO 50001:2011
Environment Management System, Energy Management System
- ISO 9001:2015
Quality Management System

Standard measurement methods



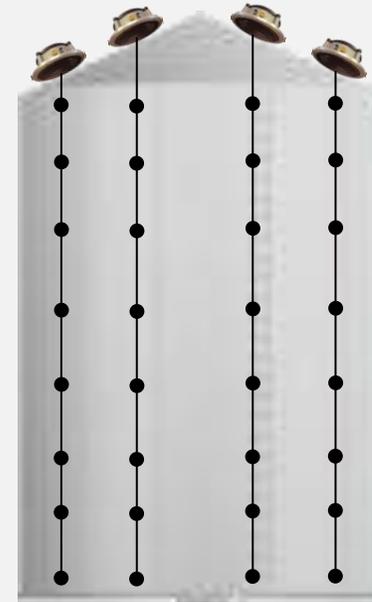
Manual measurement
(tapping, size ruler,
«sinker»)



Limit measurement
(Vibrating, Rotation,
Capacitance Switch)

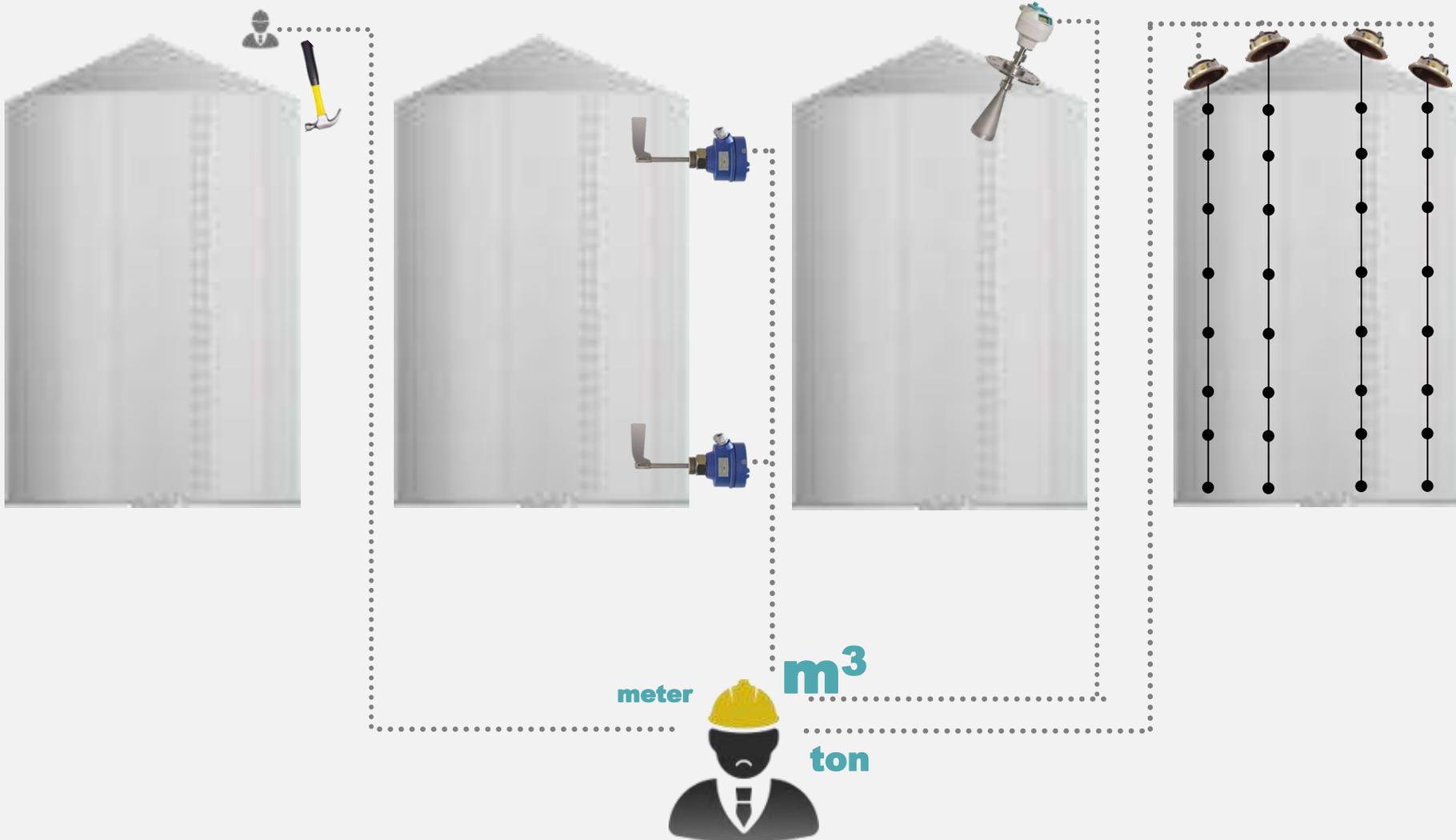


Continuous
(Radar, Ultrasonic,
electromechanical)



Indirect
(Temperature cables)

