



CRANIES



ANAGNOSTOU

TECHNICAL MECHANICAL ENGINEERING CONSTRUCTIONS

"Anagnostou" is a greek technical mechanical engineering construction company, with activities, all over Europe, in the field of construction, repair & maintenance of industrial units. Furthermore "Anagnostou" company maintains, repairs & reconstructs port cranes. Our last reconstruction is the crane No34 at the port of Thessaloniki (Macedonia Greece) described in details as follows:

1. COMPETITION OBJECTIVE

O.L.T.H. S.A. (Thessaloniki Port Authority S.A.) has proclaimed a competition for the purpose of reconstructing - improving & updating of the existing equipment, more particularly the Electric Rotating Port Crane No34 double arm, moving on stationary steel rails, so that it continues to operate smoothly & safely. The project description included the supply of all necessary materials & accessories, the repainting of the crane as well as all the control checks required by international standards for its safe & unimpeded operation.



2. GENERAL TECHNICAL CHARACTERISTICS OF THE CRANE

Manufacturer: GANS

Year of manufacturing: 1975

Year of First Operation: 1976

Location: Thessaloniki

Lifting Capacity: 16t on a 30m radius

27t on a 17m radius

Total Crane Weight: 216t

Motor Power: Lifting 2X100kw

Rotation 2X23,5kw

Arm 1X18,4kw

Rooting 4X9,8kw

Iron Wheeling Distance: 9,5m

Speed: Lifting with load 27t 30m/min

Lifting with load 16t 60m/min

Rotation 1,75RPM

Arm movement 50m/min



3. MECHANICAL PARTS

Steel Construction

Non-Rotating parts of Crane

The crane was completely disassembled (the arm DRAW BAR with the UPPER JIB, the LUFFING was removed, as well as the counter – weight, the engine room, the central pillar & the thross plate of the stationary part non rotating).

- a) A visual inspection was performed in order to point out possible erosion, corrosion, loose screw connections, errors in the gussets or cracks in general.
- b) Additional inspection by an external control office was performed, with the following findings:
 - Change of screw connections where required further points which were checked.
 - The circular wreath (ROLLERS sliding) in all the peripheral welding as well as the triangular sheet neurosis of the circular wreath.
 - The weldings of the support neurons of the brackets on the four corners of the metal carrier (PORTAL).
 - The bedplate of the THRUST BEARING on the main girder of the non-rotating part of the crane.
 - The four plate legs of the crane.
 - The cross length beams.
 - All the points where repair or different replacement, erosion, errors cracks or loose screw connections were performed.

For all the above points, control checks were performed with the use of penetrating fluids, metallic particles or ultrasound, followed by reports & solutions for every problem.



Rotating Parts – Mobile Parts

- Replacement of all bearings
 - // - of all bearing trapping points
 - // - of worn out rotating screw parts
 - // - & modification of rotating gear rollers
 - // - of sliding cornice
 - // - of pulleys and its protective parts
 - // - of wire ropes
 - // - & repair of the HEI JIB parrot
- Maintenance of the toothed rack rule
- Replacement with modification and engineered processing in our workshop of the central bearing
- Control check of the whole steel construction



Painting

Before the beginning of repairs on the steel construction, the Crane underwent cleaning via (sweeping) sandblasting.

Final painting was performed based on the appropriate requirements due to location (seaside) with the respective duration guarantee.

Mechanisms

Control and replacement of all worn – out parts of mechanisms were performed, as well as construction of new gears, maintenance of motors & reducers, replacement with new couplers, total replacement of all mobile parts where necessary. As far as the mechanisms relevant to direction, rotation movement (slewing), load lifting - plunging motion, the luffing motion, wire roops and operating room are concerned, a full disassembly was performed up in detailed parts.

4. ELECTRICAL EQUIPMENT

Electrical Power System

The existing cable drum and counter weight systems were replaced with an electric supplied one. Secondary cable drum equipment & connections were installed, as well as limiting switches & power & control cables. All repairs were made according to the electrical engineering study.

