



**PRECISION ENGINEERING IN CONSTRUCTION AND VERIFICATION OF EQUIPMENT**  
**New methods for determination of deformations and wear of the equipment**

## Our work will consist in the definition:

- straightness of objects;
- reduction to flatness;
- parallel lines and planes;
- perpendicularity of lines and planes;
- the radius of the circle and the parameters of the cylinder;
- wear and deformation mechanisms;
- the creation of high precision networks (the accuracy of determination of points from 0.1 mm to 0.01 mm)

## **Our technology is applicable:**

- **in steel mills;**
- **set the shafts of the turbines for power plant;**
- **the measurement of deformations of bridge cranes and crane tracks (change the geometry);**
- **determination of no coincidence of rotary kilns and dryers;**
- **expose of the rolling mill (for metallurgical and tube rolling mills);**
- **the sieve, screen and crusher used for coal-preparation plant;**
- **determination of deformations of buildings and structures;**
- **the creation of high-precision control network;**
- **creation of maps and plans;**
- **laser scanning of objects for determination of deformations of bridges.**

Creation of topographic plans and supervision of construction (point, axis, etc).

Ukraine, Odessa, the construction of a shopping center in the spring of 2015.

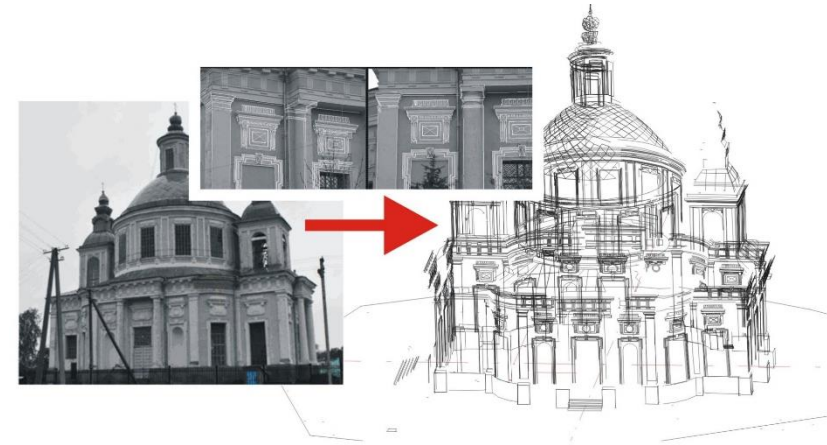
Use only of the equipment by the Leica



determination of deformations of the piers

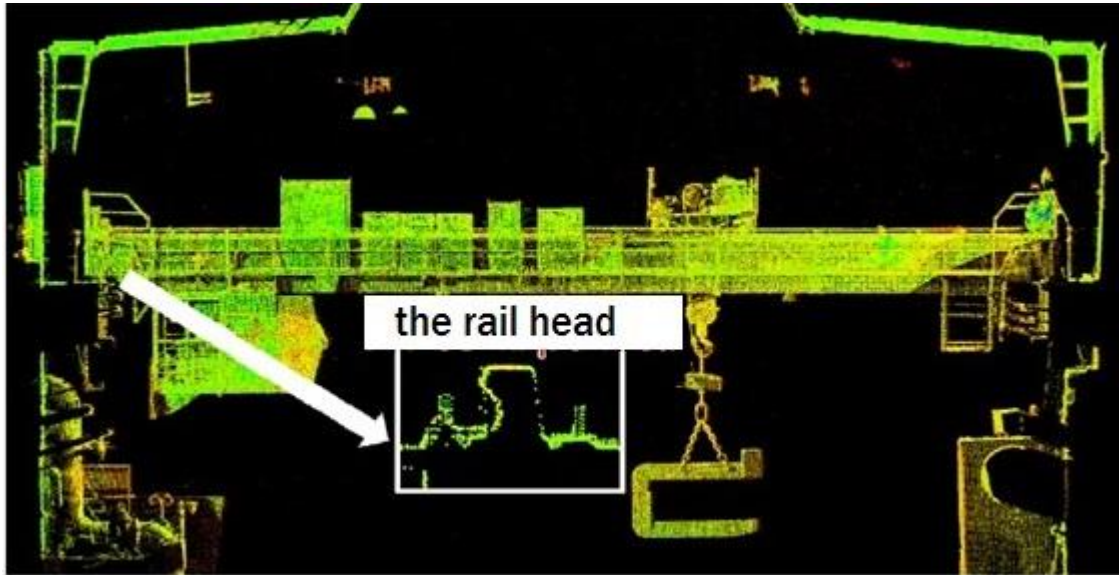


Laser scanning buildings (the Church in the East of Ukraine)