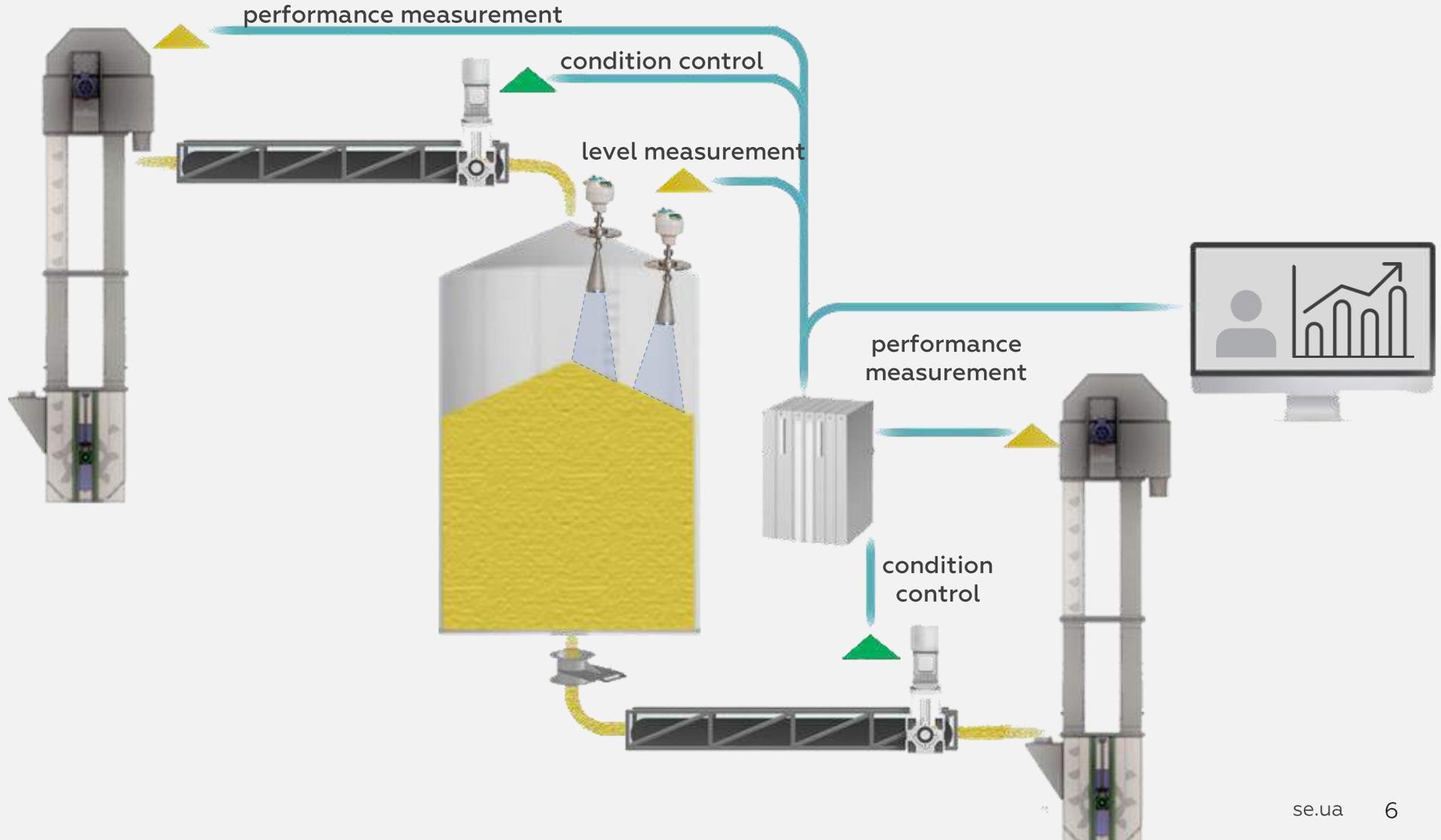
Problem



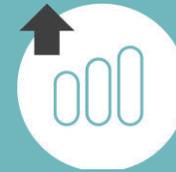
-  low accuracy, Human factor
-  No reliable data
-  The need for recalculations, manual entry of information
-  No shrinkage information
-  The possibility of theft
-  Low level of personnel safety

Principle of operation

- Continuous level measurement with two radar sensors
- Infeed/receive elevator load measurement
- Monitoring the status of the infeed/receiver conveyor
- Silo digital twin simulation



Main characteristics



Measurement range:
- up to 100 m.



Accuracy:
- 0,6% direct method
- 1,5% simulation method



Culture Type :
- any type of grain (Wheat, Corn, Rape, etc.)



