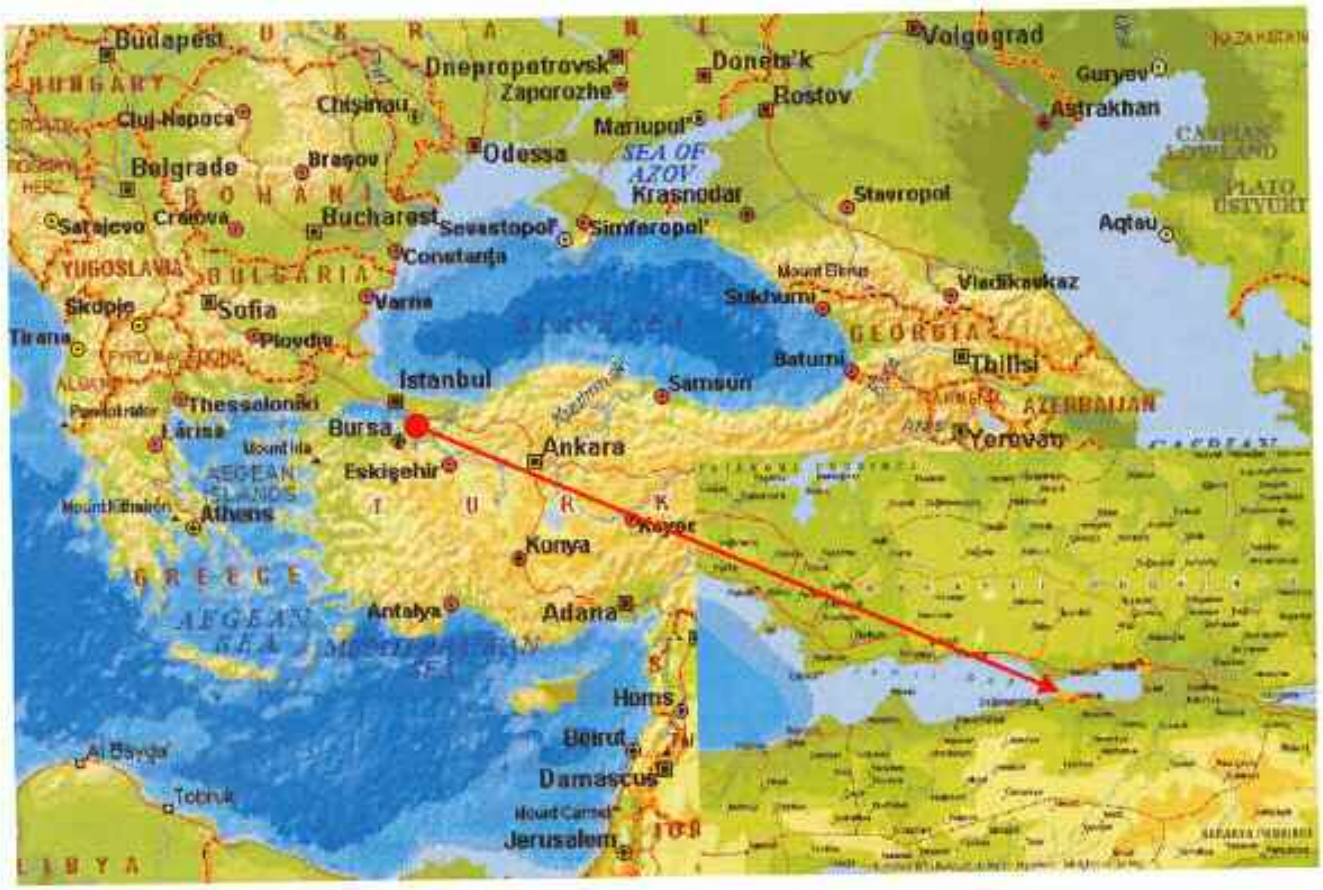
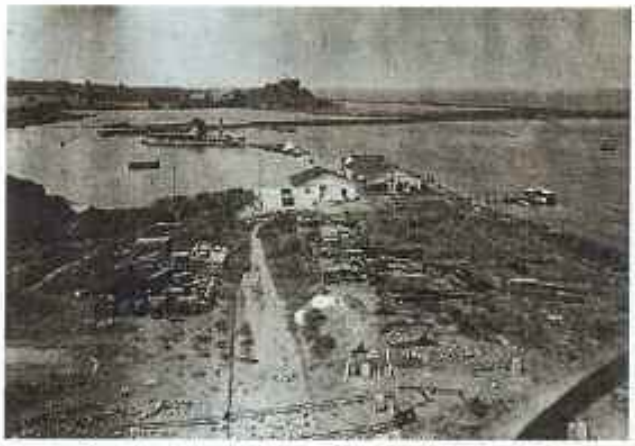
GÖLCÜK NAVAL SHIPYARD

