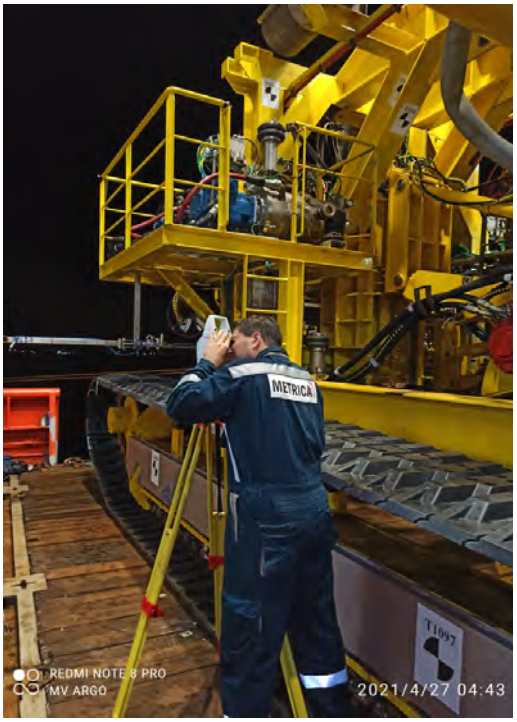
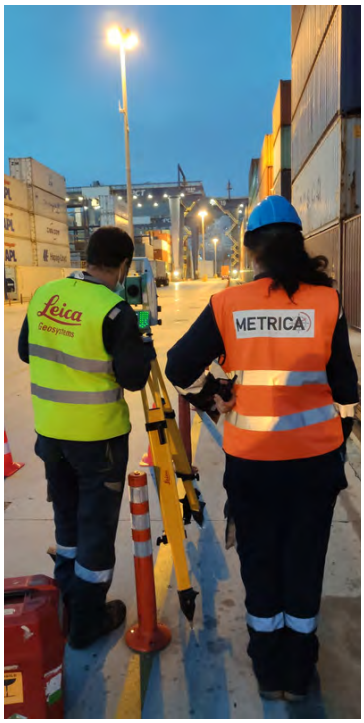
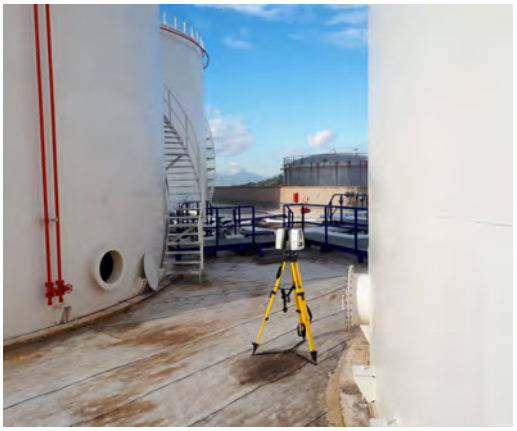
METRICA

When it's a matter of trust





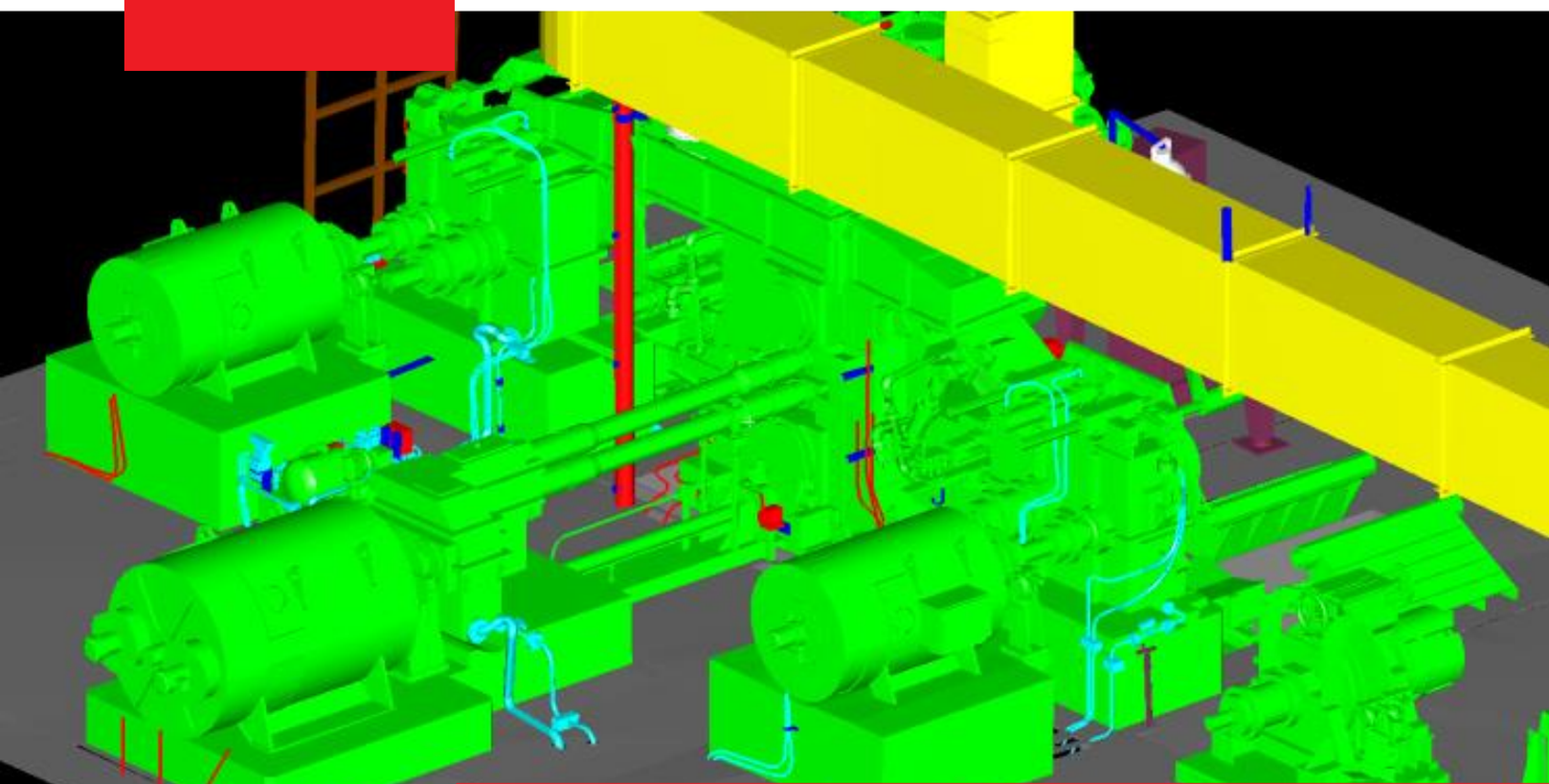


PROJECTS IN INDUSTRY

METRICA offers measurement services in almost any kind of industrial application that includes alignment inspection or as-built documentation. Based in Athens, Greece, we operate worldwide with vast experience in a diverse range of applications. Our products and services are suitable for industrial and marine sites, shipyards and offshore installations, architecture, heritage, and large-scale urban projects.