Silo type: - metal

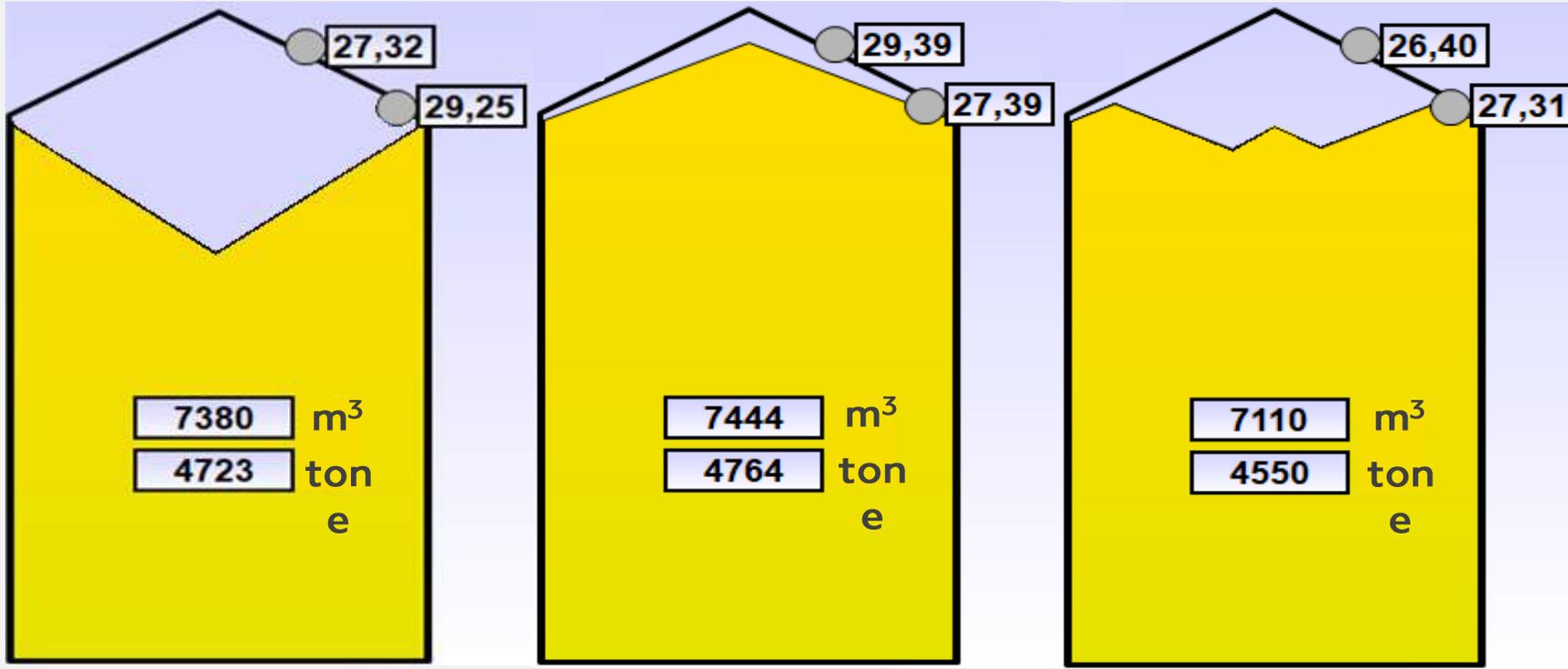


Operating modes:
- direct measurements
- measurement by simulation



Protocols for communication with DCS:
- Modbus, Profibus, Profinet
- others on request

Measurement functions



Direct measurement:
Silo unloading