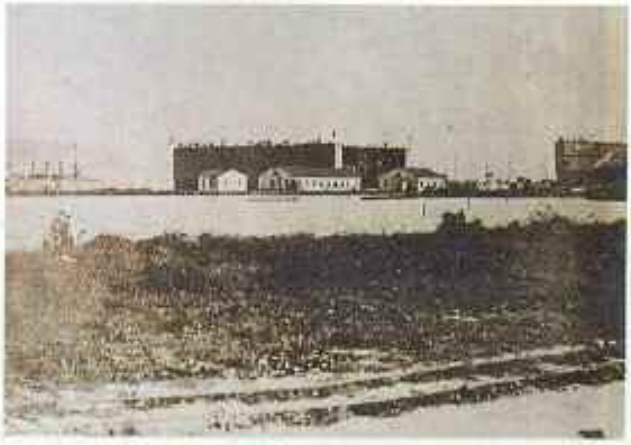
GENERAL INFORMATION

Established	: 1926
Total Area	: 394 000 m²
Indoor Working Area	: 170 000 m²
Slip Ways	: 1 x 30 000 DWT 1 x 15 000 DWT
Dry Docks	: 1 x 20 000 Tons 1 x 12 000 Tons 1 x 4 500 Tons
Work benches	: 1900
Workshops	: Hull construction, machinery, electric and electronic, weapon workshops
Docks	: 7
Personnel	: Approx.4400





Cleaning of the harbor and the initial sheds, 1926

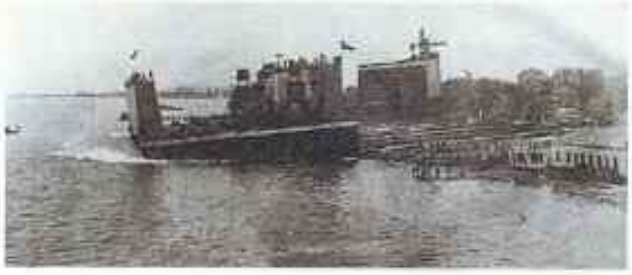


Construction of floating dry dock, 1926

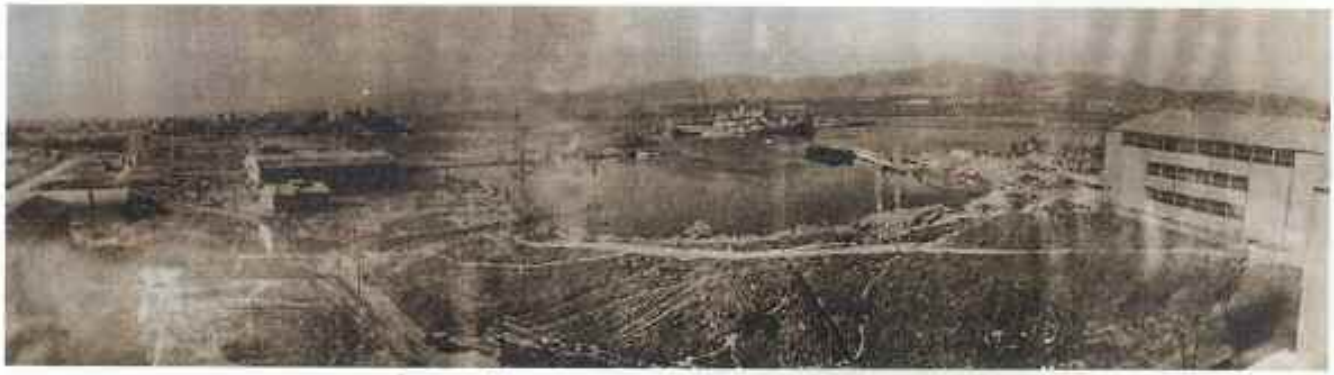
During World War I, battleship TCG YAVUZ (ex-GOEBEN) which had been transferred from the German Navy was damaged by a mine and needed to be dry- docked.

To repair the ship, a contract of 1.2 million TL for the construction of a 25.000 TLC floating dry dock was awarded to a German company, Flender. The construction started in 1924 and completed in 1926 during which some of the present land facilities were built.

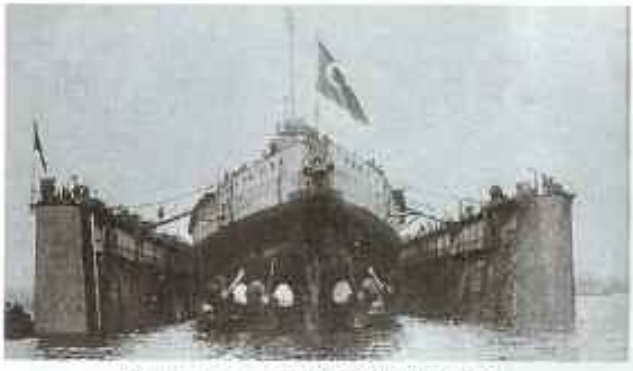
In 1928, following the objectives set forth by the founder of the Turkish Republic M.K.ATATÜRK a start was given to establish a modern shipyard in Gölcük. All planning of investment projects was completed in 1934 via an agreement with a Dutch company regardless of all the financial difficulties of the young Turkish Republic. Construction of most important parts of the project was disrupted during World War II.