INDUSTRY

METRICA
When it's a matter of trust



3D Scanning & 3D Modelling of Industrial Installations

Overview

As accuracy is critical in the revamp process of new production facility systems, our team was contracted to realize a series of 3D scanning measurements of the industrial area to create and deliver 3D models.

To produce the accurate 3D model of the infrastructure, our team used the powerful Leica ScanStation P40 laser scanner to collect 3D Point Cloud data which were used for the production of a detailed 3D model of the unit (Infrastructure Model).

Challenges

- The daily working schedule of the plant
- The complexity of the installation (the variety of materials, their reflection coefficient, oily or unclean external surfaces and accessibility)
- Elimination of movements/ vibration
- Cleaning condition of the external surfaces

Fieldwork

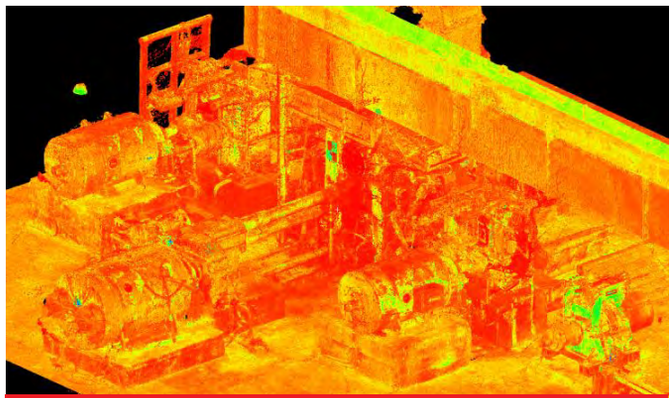
The first action was to place an adequate number of black and white targets all around the installation. These marks were well recognizable, and they had the size of an A4 paper. Additionally, four smaller targets were used to offer additional constraints. The installation was covered through 47 laser scanner setup positions with over 2 billion points.

Benefits

- elimination of field interferences
- less rework
- increased productivity
- fewer requests for information
- the decrease in time from the start of construction to facility turnover

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T. +30 2102815440

View of the industrial installation

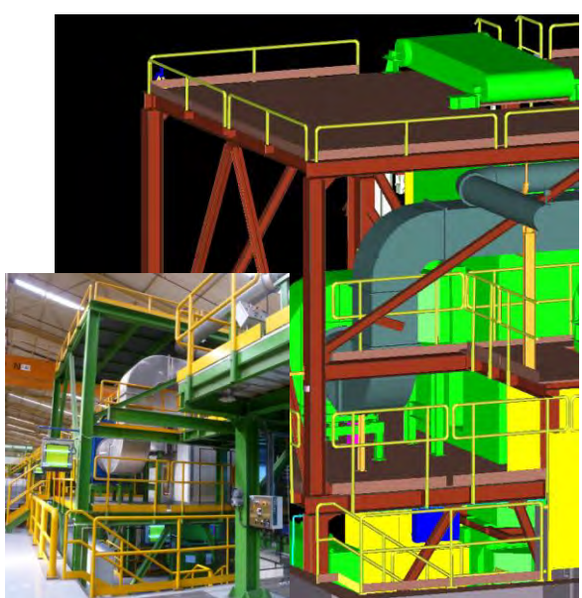


Initial Point Cloud *the 3D model appears in the front-page picture

Fieldwork

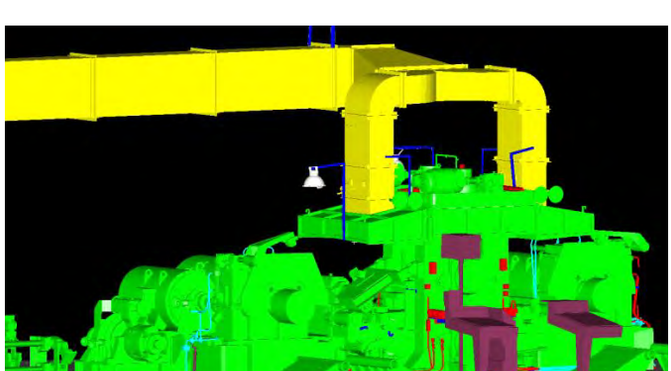
After measurement series completion, data were loaded to the Leica Cyclone 9.2.1 software for further processing. Then the point clouds were registered by using the mathematical algorithm for the 100% of the joint part between two point clouds. After the connection of the point clouds, the final unified point cloud was ready to be cleaned of all irrelevant objects captured during scanning. After that, the creation of the model began. Our team used the geometric primitives to draw the objects. The accuracy of the items is better than 5mm. The deliverables (3D model) were delivered for the design and installation of the system.

The same procedure was followed for the 3D scanning and 3D modelling of a different type of production facility system.



Existing Installation vs 3D Model

Production facility system



3D model

Instrumentation / Software

- Leica ScanStation P40
- Laser Scanner Registration Targets
- Leica Cyclone 9.2.1