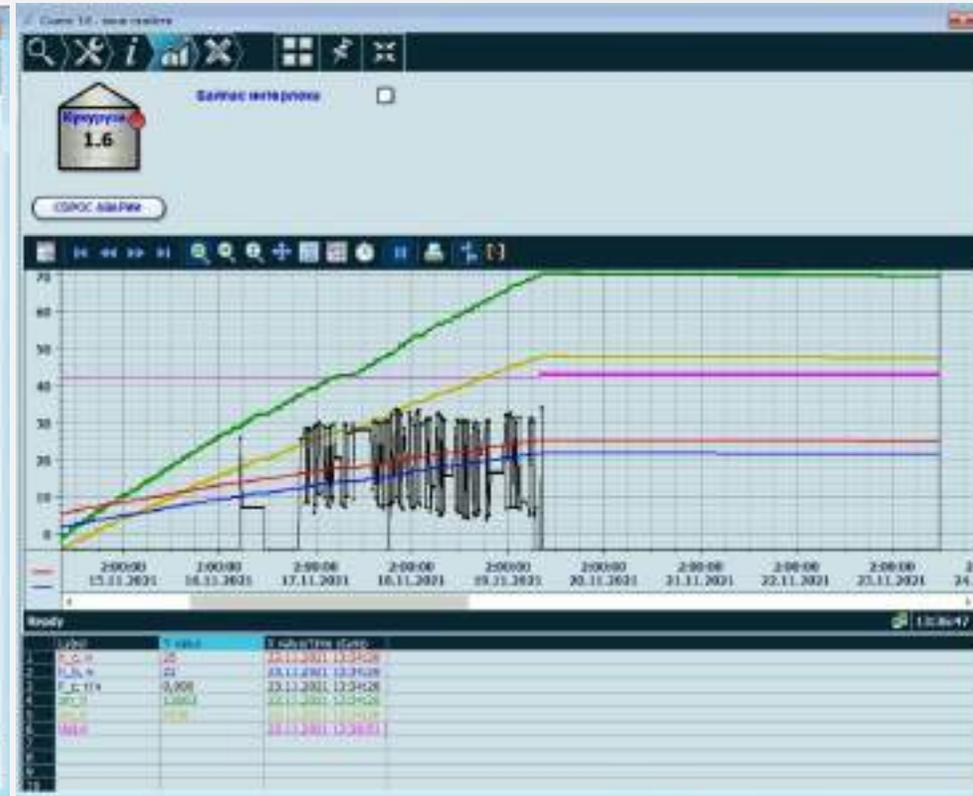
Direct measurement:
Silo loading

Simulation method:
additional loading

- Grain volume
- Grain profile
- Grain weight
- Each Silo / Total Elevator
- Real-time readings
- Integration with DBMS automatic receipt of grain type
- Direct measurement / Simulation method