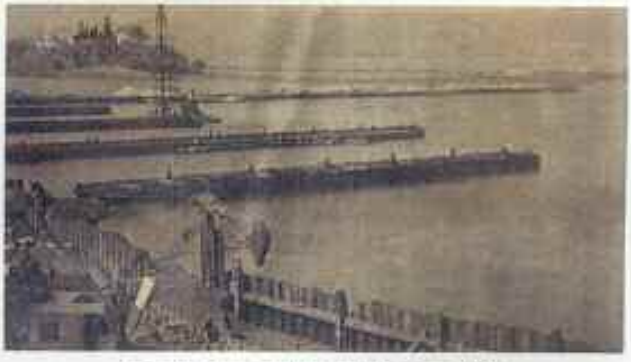
In 1926 launching of 1st block of the floating dry-dock built for the dry-docking Ex. TCG YAVUZ



Shipyard construction activities in1930s



Dry-docking of ex TCG YAVUZ in 1927



Construction of shipyard docks in 1950

Construction of TCG KOÇHISAR in 1965

Launching of TCG PEYK in 1972

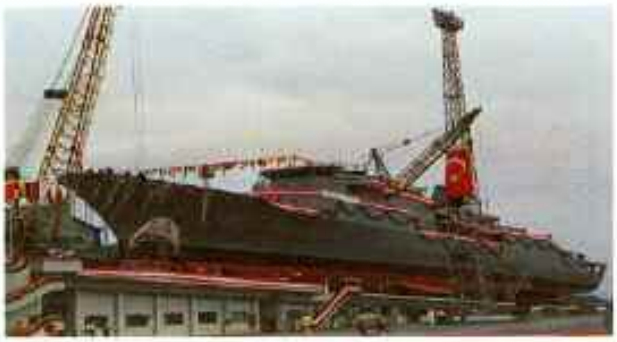
Launching of cargo ship Admiral S.ALTINCAN in 1968

TCG AKAR during replenishment at sea exercises. Launching date: 16 November 1983

Building of dry-dock 8 in 1980

Launching of TCG SG 59 in 23 July 1992

Construction of Gölcük oil tanker in 1992



Launching of TCG KEMALREIS in 24 July 1998

Construction of the shipyard facilities was accelerated as the result of growing demand for maintenance, repair and construction of ships.

All these efforts resulted in a modern shipyard which is capable of building high technology submarines and frigates, and commercial vessels up to 30.000 DWT. 476 vessels and small motor vehicles have been built up to the present day by the GNSY.

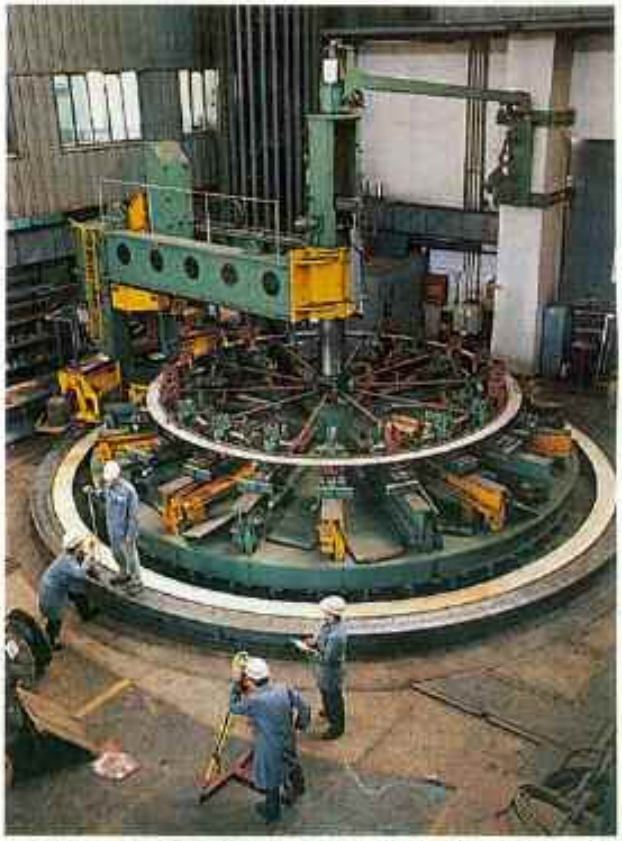
Construction of TCG Ç-150 in 1991

Transferring of TCG ANAFARTALAR FROM shore to the dry dock 6 June 1998

Building of the first HDW / IKL design AY class (TYPE 209) 1000- ton submarine was started in 1975. Submarine construction is one of the most important milestones in the GNSY's history. With the technology and know- how acquired, Turkey has become one of the fourteen countries in the world that can build submarines.

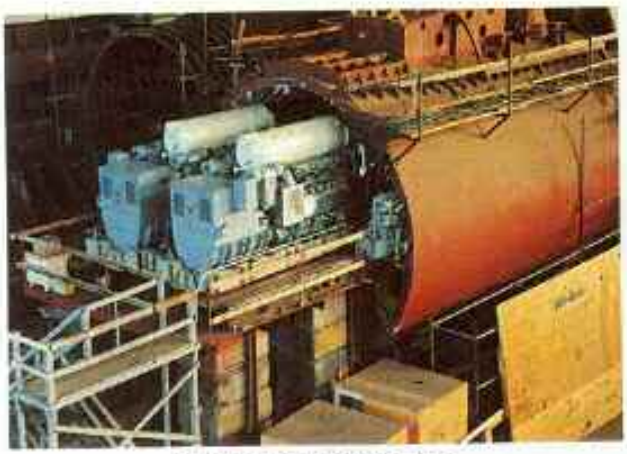
The first welding of TCG ANAFARTALAR made by the president of Turkish Republic

In 1989, construction of 1400-ton PREVEZE class submarines equipped with advanced ESM, sonar, fire control systems and Sub-Harpoon launching capability was started. Four of these submarines have already been delivered to the Turkish Navy. Preparations have started for serial building of more modern GÜR class submarines, an advanced version of the successful PREVEZE- class, between the years 2000-2006



Tack weld Bevel-Jig is a comprehensive tool for the machining of frames, frame segments and transition rings for submarine construction. It can processes materials with a diameter of 3100 mm to 7500 mm and thickness up to 800 mm.