Low Voltage Panel

The following procedures were made in the existing Low Voltage field:

- ◆ Removal of existing equipment
- ◆ Insulation of panels area walls
- ◆ Two air-conditioning units installation
- ◆ Electric roll shutters installation
- ◆ Installation of supporting backs for electrical material:
 - a) lifting motion turns amplifier 1
 - b) lifting motion 2
 - c) movement motion
 - d) arm motion
 - e) rotation brakes control
- Supply switches of all motions
- Main relays of ever motion
- Chock spool inverters of every motion
- The necessary thermomagnetic and additional relays for every motion.

Note : All parts were covered with transparent plexiglass material for protection against contact.





Magnet and Cable drum Magnet Panel

Cleaning and maintenance of existing panels.

Disassembly and maintenance of cable drum magnet motor.

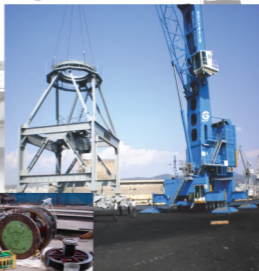
Rotation ring carrier

Control check and maintenance of the rings.

Three – Phase Motors AC

In the remaining motors the following works were performed:

- Disassembly of the motor
- Washing with electro cleaner chemicals
- Heating for humidity damping
- Painting with insulating varnish
- Disassembly of rings & heatsink windings
- Construction of ring for the bridging of windings
- Setting of a thermistor in the wrappings
- Replacement of bearings
- Balances
- Proper operation testing



Reduction gear

Control Check – maintenance – replacement of worn-out gears, proper lubricants supply.

Limit Switches

Limit switches with a reducer 6 contacts, IP 65, Stromag or an equivalent one as well as switches 1NO 1NC, 10A, IP65 for the cablewires control.

Gradual braking rotation system

In the rotation motion 2 new brakes type ELDRO were put on each motor.

The motor of the two ELDROS are controlled by an electronic turn moderator. The whole system is controlled by a pedal in the operating booth which gives an analogue signal so that a progressive braking of the rotation is achieved.



Movements control – General Characteristics

Control of all movements is achieved via alternative current turn regulators, (AC inverters) of Altivar 71 type of the Schneider Telemecanique house.

Programmed Logical Control (PLC)

MODICON Premium TSX57 series type for control & interlockage of all movements.

The coders of the motors are connected with both the transformers & the PLC.

Electronic crane management system (CMS)

Through the crane management system there is a potential of indication & recording of errors (software).

Peripheral equipment

Operator's chair: Improvement

Windmeter: The wind speed measuring sensor was replaced, while it activates two free contacts for warning or immobilization of the crane.

Overload Protection System: The system was checked & tuned & connected with the PLC.

Lighting: Sufficient number of lighting bodies supplied & installed



Starting off

The equipment was set in motion by our company's crew, supervised by the manager in charge of the project and in the presence of a representative of Thessaloniki Port Organization, both during test trials & during final delivery.





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Staff training

Our company was responsible for the staff training:

- Explanation of all the electrical drawings of the crane as well as codes & symbols.
- Basic knowledge of programming, introduction and installation of PLC software as well as turning adjustment parameters.
 - Malfunction detection method.
- Virtual malfunctions in the crane – discovery and restoration.
- Adjustments and maintenance of electrical equipment.



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Study/Drawings

The drawings and study, both for the mechanical and electrical installations were delivered in printed & electronic version. Any relevant literature (brochures manuals) concerning equipment was also delivered.



Time

The time of execution of the project was approximately one hundred (100) days, from 15/07/2011 to 25/10/2011.

Budget

Seven hundred & fifty thousand euros (750.000,00€)

Machinery

The machinery that was used in the project was:

Four (4) telescopic cranes: (2 X 150 ton), (1 X 120 ton), (1 X 100 ton)

Two (2) parrot cranes: (1 X 10 ton), (1 X 15 ton)

Human Resources

One (1) Worksite Manager - Mechanical Engineer

Four (4) Engineers:

Mechanical Engineer | Electrical Engineer

Weld Mechanical Engineer | Computers Engineer

Three (3) Foremen

Eight (8) Technicians (Fitters)

Four (4) Welders

Two (2) Machinery Technicians

Four (4) Crane & clark operators

Four (4) Sandblasting - Painting Technicians

Four (4) Electricians

Two (2) Computer operators



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