Calculation functions

- Silo Free Volume Calculation
- Calculation of free volume by elevator
- Full load for silo
- Shrinkage control and measurement
- Automatic loading of silos
- Loading/unloading symmetry control

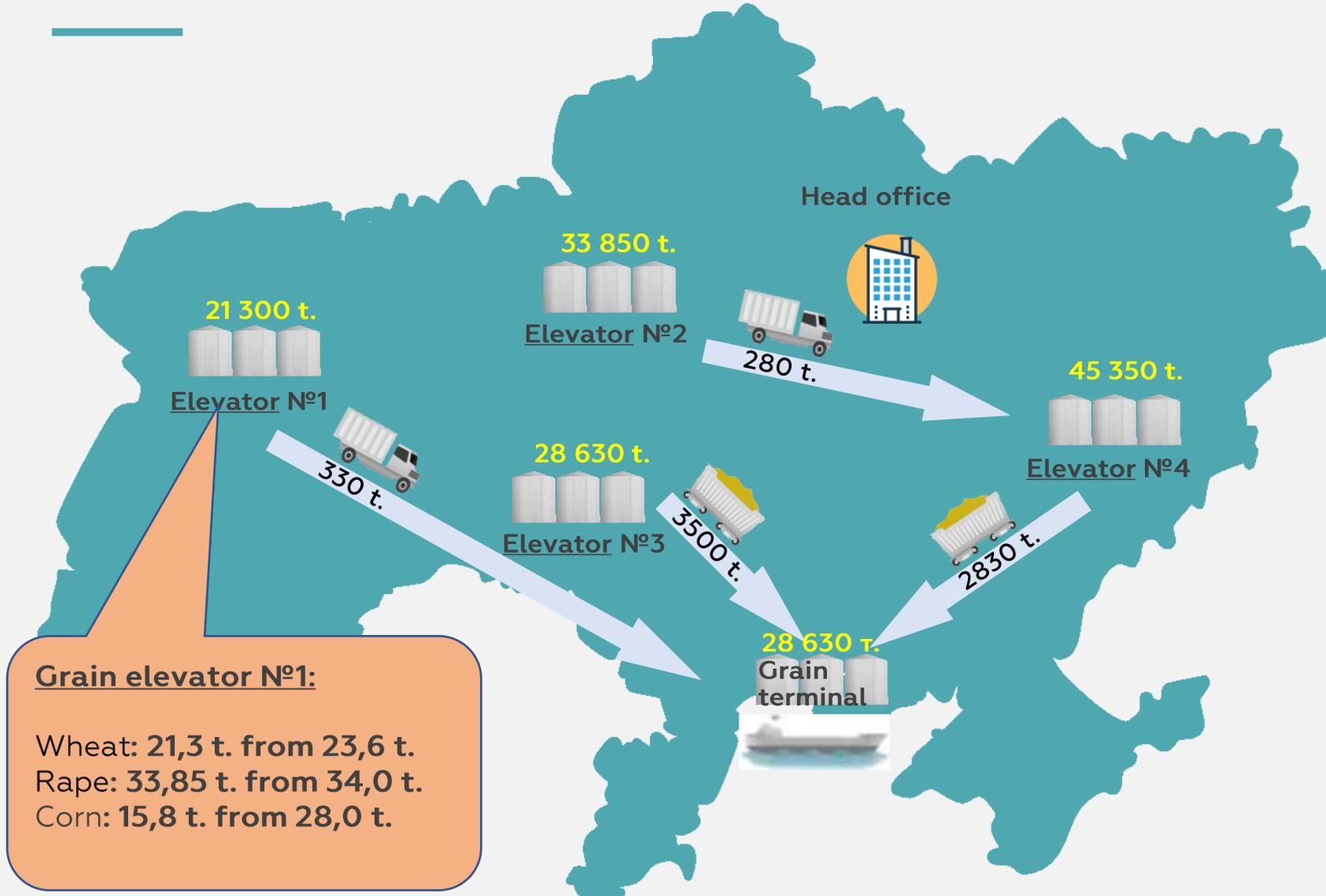


Control functions



- Switching the silo under security
- Notified about status changes
- Function "virtual seal"
- GPS binding of silos
- Identification of silos by ID