Construction of pressure hull



Installing the diesel generator

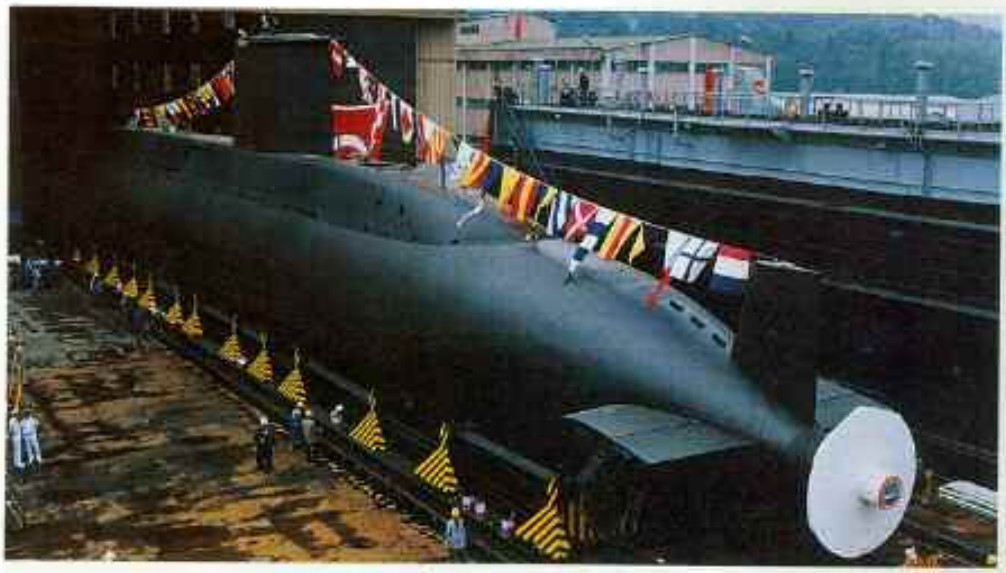
Installing the propulsion motor

Bringing the main sections together

Although the construction of AY-class submarines started in GÖLCÜK following the extensive training received in Germany before and during the construction, more advanced PREVEZE class submarines, as well as their prototype, were built in the GNSY without a prior prototype from the original manufacturer.

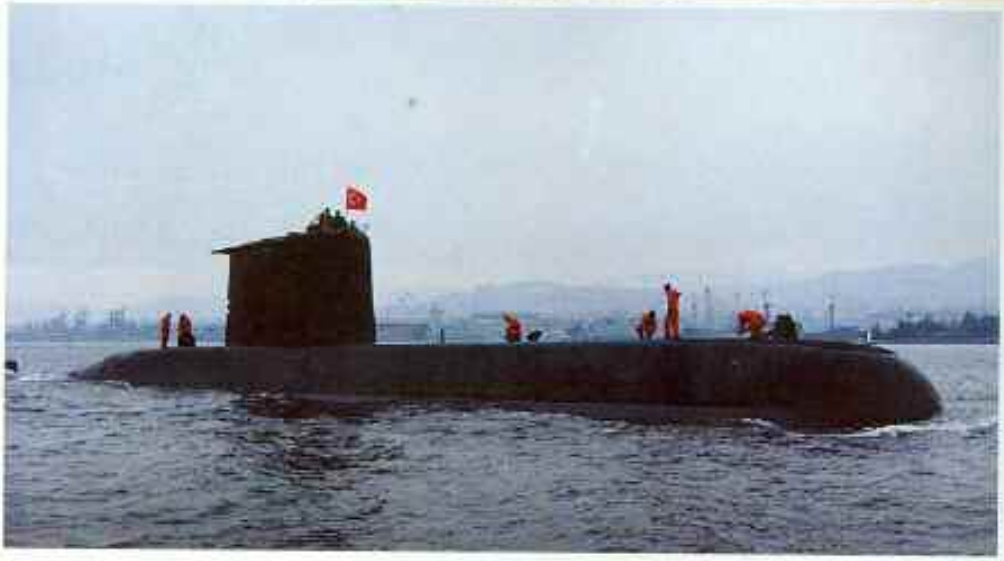
The general characteristics of PREVEZE-class submarines:

- Displacement : 1470 ton
- Dimensions : 62 m. X 6.2 m
- Speed surfaced : 11 Knots +
- Speed in submerged : 21 Knots +
- Weapons : 8x21 inch. torpedo tubes (Torpedo and sub Harpoon)



Transferring of
TCG ANAFARTALAR
to the dry dock

TCG ANAFARTALAR
in the dry dock



TCG ANAFARTALAR
during sea trials

The construction of surface vessels started in 1966 with KOÇHİSAR patrol boat, continuing with escort destroyers TCG BERK and TCG PEYK in 1970.At present modern surface combatants and logistic vessels continue to be built in GNSY.