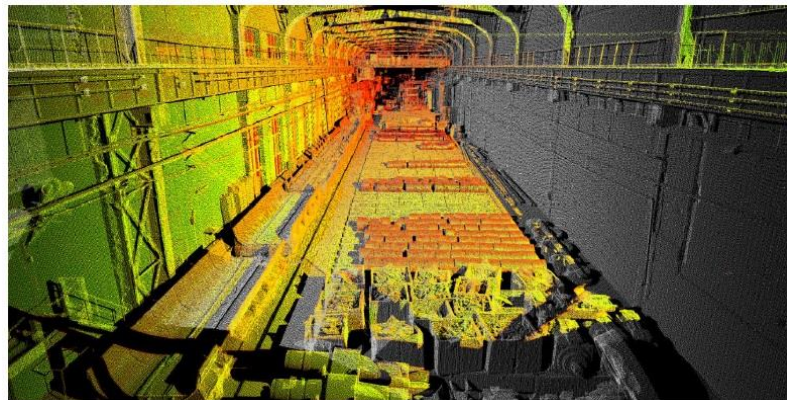




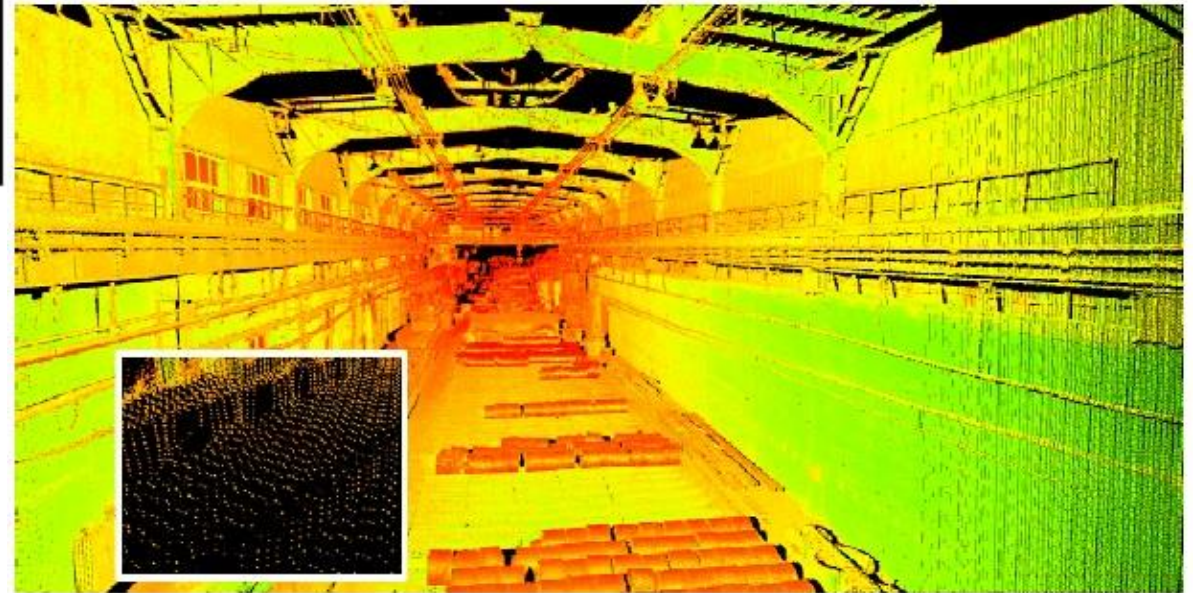
# Laser scanning under crane track bridge crane



The cloud of points along the rails. This post processing enables to determine the deformation runways



A three-dimensional image of the workshop with a crane track

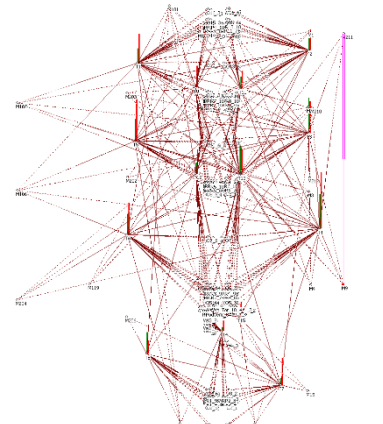




# Metallurgical Combine Azovstal, (Metinvest)

All work is carried out without stopping the technological process, which allows not to influence the activity of the enterprise. Implementation of these works allows to set the equipment in accordance with the project, which reduces the percentage of defects of finished products and component wear and reduces repair costs and maintenance of equipment.