Deviverables

- 3D model of the industrial installation

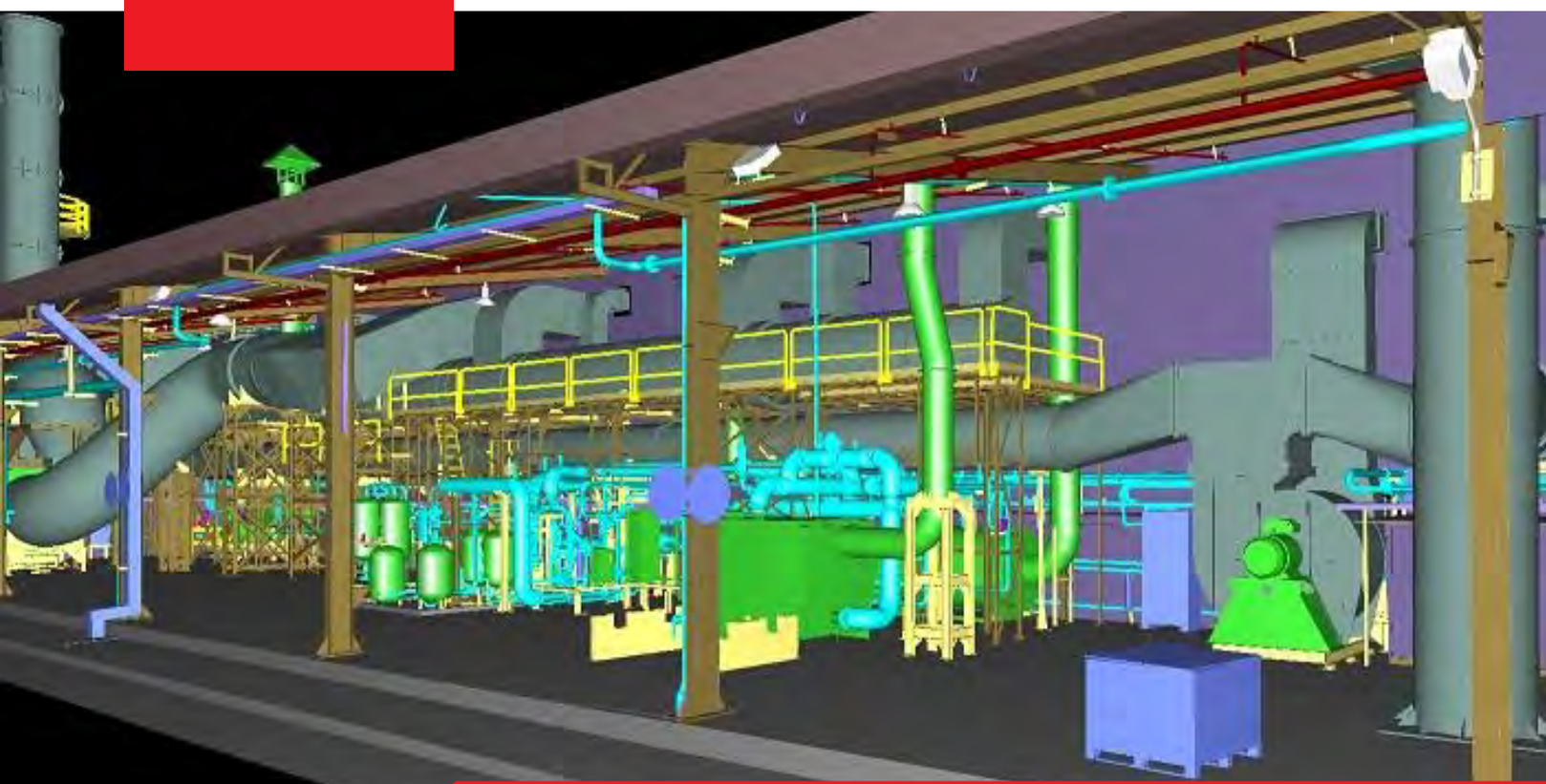
METRICA
When it's a matter of trust

Do you have a similar project?

Contact our team at info@metrica.gr

INDUSTRY

METRICA
When it's a matter of trust



3D Scanning & 3D Modelling of Industrial Installation

Overview

Industrial installations often need to revamp their facilities to optimize productivity, improve product quality, reduce operating and maintenance costs e.t.c.

In this case, our team's job was the 3D Scanning survey and 3D model creation of existing installations in ELVAL S.A. industrial area to be utilized in the revamp process of new systems for the production facility.

To produce the accurate 3D model of the pipe installation, our team used the powerful Leica ScanStation P40 to collect 3D Point Cloud data and used them for the creation of a detailed 3D model of the unit (Building Infrastructure Model).

Fieldwork took two days, and an engineer worked in the office for 20 days to deliver the report.

Challenges

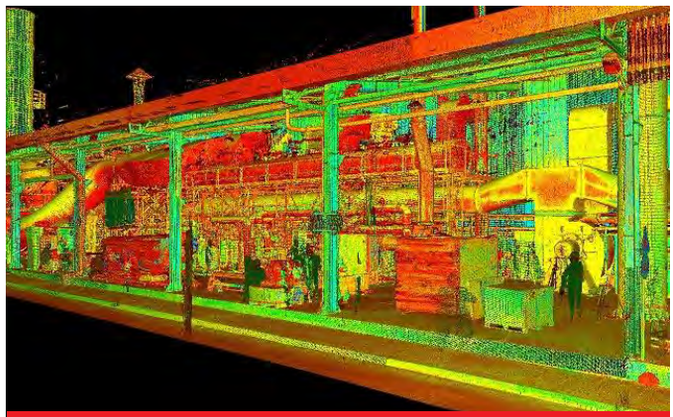
- The daily working schedule of the plant
- The complexity of the installation (the variety of materials, their reflection coefficient, oily or unclean external surfaces and accessibility)

Benefits

- elimination of field interferences
- less rework
- increased productivity
- fewer requests for information
- the decrease in time from the start of construction to facility turnover

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T.+30 2102815440

View of the industrial installation



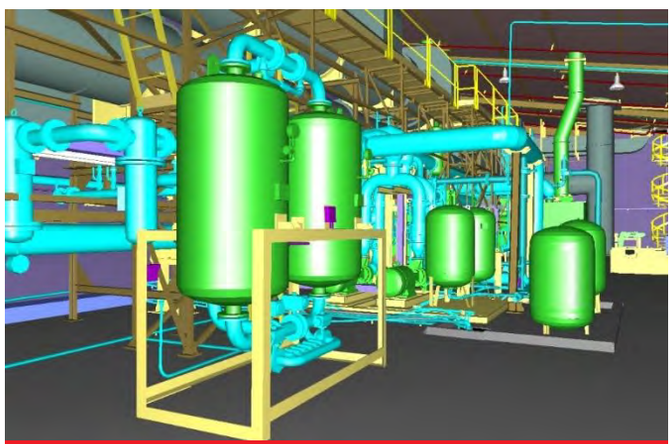
Point Cloud

Fieldwork

The first action was to place an adequate number of black and white targets all around the installation. These marks were well recognizable, and they had the size of an A4 paper. Additionally, our team used four smaller targets to offer additional constraints capturing their position with the use of the highest accuracy industrial total station Leica TDRA6000. The installation was covered through 75 laser scanner setup positions with over 2 billion points.

After measurement series completion, all data were loaded to the Leica Cyclone 9.0.1 software for further processing. Then the point clouds were registered by using the mathematical algorithm for the 100% of the common part between two point clouds. After the connection of all point clouds, the final unified point cloud was ready to be cleaned of all irrelevant objects captured during scanning. After that, the creation of the model began. Our team used the geometric primitives to draw the objects. The accuracy of the items is better than 5mm. METRICA team delivered the 3D models for the design and installation of the new system.

Production facility system



3D model of the production facility system

Instrumentation / Software

- Laser Scanner Leica ScanStation P40
- Industrial Total Station TDRA6000
- Laser Scanner Registration Targets
- Leica Cyclone 9.0.1

METRICA
When it's a matter of trust

Deviverables

- 3D model of the industrial installation

Do you have a similar project?

Contact our team at info@metrica.gr

INDUSTRY

METRICA
When it's a matter of trust

3D Scanning & 3D Modelling of Industrial Installation

Overview

As accuracy is critical for the as-built documentation of facilities and equipment, our team was contracted to realize a series of 3D scanning measurements on a Steam Boiler Room in PMI – PAPASTRATOS Greece premises.

The purpose was the creation of a 3D model, with geometric and attributed data of the components. This process is known as Scan to BIM. Data can be further utilized for maintenance purposes, revamp process preparation and design of new production facility systems, run operation simulations and many others.

To produce the accurate 3D model of the infrastructure, our team used the powerful Leica ScanStation P40 to collect 3D Point Cloud data, which were used for the creation of a detailed 3D model of the unit (Infrastructure Model).