MEKO class frigates are successfully built by the GNSY's experienced technical personnel thanks to the expertise acquired during the last half century. These frigates are equipped with modern sensors, command & control and weapon systems against surface, subsurface and air threats. In this program diverse modern weapon and electronic systems of both European origin and US have been successfully integrated into a frigate for the first time.

The first welding of TCG KEMALREIS by the President of Turkish Republic, Mr. Süleyman Demirel.

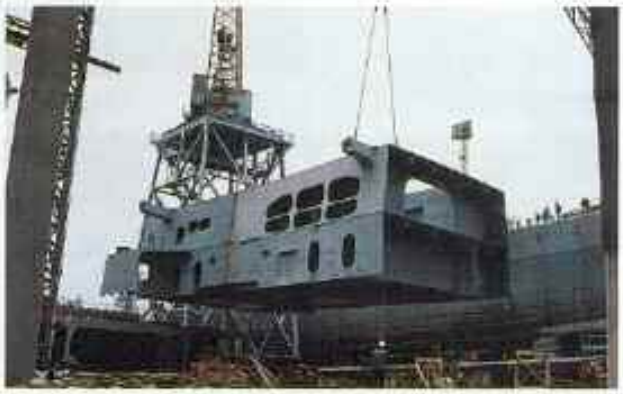
Hull module fabrication in the hull shop.

Four cutting machines, one of them being a plasma cutting machine in the hull shop, are used to cut different dimensions of steel plates. Hydraulic presses with capacities of 350, 500 tons and one bending machine with a capacity of 1000 ton are used to bend plates.

Transportation of hull module

The general characteristics of BARBAROS class frigates:

- Displacement : 3400 tons
- Length : 118 m
- Width : 14.8 m
- Draft : 4.25 m
- Propulsion system : CODOG
  2 x GE LM 2500 gas turbines
  2 x MTU diesel motor
- Diesel generator : 4
- Fin stabilizer : B+V simplex
- Speed : 32 kts.+
- Weapons : Harpoon system, Sea Sparrow SAM (VLS), Mk 45 5"/54 gun, Sea Guard CIWS, Mk.32 torpedo tubes
- Cruising range : 4000 NM
- Helicopter : 1
- Air conditioning : Noske- Kaeser



Transportation of superstructure to the slip way for mounting

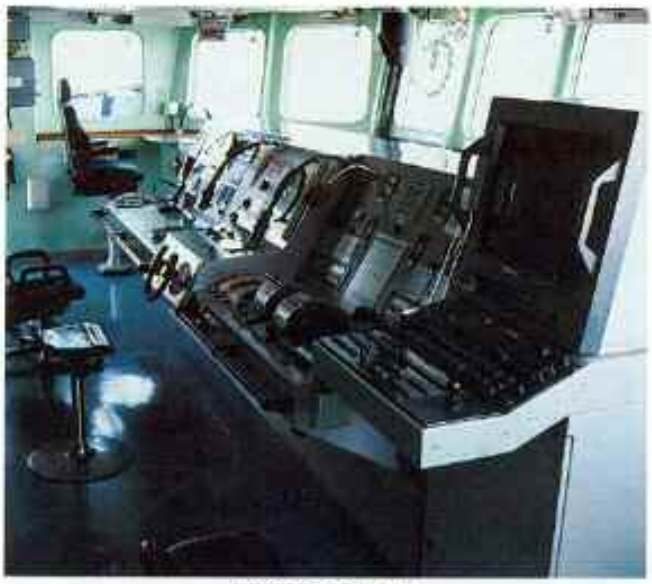
Hull construction on the slip- way

Installation of reduction gear on board

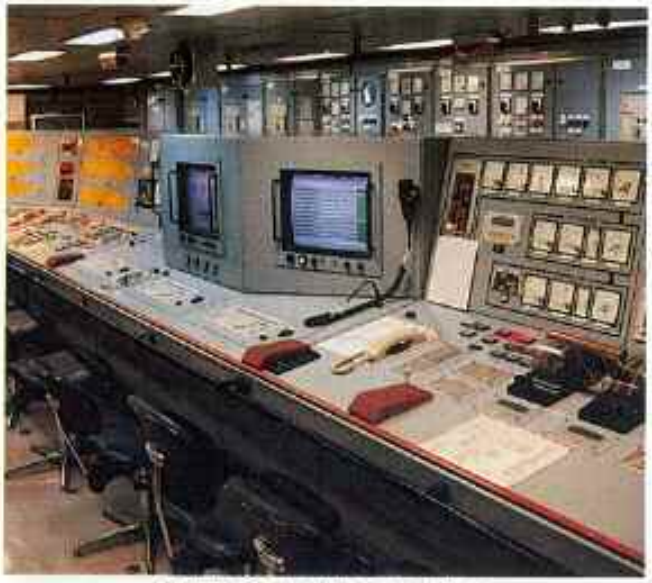
- Construction of TCG FATİH and TCG YILDIRIM frigates, the third and fourth ships of YAVUZ class, was started in January and November 1986 respectively, with delivery to the Turkish Navy in October and November 1989.
- The construction of the sixth ship TCG ORUÇREİS was started in December 1992 and delivered to the Turkish Navy in May 1996.
- The keel of the eighth ship TCG KEMALREİS was laid in October 1996 and launched in 24 July 1998.