September 2015, Mariupol, Ukraine

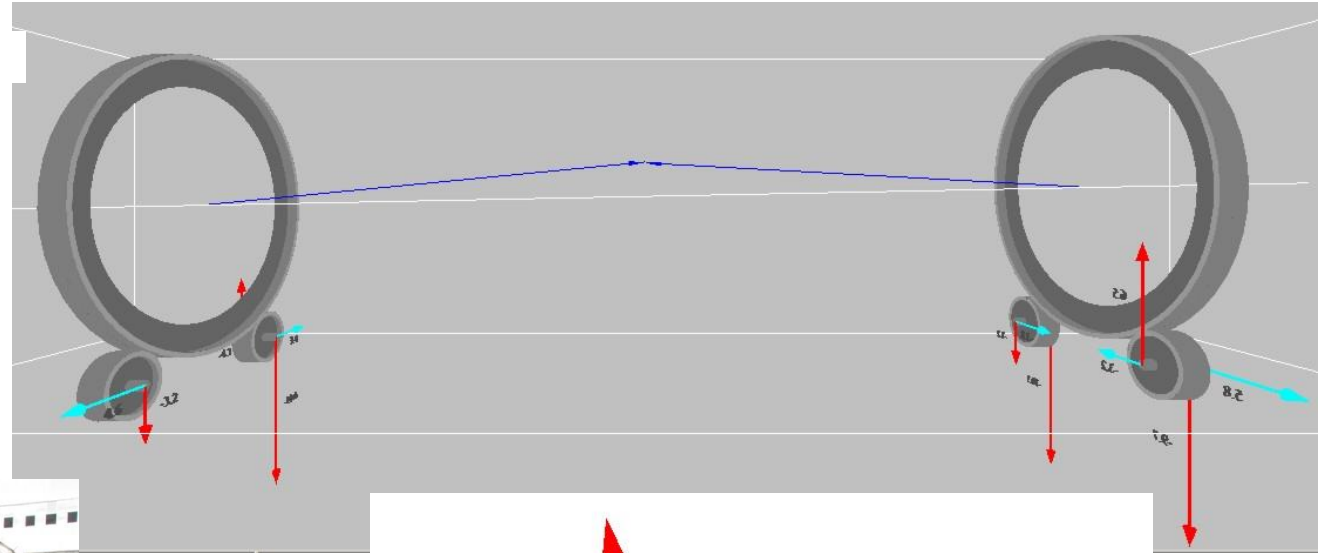


The creation of a high-precision network around the unit. The accuracy of determination of points of the network is 0.2 mm with a length of 90 meters rotary kiln

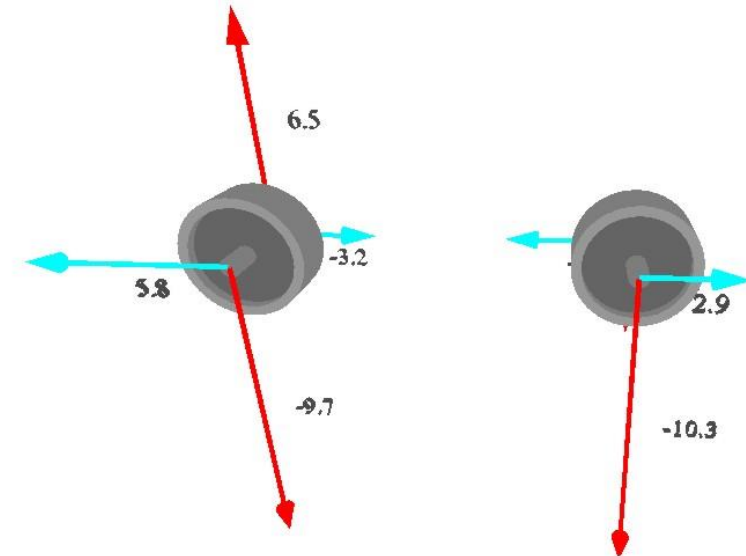
# The adjustment elements of the rotary kiln