Challenges

- The daily working schedule of the plant
- The complexity of the installation (the variety of materials, their reflection coefficient, oily or unclean external surfaces and accessibility)

Benefits

- elimination of field interferences
- less rework
- increased productivity
- fewer requests for information
- cost reduction
- time-saving

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T.+30 2102815440

View of the industrial installation

Point Cloud of the industrial installation

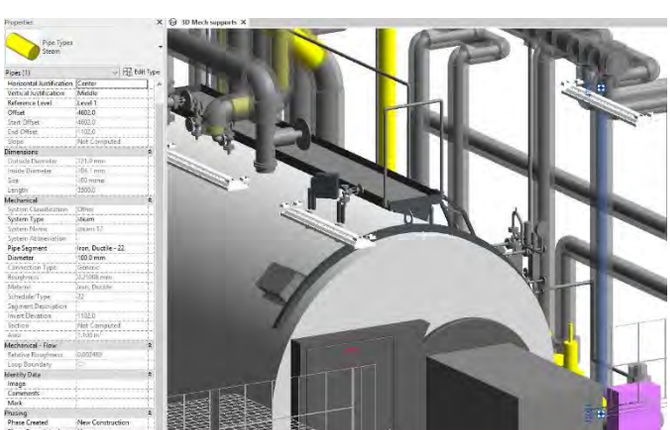
Fieldwork

The first action was to place an adequate number of black and white targets all around the installation. Thes marks were well recognizable, and they had the size of an A4 paper. The installation was covered through 94 laser scanner setup positions with over 371 million points.

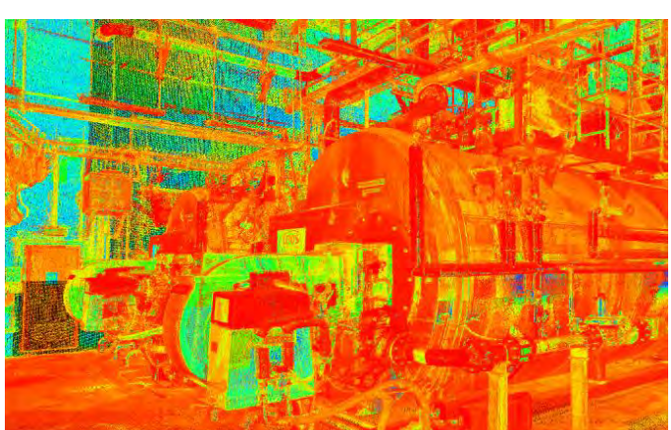
After measurement series completion, data were loaded to the Leica Cyclone 9.4 software for further processing. Then the point clouds were registered by using the mathematical algorithm for the 100% of the common part between point clouds. After the connection of all point clouds, the final unified point cloud was ready to be cleaned of all irrelevant objects captured during scanning.

3D model of the industrial installation

After that the creation of the model was done in Autodesk Revit software, involving information of steam boilers, piping, insulation and mechanical equipment.



3D model



Point cloud

Instrumentation / Software

- Laser Scanner Leica ScanStation P40
- Industrial Total Station TDRA6000
- Laser Scanner Registration Targets
- Leica Cyclone 9.0.1

Deviverables

- 3D model of the industrial installation

Do you have a similar project?

Contact our team at info@metrica.gr

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T.+30 2102815440

INDUSTRY

METRICA
When it's a matter of trust

NEW ALUMINUM UNIT INSTALLATION

Overview

The main purpose of measurements was the geometrical inspection and further tolerance validation of the installation and alignment procedures for a new aluminum unit. Measurements were taken with the use of Leica Absolute Laser Tracker AT402 and relevant SMRs and accessories.

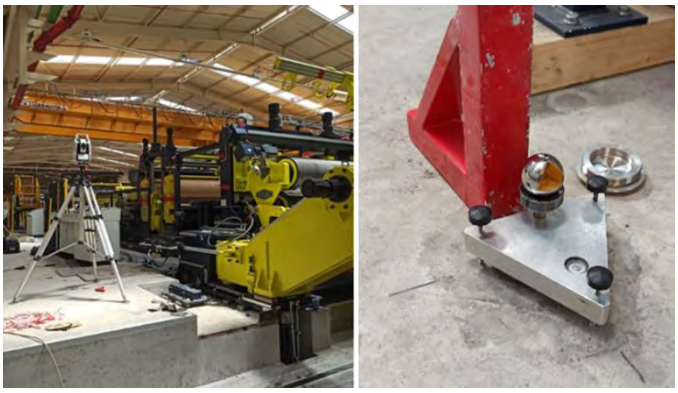
Measurements

After a demand for totally 9 measurement services, the aluminum unit was inspected for the compliance with the designed dimension and geometrical tolerances. Because of its particular design which enables the translation of the whole unit and its relevant rolls on the steel guide rails, the single parts as also the whole framing was examined under different loading and unit positions. The results were discussed with the responsible engineers and workshops. For both haspel coiler and decoiler rolls, after their inspection, they were aligned according to the design tolerances.

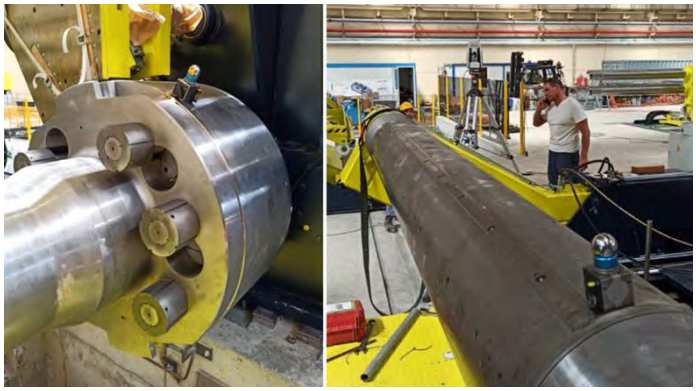
Benefits

- High accuracy process
- Fast technique
- Adaptable to the custom mechanical arrangement

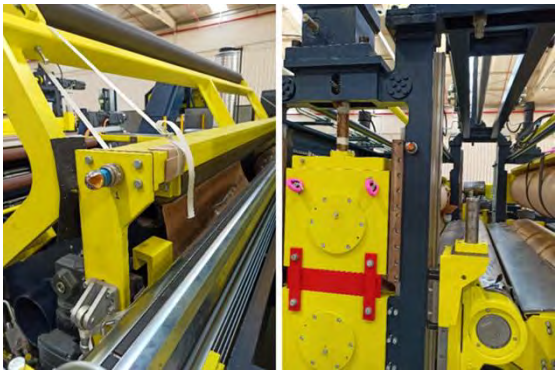
88A Ginossati st., P.S.14452, Metemorphosis, Greece I info@metrica.gr I www.metrica-isv.gr I T. +30 2102815440



Measurement of reference line benchmarks



Haspel measurement and axis extraction



Frame monitoring

Tensioning Rubber Rolls Inspection

Brake Rolls Inspection

Guide Rail measurement

Inspection services included:

- The established reference line
- The haspel – decoiler roll
- The haspel – coiler roll
- The belt wrapper
- The tensioning unit rubber rolls
- The brake rolls
- The guide rails
- The whole unit and roll framing

Instrumentation / Software

Absolute Tracker Leica AT402

Red Ring Reflector

Spatial Analyzer Hexagon Metrology

Deviverables

- Tables including all measured points' coordinates
- Tables showing horizontal and vertical deviations

METRICA

When it's a matter of trust

Do you have a similar project?