Installation of 5"/54 gun onboard

Transferring the fire control radar on board



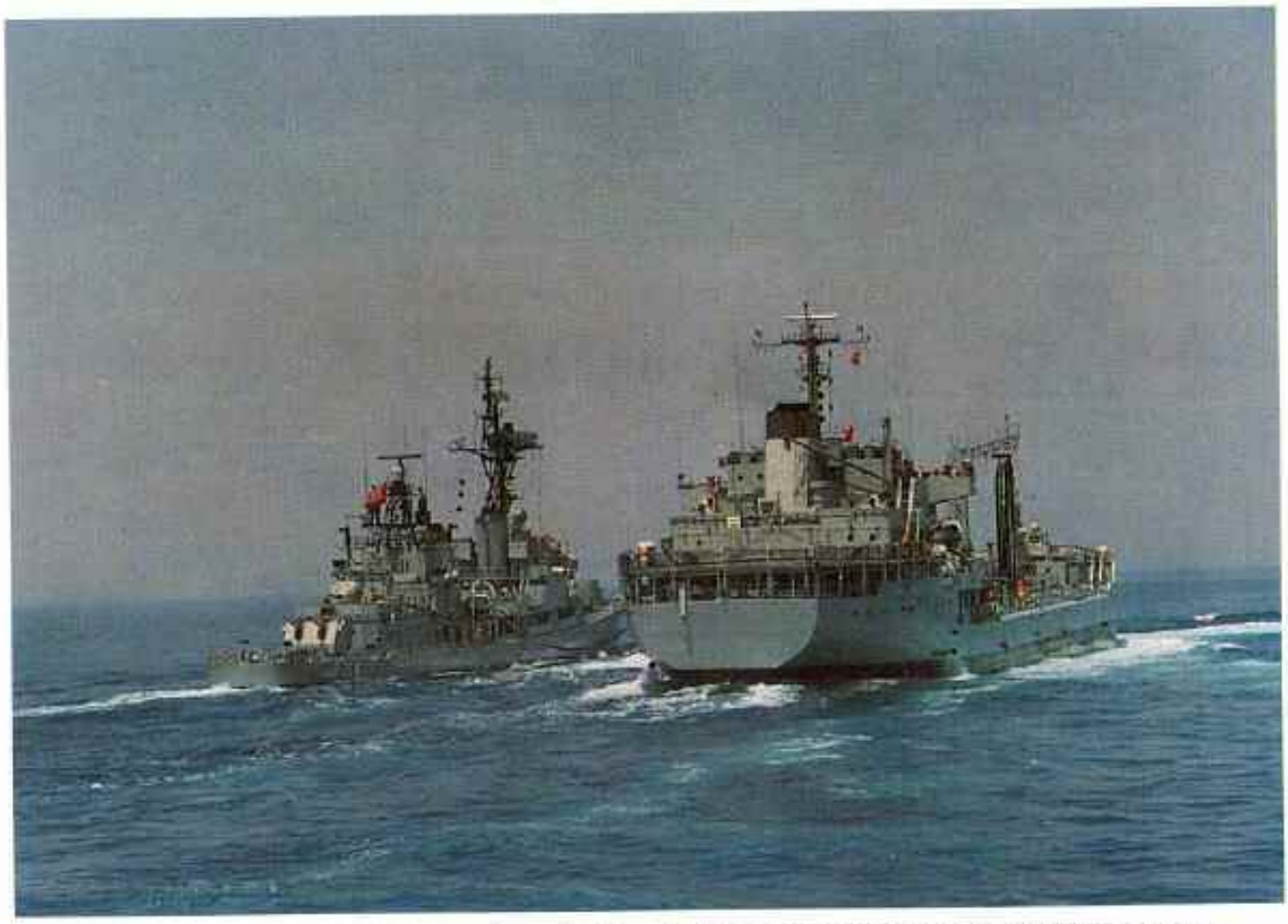
Bridge of a frigate



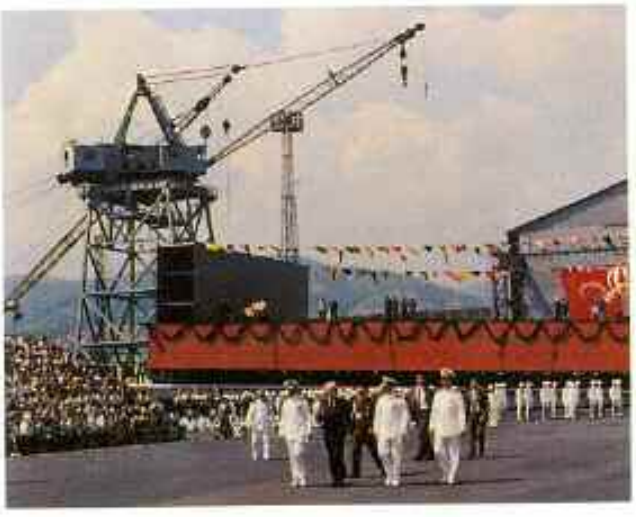
Machine Control Room of a frigate

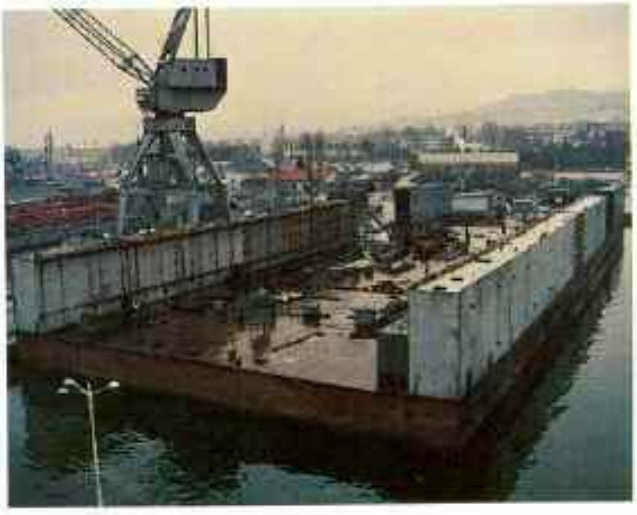
Launching of TCG KEMALREIS, 24 July 1998

The first vessel that was built in the GNSY and delivered to Turkish Navy in 1937 was an oil tanker named GÖLCÜK. GNSY has been continuing its ship building activities successfully by constantly building upon previous experiences with