high safety works

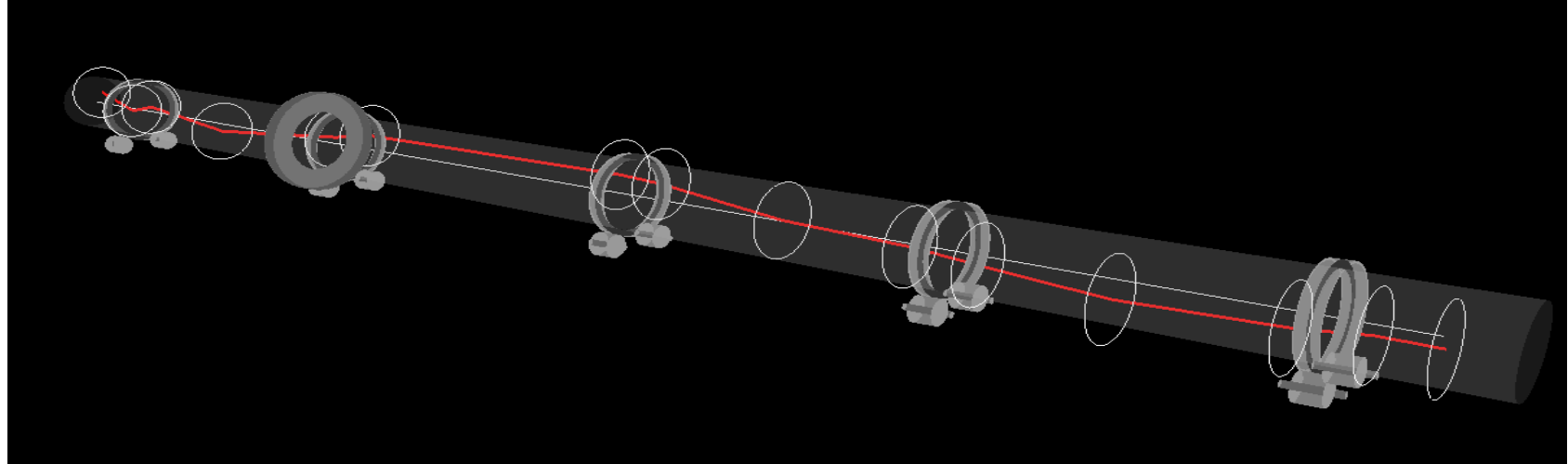


the discrepancy between the axes of rotation with a subsequent adjustment to bring in the design position of the whole unit