Monitoring functions



Grain elevator N°1:

Wheat: 21,3 t. from 23,6 t.
Rape: 33,85 t. from 34,0 t.
Corn: 15,8 t. from 28,0 t.

-  Remote control via WEB
-  Current loading of elevators
-  Reports on the grain movement within the holding for 2+ seasons
-  Loading/unloading trends by silo/elevator/holding
-  Messages for all silo statuses
-  Automatic free space calculation

Integration with DCS



Reliable silo overflow protection



Automatic transition to the next silo



Formation of the batch volume of shipped grain

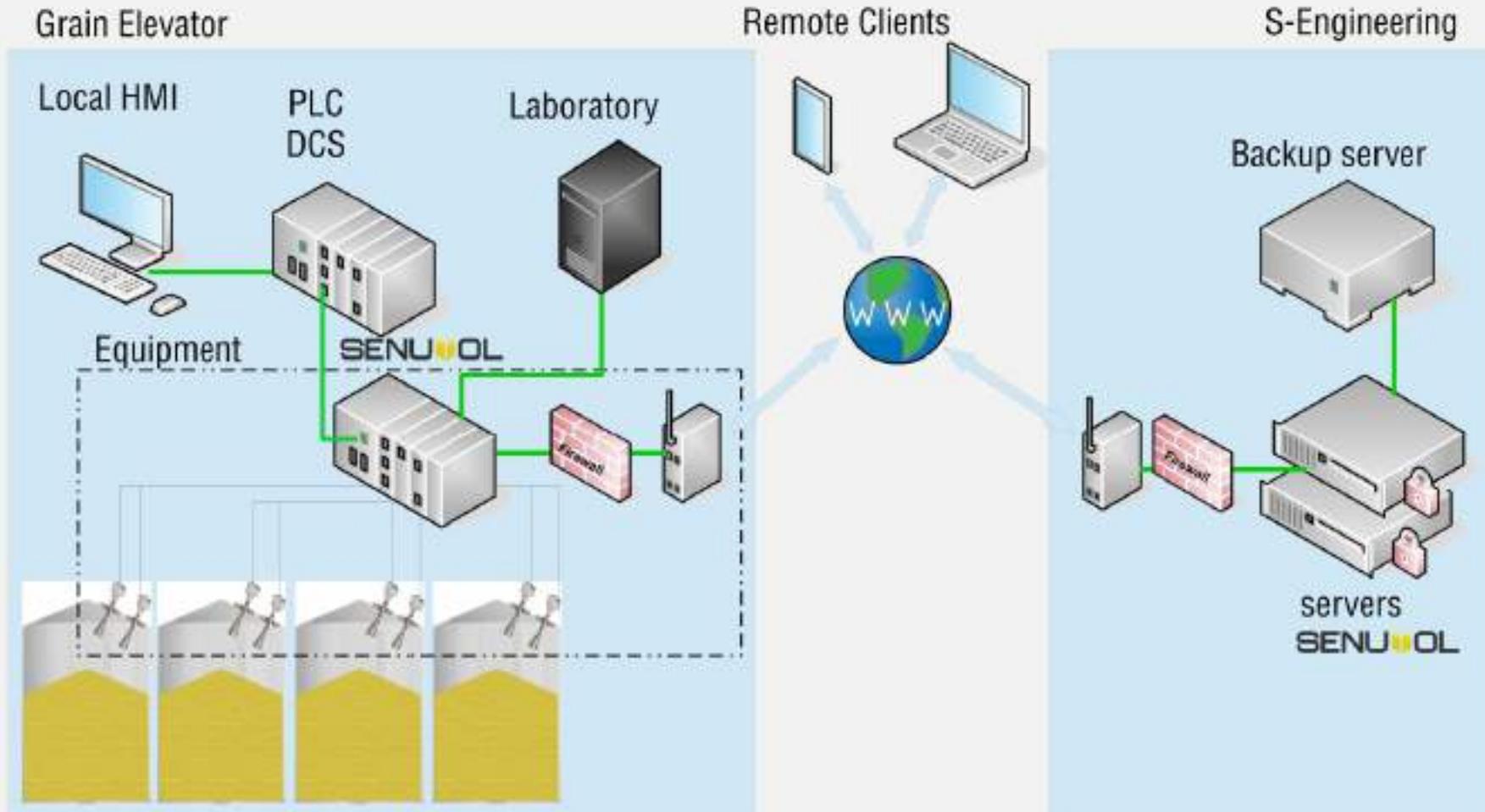


Determining the mixing ratio



Automatic execution of pre-loading tasks

Structure of the access security system



Secure access from anywhere



Local secure storage of information



Daily Backup copy archive and settings

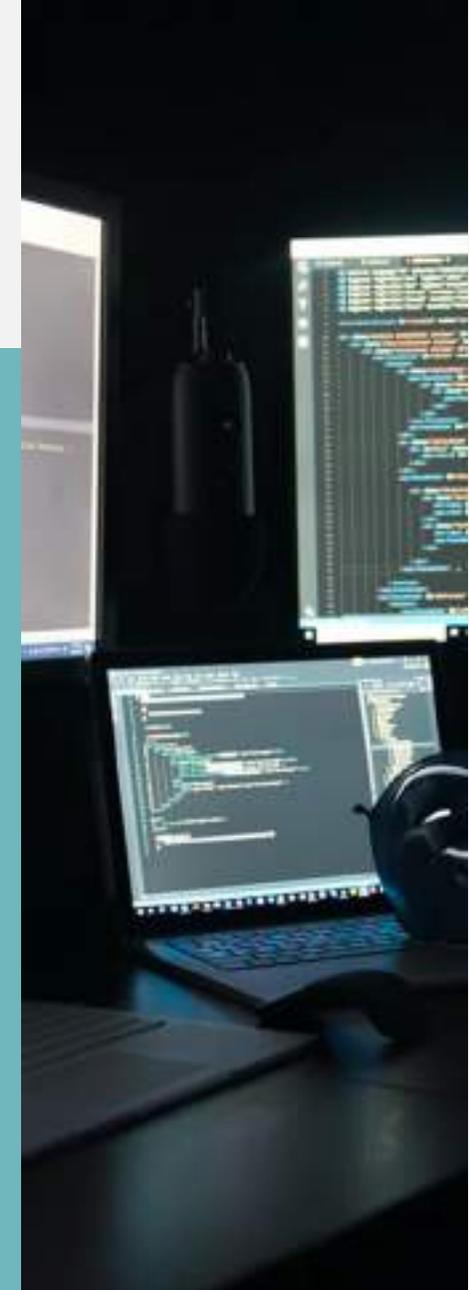


Minimal intervention in the existing DCS

Packages configurations



Basic package	+ integration with DCS	+ integration with laboratory	+ holding monitoring
<ul style="list-style-type: none"> - level measurement module; - module for measuring the performance of bucket elevators; - module for determining the operation of the silo; - module for calculations, modeling and data transfer to the SENUVOL server; 	<ul style="list-style-type: none"> - Basic package; - module for integration with the existing DCS; 	<ul style="list-style-type: none"> - Basic package; - module for integration with the existing DCS; - module for integration with the existing laboratory software; 	<ul style="list-style-type: none"> - Analytics and calculations module for centralized product movement management;



Relevance



The relevance of SENUVOL in modern production



Increasing storage



Online monitoring of storage products within the elevator / holding



Personnel safety

DISCOVER THE
LIMITS

SENU  OL

 Engineering