increasingly advanced and sophisticated products. Several examples of the vessels built in the GNSY are shown below.



TCG AKAR (19000 ton) is the first large- scale construction project of a supply vessel delivered to the Navy by the GNSY.

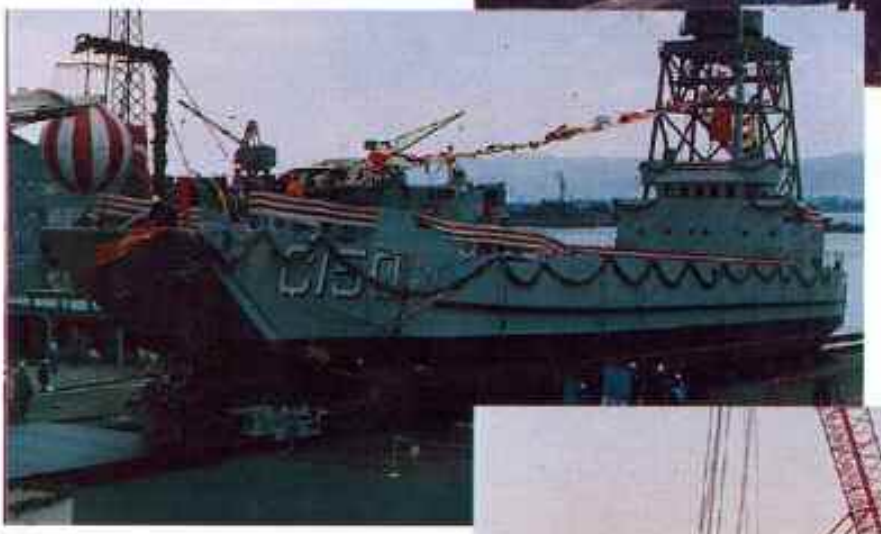




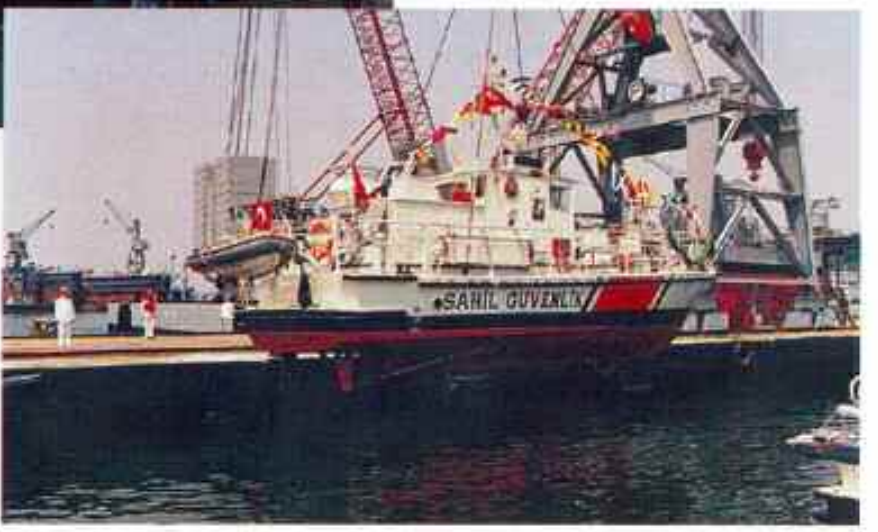
Building of dry docks.

The construction of 18000 DWT BURSA and BALIKESİR bulk carriers followed by 5500 DWT KONYA and KULA general purpose container dry cargo vessels was among the most important achievements of the GNSY.