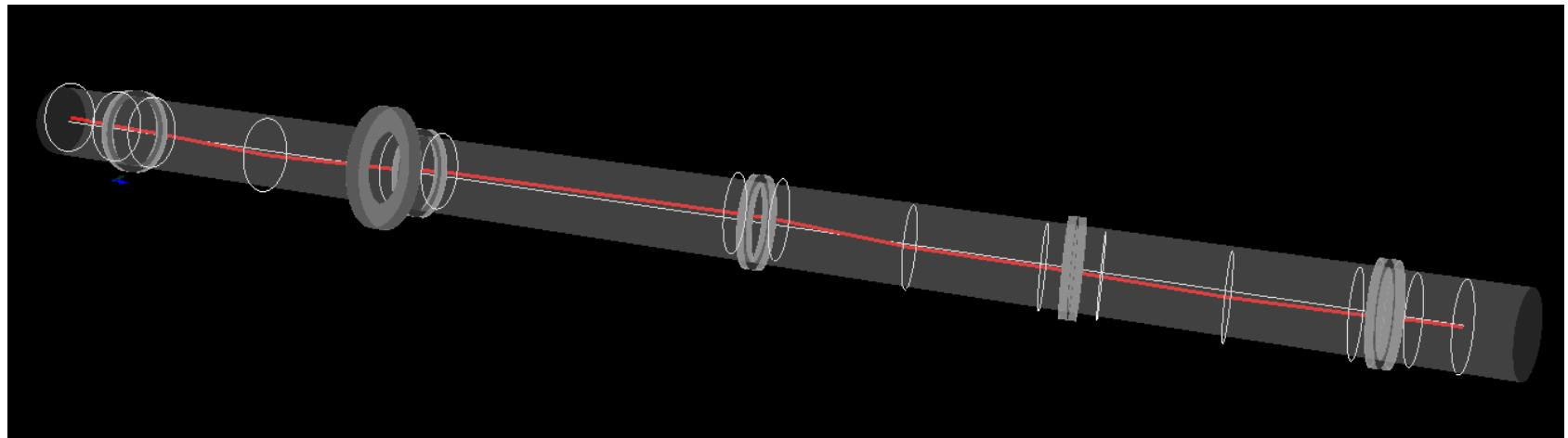


# Three-dimensional model of rotary kiln

before correction

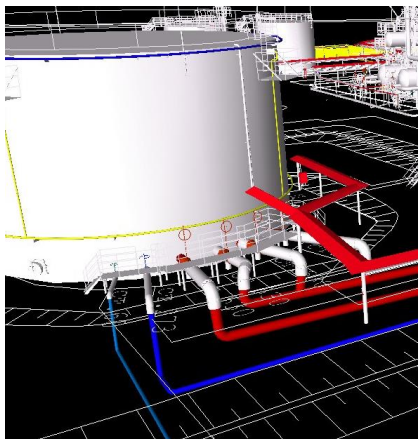


after correction

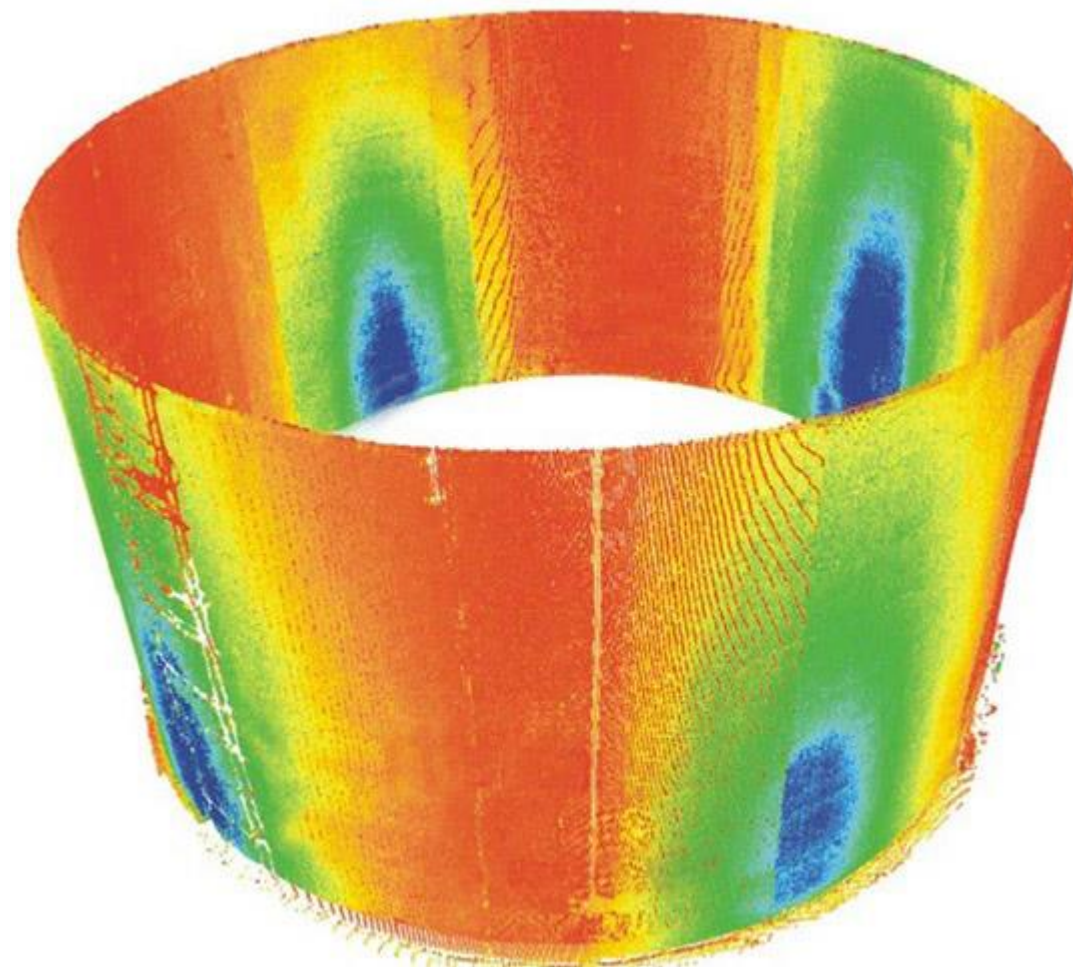
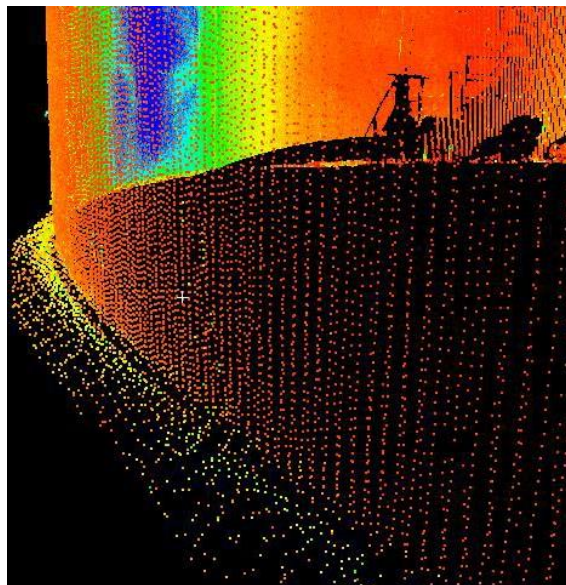