Contact our team at info@metrica.gr

88A Ginossati st., P.S.14452, Metemorphosis, Greece I info@metrica.gr I www.metrica-isv.gr I T. +30 2102815440

INDUSTRY

METRICA
When it's a matter of trust

MACHINES RE-INSTALLATION AND ALLIGMENT

Overview

The main purpose of the measurements was the accurate alignment of two machines in an industrial unit after a significant overhauling. The unwinding and winding machines were going to be removed. First, new constructions were to be created, and then both machines were placed back in their original position. To complete this demanding job, the project engineers needed high accuracy measurements to guide the process.

Our team used Leica Absolute Tracker AT402 and its relevant accessories to establish a geodetic network. Based on this network we placed back the machines in the as found position. After the placement of the machines, their alignment follows according to the reference roll of the installation. Tolerance for the alignment is 0.10mm/1000mm

Benefits

- High accuracy process
- Fast measurements
- Adaptable to the custom mechanical arrangement

The **Leica Absolute Tracker AT402** is the most portable 3D Absolute Tracker for traditional inspection tasks or for fully guided measurement processes. It is able to be powered by its own internal battery and is able to work in the most demanding environment yet maintains the highest level of precision and the largest ever work envelope. The AT402 features increased ruggedness and extended battery life.

88A Ginossati st., P.S.14452, Metemorphosis, Greece I info@metrica.gr I www.metrica-isv.gr I T. +30 2102815440

Wrapping machine,A

Wrapping machine B

Methodology

A local geodetic network was created to place the wrapping machines back in their original position after the removal. The geodetic networks consist of reference points marked on the machines and in the nearby installation. The first thing after the measurements was establishing the coordinate system (CS) in the highest possible accuracy with the use of Leica Laser Tracker AT402, which can offer 3D accuracy of 0.015mm under certain circumstances. After that, the machines of the unit were ready for removal and re-installation. The re-installation is the first rough approach of the alignment of the machines; then with the use of the reference rolls indicated to our team by the factory engineers, we performed the final alignment with tolerance of 0.10mm/1000mm in the horizontal and the vertical plane.

Break Resistant Reflector

Break Resistant Reflector

Instrumentation / Software

Absolute Tracker Leica AT402
Break Resistant Reflector
Spatial Analyzer Hexagon Metrology

Deviverables

- Tables including all measured points' coordinates
- Tables showing horizontal and vertical deviations

Do you have a similar project?

Contact our team at info@metrica.gr

INDUSTRY

METRICA
When it's a matter of trust

Demanding environment and high level of required accuracy were the challenges our team has successfully faced in this project.

Alignment of beam transfer system

Overview

The purpose of the measurements was the alignment inspection & alignment correction of charge and discharge rollers on a continuous homogenizing furnace.

Fieldwork: 2 days, 2 staff members

Office work: 2 days, 1 staff member

Measurements were taken in two telescope faces and dual sampling to enhance accuracy.

A local geodetic control network was established and measured by taking under consideration the following parameters:

- geometrical strength (concerning the available working areas)
- visibility of the majority of control points between different station setups
- minimization of errors on desired directions (prescribed precision)
- ability to detect blunders (reliability)§visibility of interest areas

Benefits

- Accurate and robust method of inspection
- Adaptable to the custom mechanical arrangement via jig development
- Results and documentation according to the specific needs

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T. +30 2102815440

Continuous homogenizing furnace walking beam system

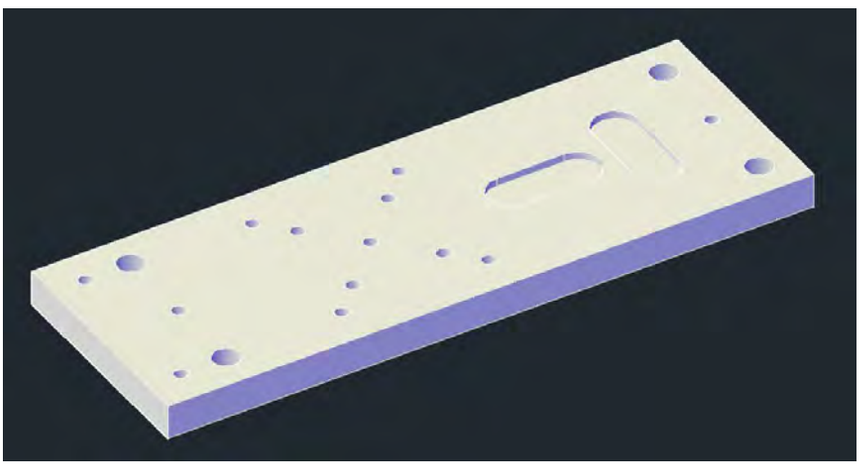
Measurement procedure

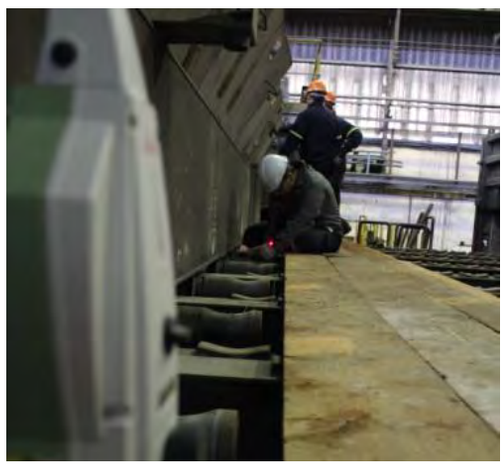
Fieldwork

The local geodetic network was realized through 5 spherical reflectors (control points). Targets were periodically checked for the prevention of possible instrument drifts. Results were directly announced to the project engineers and workshops for evaluation and action.

Totally 19 rollers were geometrically inspected and adjusted for possible misalignments and positioned to the proper offsets to compensate for thermal expansion as the corrections took place in cold conditions. Measurements were taken with the use of a high – end industrial total station Leica TDRA6000, spherical reflectors and measurement tools that were designed for this project.

Along with industrial total station Leica TDRA6000, a special jig that holds the reflector in place was used to achieve maximum accuracy.





Special Jig designed by METRICA S.A.

