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Industrial Surveying www.aksm.gr



SURVEYING PRECISION

land-building-industrial

The COMPANY

In today's complex construction environment our innovative expertise, analysis and carefully crafted approach can bring security to construction process. AKSM implements high accuracy applications which allow us to survey with pinpoint accuracy for industrial projects.

AC

Our experienced staff at AKSM supports manufacturers in a wide range of construction process in order to meet specifications in terms of precision. We provide measurement data with high precision for proper information on the size, shape and position of objects. We can carry out spot on measurement on site with the advantage of the latest technology.

INDUSTRIAL SURVEYING

We offer a wide range of industrial surveying services from offshore surveying of industrial facilities and equipment to offshore surveying in demanding environments. Measuring with accuracy in harsh environments is a challenging issue to solve, that requires the use of the most advanced techniques and qualified personnel.

Recent advancements in High Definition Laser Scanning and 3D Modeling technology have a significant and beneficial impact on our ability to support industrial surveying application.

SERVICES

- Personnel & equipment provision
- Method statement provision
- High accuracy Network installation & maintenance
- Determination and control on building's elements
- Geometry verification and As Built Surveys
- ISO standards incorporation quality control records creation
- High accuracy applications in corporation
- Control of axes: alignment, parallelism, verticality, flatness control
- Position alignment on large engines or assembly of different parts (flanges, anchors, e.t.c.), dimension control
- Geometry control and verification on prefabricated parts of large constructions in projects like bridges, pipes, wind power generators
- Deformation analysis & control
- Survey & geometry determination through point cloud collection
- 3D Scan Service
 - 3D digitalization of components
 - 3D inspection with CAD models
- 3D Total Station Services
 - Dimensional analysis Position alignment
 - Setting out

APPLICATIONS

- Shipbuilding
- Rail Vehicles
- Pipes & Flanges
- Plant construction
- Steel construction
- Machine Assembly
- Aircraft Construction
- Monitoring
- Tunneling & Mining
- Wind Energy Industry
- Paper Industry
- Scanning & Tracking



High Pressure Natural Gas and Regulating Station, Tema, Ghana



High Pressure Natural Gas and Regulating Station for the Feeding of V.R.A. at Takoradi



Tsakona Bridge, Kalamata



Natural Gas Unit, Nea Mesimvria Thessaloniki

Dimensional analysis erification

survey on constructed geometry, Aspropyrgos, Attica

Replacement of Rio - Antirio

special

parts,

Bridge's

Corinthian Gulf



Construction of new natural gas unit at Unit V of P.P.C. S.A., Megalopolis, Arkadia



Construction of new Wet Flue -Gas Desulphurization (WFGD) Unit at Unit III of P.P.C. S.A., Megalopolis, Arkadia







Erection of gas compression

station, New Messimvria,



Construction of Unit V of P.P.C. S.A., Aliveri, Evoia





Construction of 5 new silos in the area of Halvps Cement Industry, Aspropyrgos, Attica



Construction of new industrial buildings, tanks and silos, Varitimi, Milos Island





Thessaloniki

Erection of Trafigura Tank Farm. Procurement and installation of 18" pipeline Thema, Ghana

Erection of high pressure natural gas metering and regulating station, Thema, Ghana



Construction and extension of RM2 Unit and Spooler Unit at Halivourgiki S.A. facilities, Elefsina, Attica





Construction of facilities and new buildings for the creation of new production cable line, Korinthos



Construction of Sidma S.A. new factory production line. Inofyta, Viotia



Mine tunnels survey through point to cloud collection and verification surveys on existing equipment. Olympiada, Chalkidiki



Construction of Sidma S.A. new factory at Aspropyrgos, Attica



support Topographic for reconstruction of bridge crane at shipyards, Elefsina, Attica



Topographic support of metal construction at cement Industry of Titan S. A., Kamari, Viotia



Flare at Elefsina Refinery of Hellenig Petroleum, Attica



Alignment control of bridge crane rails at Corinth Pipeworks S. A., Thisvi, Viotia



Construction and extension of industrial buildings. Topographic support for construction of new bridge crane rails, Skaramagas, Attica



Extension of facilities and new buildings of Emek S.A. factory, Aspropyrgos, Attica





Preconstruction and erection of canopy through laser scanning technique, Kallithea, Attica

Fastern structural steel work for the Doha 2006 Asian Games Ceremonies, Doha, Qatar



Topographic survey through point cloud collection Aspropyrgos, Attica



Erection of high pressure natural gas metering and regulating station for the feeding of V.R.A at Takoradi, Ghana

SURVEYING PRECISION

CASE STYDY THE SNFCC FERROCEMENT CANOPY CONSTRUCTION & ERECTION

The ferrocement canopy of the opera building is made out of two ferrocement skins: the superior one (top skin) and the interior one (bottom skin). They are connected together by ferrocement diaphragms and steel diagonal circular hollow tube sections. Each skin consists of different ferrocement panels casted into steel formworks during the canopy preconstruction phase. The general methodology, for the canopy construction, foresees the preconstruction on the ground of 6875x3173mm (typical prefabricated panel dimension) pre-casted elements, corresponding to parts of the bottom and top skin of the canopy. These parts will be connected with splice zones at the final canopy position, which have equal dimensions of 577mm between the ribs.

PRECONSTRUCTION

Each ferrocement panel is casted on metal formwork (4000x800) installed on metal benches. It consists of a thick steel plate (t=10mm), that is made rigid with upn sections, is leveled and is connected via stiffeners to turnbuckles which allow the creation of the exact curvature for each panel. The steel plate is controlled by 64 points that correspond to the panels geometry. Deformations and deflections on the surface of the plate were adjusted by using a high accuracy leveler and invar rod.

Subsequent to the surface adjustment, the panel's reinforcement was placed on the casting mould, in a way that the constructed ribs and beams axes perfectly matched to the theoretical axes perfectly matched to the theoretical axes. Corrective movements were performed in order to eliminate deviations, by investigating the position of the implemented to the reinforced couplers. At the beginning, the 28 mm skin was casted.

Reflective targets, mounted on steel plates and placed on side mould, were used in order to verify the alignment of ribs and beams. Finally, control points were installed on the inner side of the panel and on the external visible side in order to be used during the erection sequence via the transformation from Local (preconstruction) to Global (erection) reference system.









GEOMETRY VERIFICATION PRIOR TO ERECTION

For each unit a fully referenced registry report was created by using 3D Laser Scanning Techniques. Each panel was evaluated on its constructed geometry:

- Curvature of the casted slab
- Slab thickness
- ER points coordinates deviation in relation to As-Built values
- Ribs, Beams width and CL

CANOPY ERECTION

i. Network Establishment

A high accuracy network (sd <1 mm), was established on the Roof of the Opera Building consisting of adequate in number reference points, distributed on the area of interest and finally determined in geometry and position in relation to the density of the scaffoldings. In total 90 benchmarks for CCR prisms were established and incorporated to the main network.

ii. Panels erection

Preliminary installation took place with measurements performed on the other side of the panel. Then each panel was adjusted on its final position by measurements performed on the inner side (installation of control points). Finally each panel was examined for its final position in relation to the adjacent, in order to fulfill the erection criteria.

iii. Bracings (metal structure) installation

Each part of the internal steel structure was modified according to the as-built model provided to the designer. Final adjustments were performed by measurements.

iv. Upper skin installation

Each top skin panel was preliminary positioned by the use of the bracings calibrated. Then the final adjustment took place by using the control points established during preconstruction.











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SURVEYING & MAPPING