# Laser scanning of storage tanks for petroleum products



The combination of two-dimensional and three-dimensional surveys



Determining the magnitude and direction of deformation

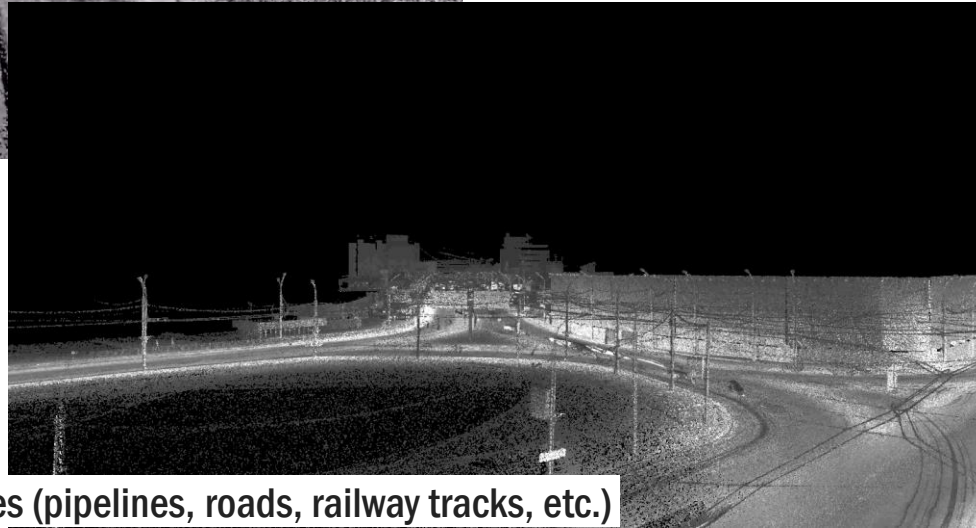
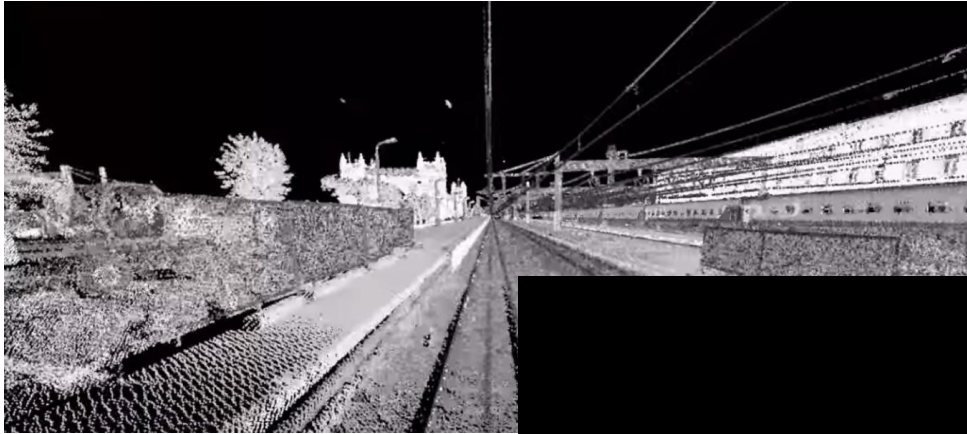
Continuous determination of deformation of the tank walls

Determination of the differential settlement of the bottom

Automatic detection of form deviation of the walls from the vertical

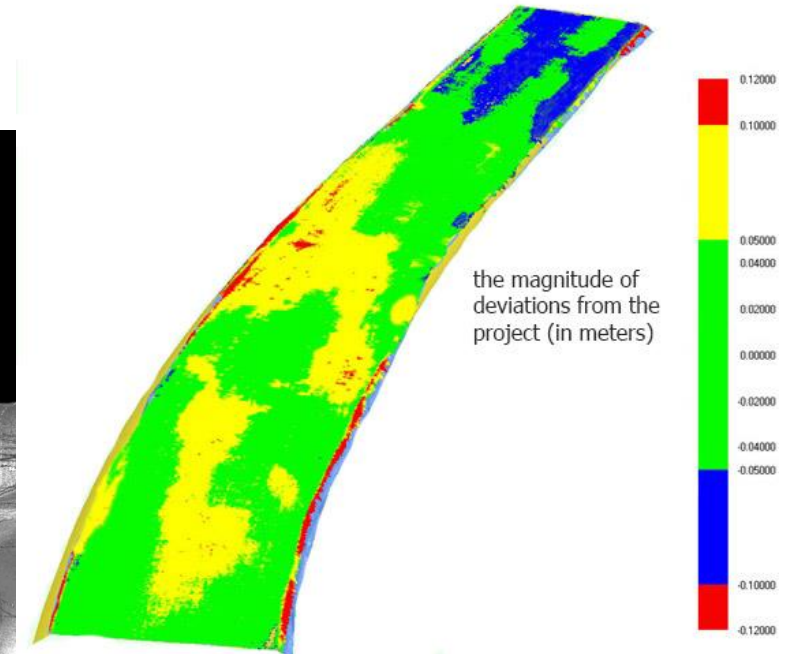
Determination of deformations of pipelines

# Mobile laser scanning



Executive survey of linear facilities (pipelines, roads, railway tracks, etc.)