Instrumentation / Software

- Leica TDRA6000

Deviverables

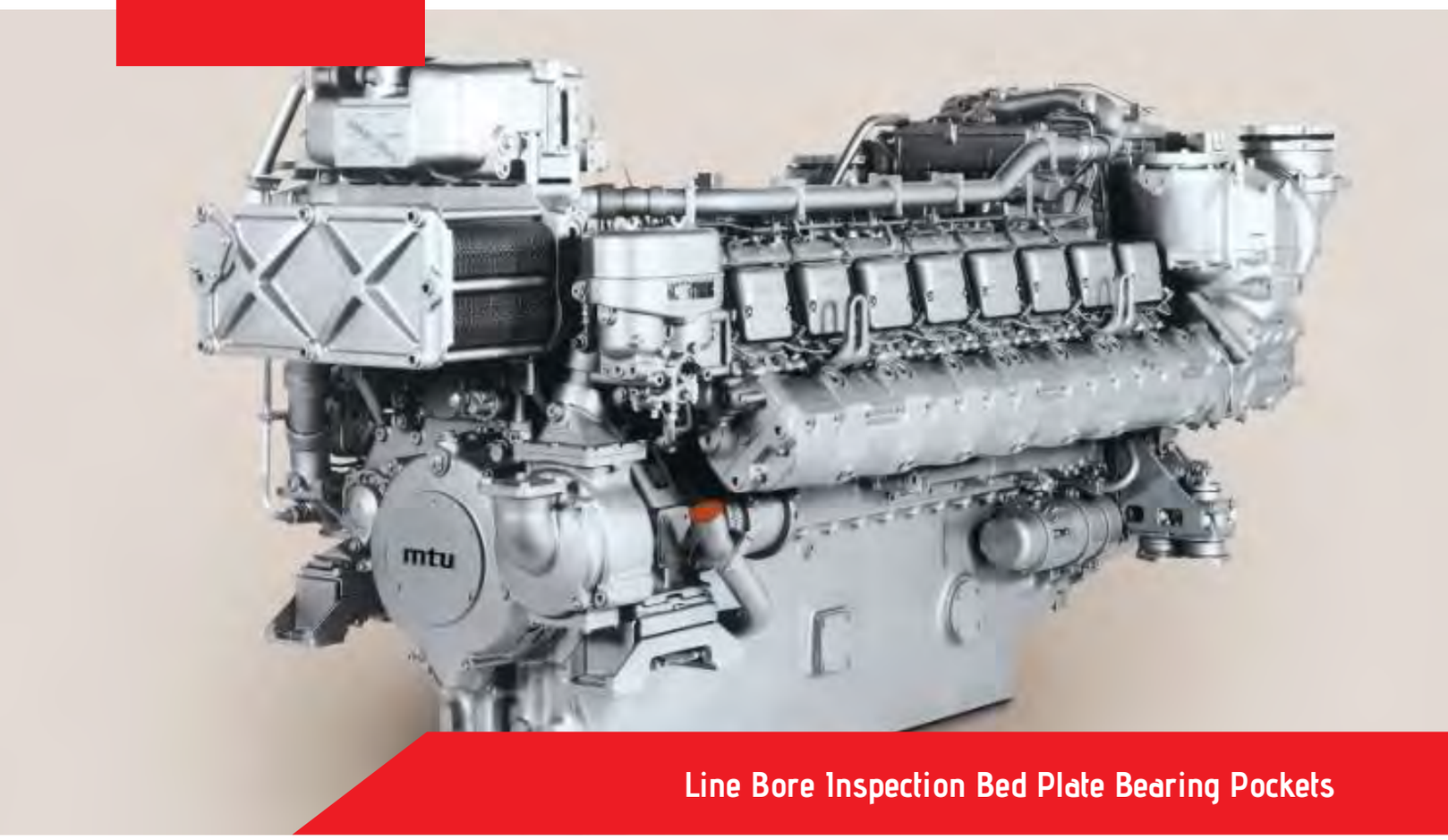
- Tables including all measured points coordinates
- Tables showing horizontal and vertical deviations

Do you have a similar project?

Contact our team at info@metrica.gr

INDUSTRY

METRICA
When it's a matter of trust



Line Bore Inspection Bed Plate Bearing Pockets

Overview

The main scope of this application was the alignment inspection of two MTU 16V 396 after machining the bearing journal pockets of the bedplate. The reason for these measurements was to verify whether the machining was successful or not.

For the inspection measurements, our team used Easy Laser E950 Bore Alignment system. This system makes the control and adjustment work of bearings and bearing journals easier thanks to the wireless detector unit and measurement programs that guides you through the measurement process. All parts included in the systems are designed and built for even the most demanding workplace and easy setup on any machinery.

Challenges

- The wind currents

Fieldwork

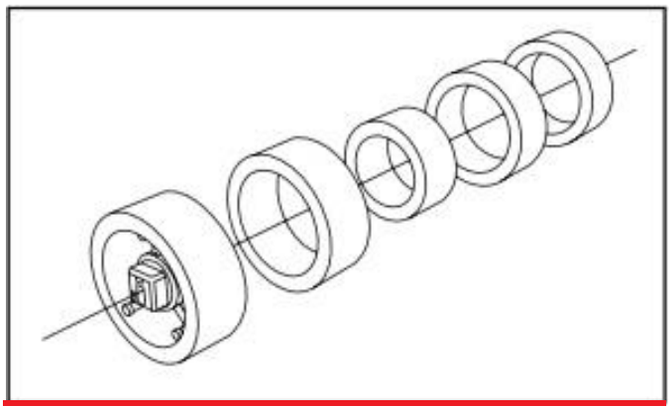
The measurements took place in Perama Shipyards. Special attention was given to wind currents as line bore application is a demanding procedure in terms of accuracy. To avoid the effects of turbulence etc, high sampling period of time (filter) was used while capturing data.

Benefits

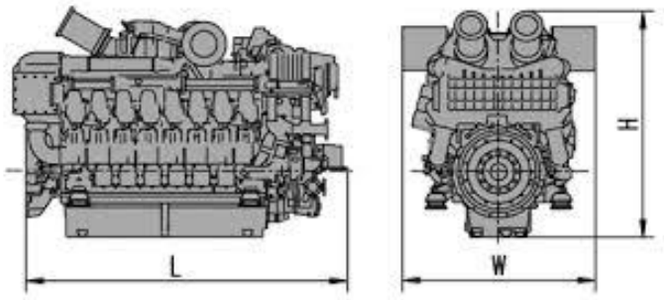
- Time saving
- Precise
- increased productivity

EASY-LASER®

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T. +30 2102815440



Principles of function



MTU diesel engine drawing

Fieldwork

The laser emitter was mounted on the first bearing journal on the aft side on both engines. All nine positions were inspected.

The first procedure was the rough alignment of the laser beam to the axis of the rotation of the crankshaft, then the fine alignment followed. The next step was the placement of the detector consistently to all critical positions.

Two series of measurements were performed for each engine to verify that no critical random error is included in the procedure.

Immediately by the end of the measurements, the software of the system created the report in pdf format. Note that the report from the software can be exported to any USB stick. In the office, a more detailed report can be issued if needed.

During measurements

During measurements

Instrumentation / Software

- Easy Laser E950 Bore Alignment system

Deviverables

- Report

Do you have a similar project?

Contact our team at info@metrica.gr

INDUSTRY

3D Scanning & 3D Modelling of an oil rig

Overview

METRICA S.A. accomplished 3D Scanning measurements and delivered the 3D model of a specific deck of an oil rig. Fieldwork took to our engineers two working days to capture the necessary information. Our team prepared the 3D model within twenty days.