The deviation of the actual road surface from the project





# The creation of high-precision geodetic control network for the installation of cable-belt conveyor Metso Inc.

Krasnoarmeyskaya-Zapadnaya mine number 1, the coal company, Krasnoarmeysk, UKRAINE



Cable-belt conveyor company Metso minerals  
The length of 5200 m, 3 rotary land  $R=440\text{m}$ ,  
accuracy of installation of supports 6mm

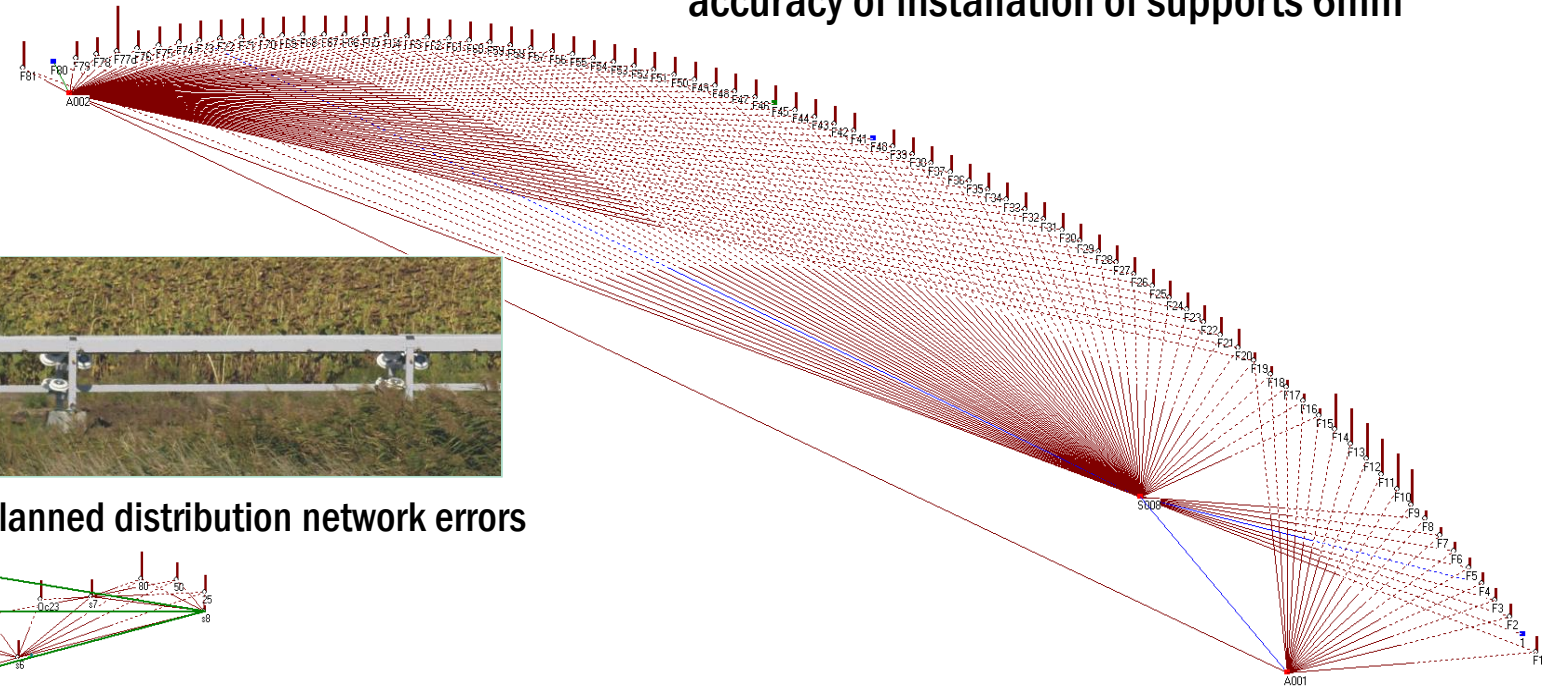
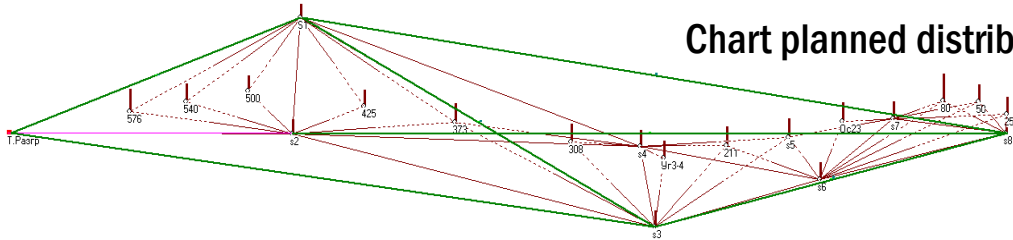