Challenges

- the complex industrial environment
- the unapproachable character of interest zones
- the narrow passages on the scanned deck
- the necessity for quick on-field measurements and
- the high safety measures

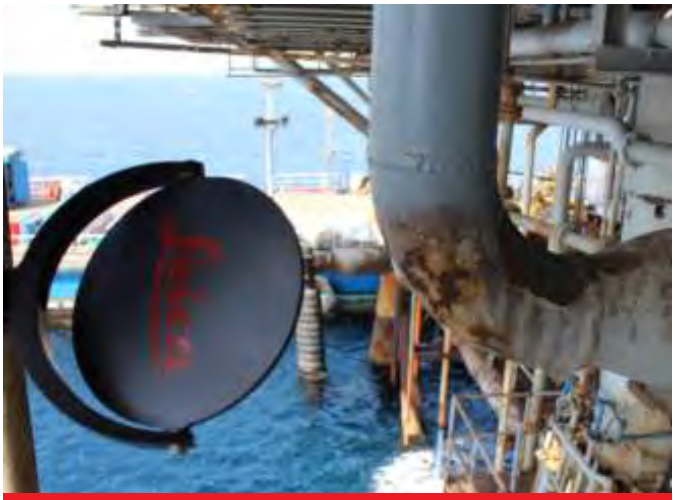
Fieldwork

Our team used Leica ScanStation P40 to capture the necessary information. The area of interest was covered through sixty three (63) laser scanner setups. Chequered targets were placed all over the installation and measured with the industrial total station Leica TDRA6000.

Benefits

- elimination of field interferences
- less rework
- increased productivity
- fewer requests for information
- cost reduction
- time-saving

88A Ginossati st., P.S.14452, Metemorphosis, Greece I info@metrica.gr I www.metrica-isv.gr I T. +30 2102815440

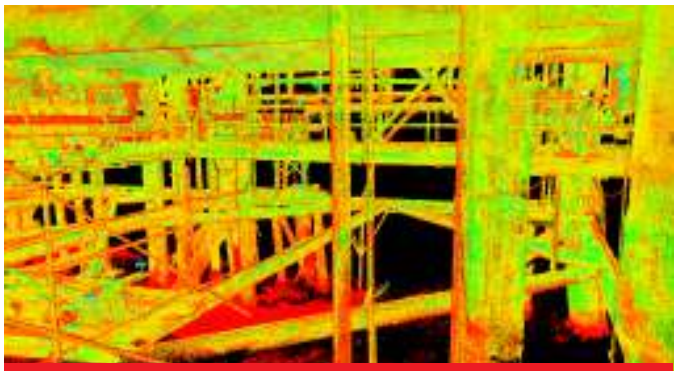


Leica targets in the area of interest

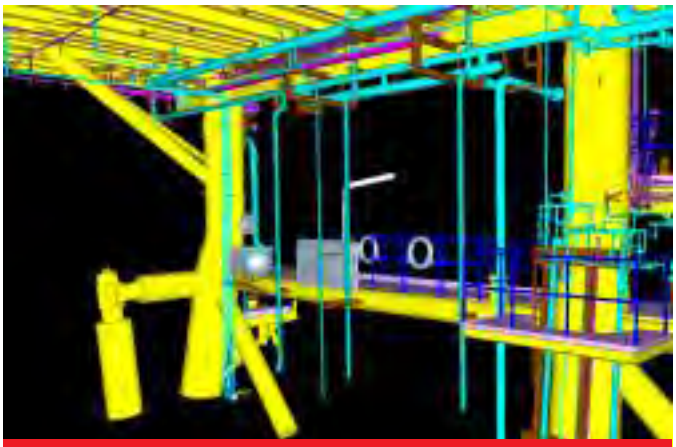
During 3D Scanning measurements

Fieldwork / Office work

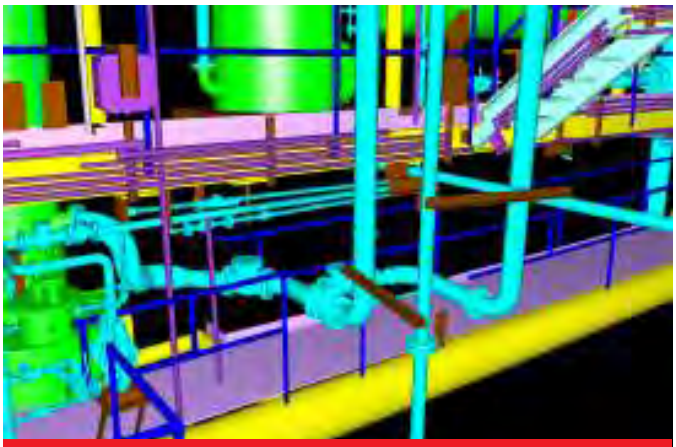
After measurements, all data were loaded to the Leica Cyclone software for further processing. Then, point clouds were registered to a final unified and aligned point cloud which was ready to be filtered - cleaned from all irrelevant objects captured during 3D Scanning. The installation was modelled through the usage of geometric primitives and other stored modelling libraries. The accuracy of the object was better than 5mm. The final deliverable was the 3D model in CAD format.



Point cloud



Part of the 3D model



Part of the 3D model

Instrumentation / Software

- Laser Scanner Leica ScanStation P40
- Industrial Total Station TDRA6000
- Laser Scanner Registration Targets
- Leica Cyclone

METRICA

Deviverables

- 3D model of the area of interest

Do you have a similar project?