Chart planned distribution network errors



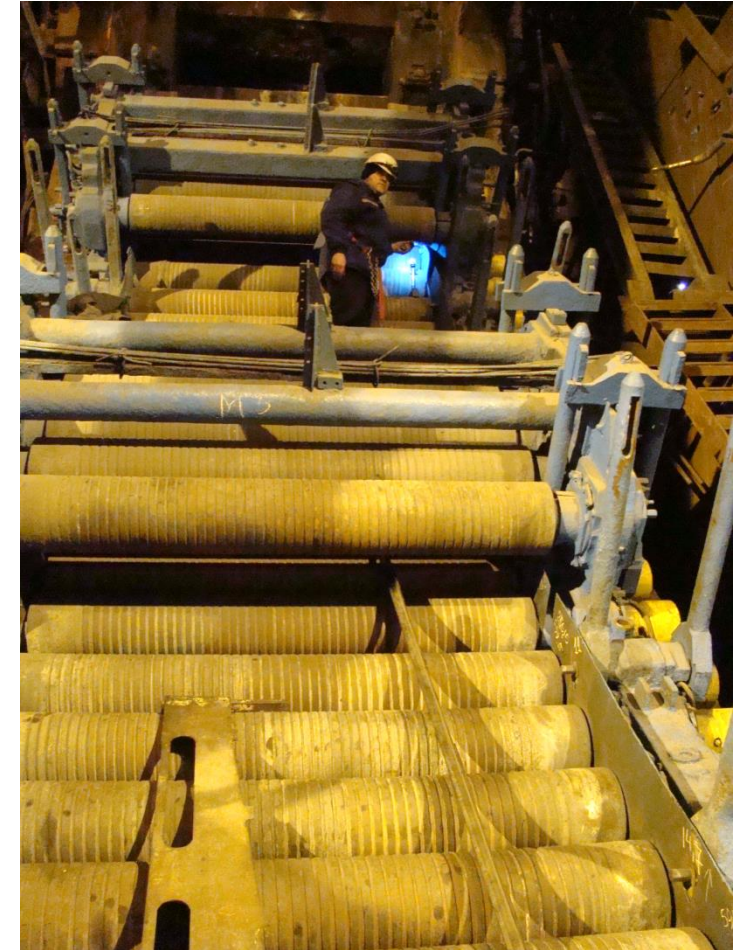


# Metallurgical Combine Azovstal, (Metinvest)

Features steel continuous casting plant :

- the production of "Uralmash" 1972
- the large size of the object ( 93 roller, length – 60 meters)
- high installation accuracy of 0.2-0.4 mm
- the lack of embedded benchmarks
- the need to create high-precision geodetic network
- the high complexity measurements
- the need for special tooling
- lack of time
- wear of equipment

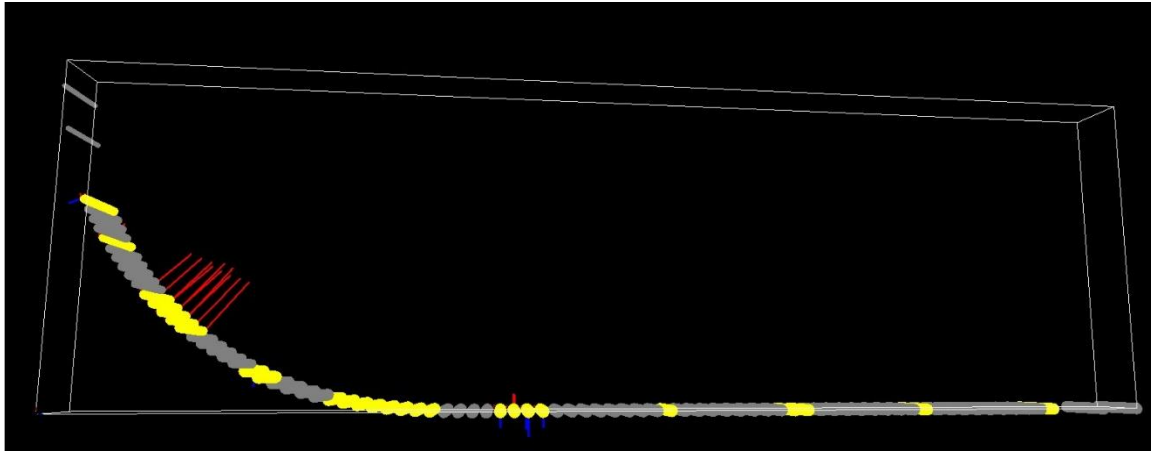
Statistics show smelters 50% of premature equipment repairs occurs because of improper installation in the design position



Mariupol, Ukraine

# measurement and correction

Optimal corrective actions for continuous caster rollers



Check position of the Drum Flacker



The measurement steel continuous casting plant





**EMPIRE**

**PRECISION ENGINEERING**