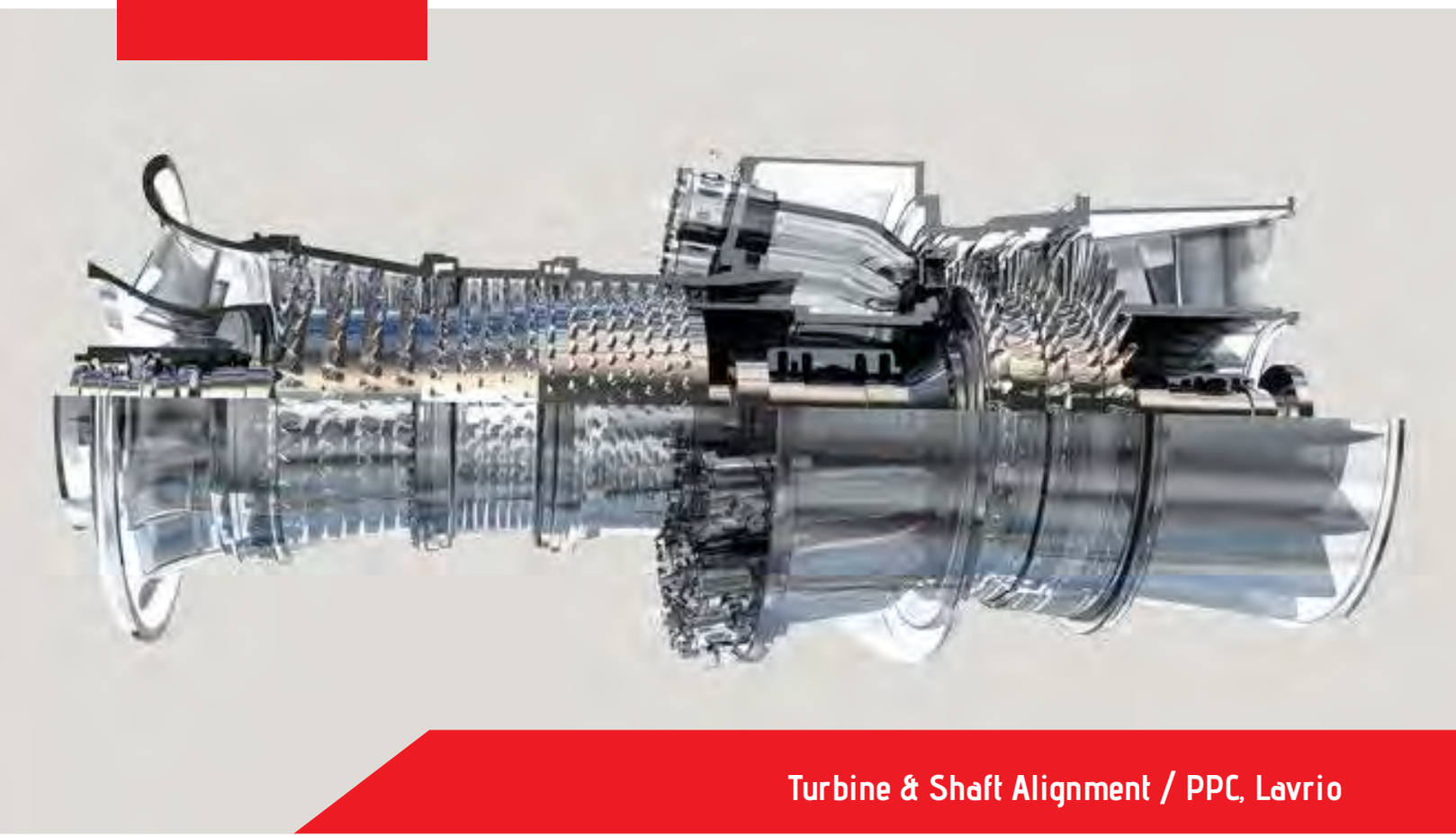
Contact our team at

info@metrica.gr

88A Ginossati st., P.S.14452, Metemorphosis, Greece I info@metrica.gr I www.metrica-isv.gr I T. +30 2102815440

INDUSTRY

METRICA
When it's a matter of trust



Turbine & Shaft Alignment / PPC, Lavrio

Overview

Due to an extended wear on the turbine shaft and bearings our team performed alignment measurements with the use of Easy laser systems. Additionally, in cooperation with Easy Laser experts we offered on the job training to PPC personnel on Easy Laser technology to be able to use the equipment in a variety of applications.

Fieldwork lasted twenty days.

Challenges

- The daily working schedule of the power plant
- Working inside a Gas-Turbine with little access and obstacles slowed down the processes

Training

Mr. Prosper Chekroun, an Easy Laser Application Engineer and Instructor on Turbine Alignment trained PPC personnel in the use of on Easy Laser Turbine Alignment System E 960B on behalf of METRICA.

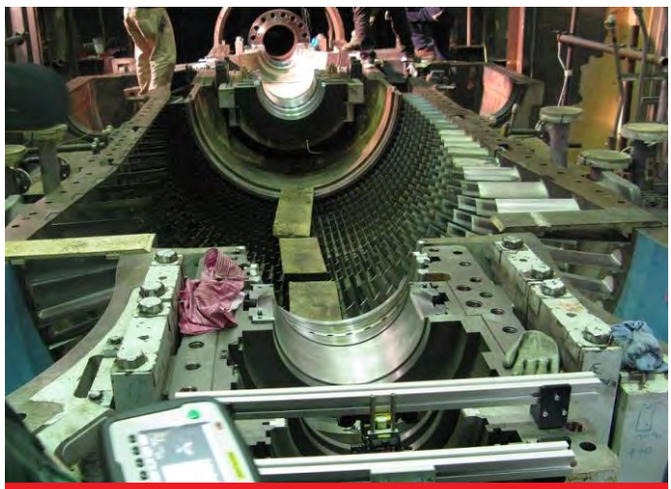
The training lasted 5 working days. The team of engineers that attended the training is now a team of certified Easy Laser operators that can complete any measurement in their field.

Benefits

- Time saving
- Precise
- increased productivity

EASY-LASER®

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T. +30 2102815440



E 960B system on the turbine

During measurements (Turbine cells alignment)

Fieldwork

Gas-Turbine alignment : The main task was to define the geometric condition of the Gas-Turbine, make the necessary adjustment to achieve alignment and then re-measure to document and verify that the alignment was successful and within manufacturer tolerances. All processes were achieved successfully. The equipment that our team used was Easy Laser E 960B Turbine Alignment System.

Movement monitoring: While PPC personnel were performing the movement of the turbine cells, Metrica S.A. utilizing Easy Laser E 940 Machine Tool to monitor the movements. These real time measurements were possible by using the application "Live Values" that gives in real-time the results of the performed movements. This application proved a potent tool to let the personnel know when to stop moving the cells.

Shaft Alignment: After the successful completion of Gas-Turbine cells alignment, the shaft of the turbine had to be aligned with the generator shaft. For this reason, our team utilized Easy Laser E 710 to perform the alignment. The system accepts thermal compensation values as also as many generator foot pair as needed. The application offers live monitoring of the movements performed while adjusting the movable engine. The process was successful and, was also performed on another engine-pump on PPC premises.

Live monitoring of cell movements

Turbine-Generator Shaft Alignment

Instrumentation / Software

- Easy Laser Turbine Alignment E 960B
- Easy Laser Machine Tool E 940
- Easy Laser Shaft Alignment E 710

Deviverables

- Reports
- Training Certifications

METRICA
When it's a matter of trust

Do you have a similar project?

Contact our team at info@metrica.gr

INDUSTRY

METRICA
When it's a matter of trust

Wind turbine (vestas v47) alignment

Overview

The project's scope of work was the alignment of the generator to the gearbox on a Vestas V47 type of wind turbine after servicing.

Fieldwork 2 days / 1 staff member

Challenges

- Working in heights
- Weather conditions that can stop the process

The measurements realized in Syros island on top of the wind turbine tower. Special attention was given to the weather conditions as shaft alignment is a very accurate and sensitive procedure. The equipment used on this application was Easy Laser Shaft Alignment System E 710.

Benefits

- Time saving
- Precise
- increased productivity

EASY-LASER®

88A Ginossati st., P.S.14452, Metemorphosis, Greece | info@metrica.gr | www.metrica-isv.gr | T. +30 2102815440

Units during measurements

Easy Laser E 710 Shaft Alignment System

Fieldwork

The units were mounted on the generator and gearbox flanges. The first set of measurements showed that the generator needed a rough alignment at first and then we repeated a series of measurements and movements to reach a good alignment within manufacturer tolerances.

After the rough alignment, fine alignment followed. A movement followed every set of measurements. The movements were performed by hydraulic lifting jacks and were monitored live on the display of Easy Laser E 710 system.

When all corrective movements and shimming were fulfilled and the generator feet were tight to the recommended torque, a final set of measurements were performed to verify that the alignment was successful and for documentation purposes.

Movements live monitoring

Generator flange

Instrumentation / Software

- Easy Laser Shaft Alignment E 710

Deviverables

- Report

METRICA
When it's a matter of trust

Do you have a similar project?

Contact our team at info@metrica.gr