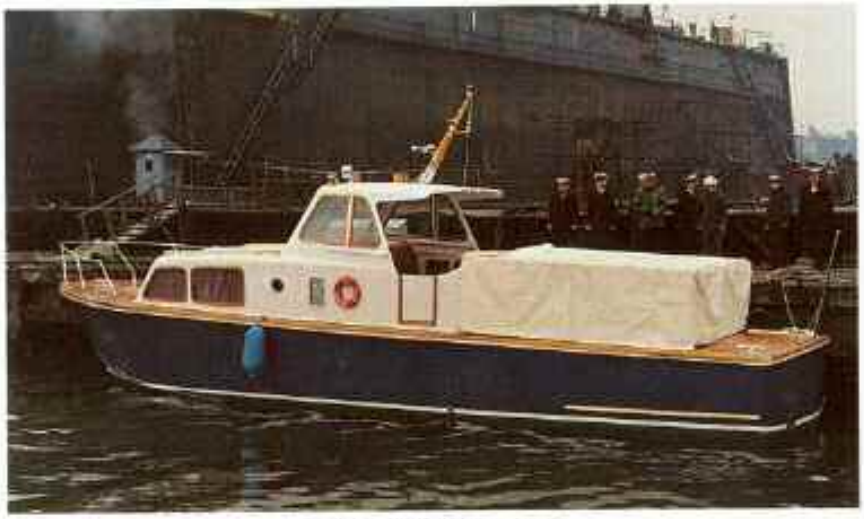
Building of the oil tanker Gölcük



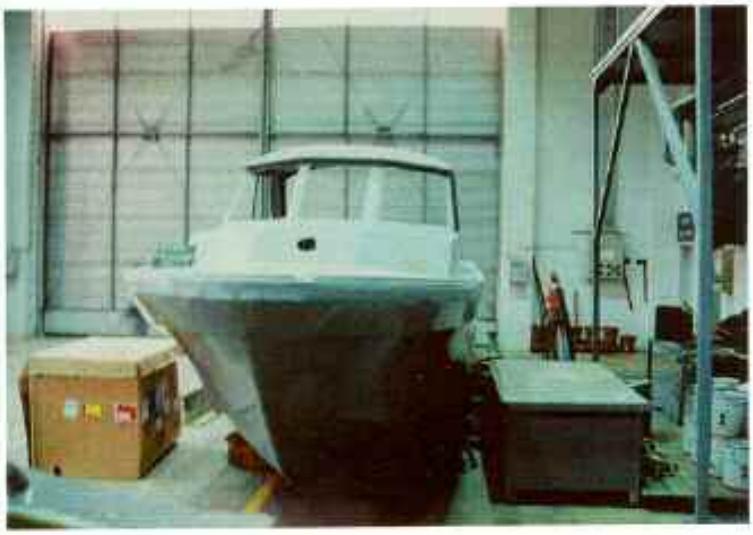
Launching of the landing craft TCG Ç-150

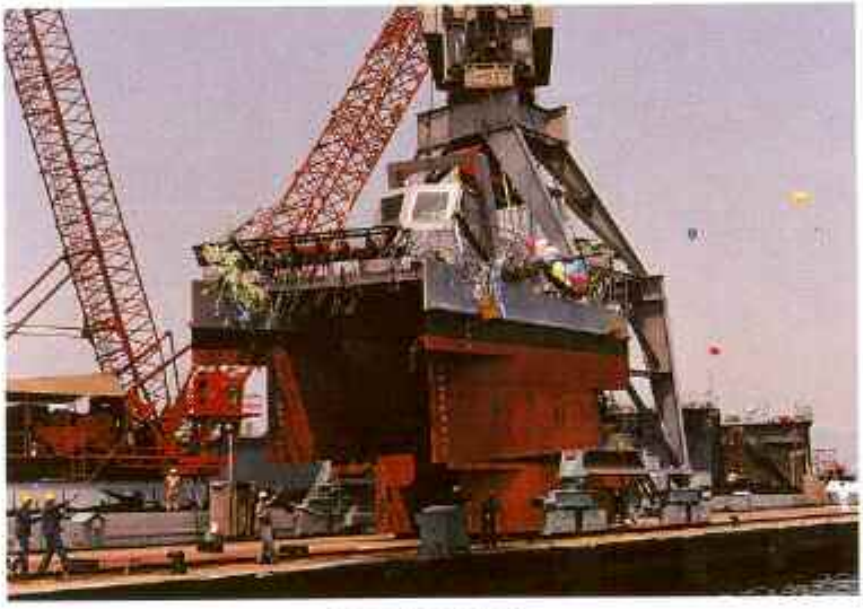


Launching of the coast guard boat



Building of Fiberglass boats





Sea- skimmer boat

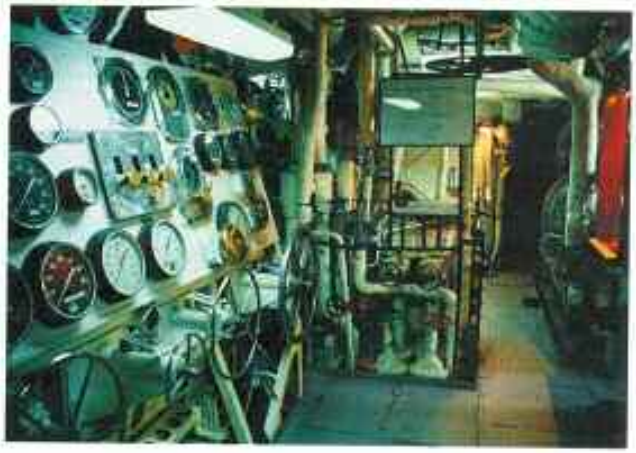
GNSY is an environmentally conscious organization, employing the latest anti-pollution techniques. GNSY demonstrates this policy in building sea-cleaning vessels.

TCG GAYRET, built in 1946 in USA and serviced by the Turkish Navy between 1977-1995, was converted to a museum in GNSY by the order of Admiral Salim DERVİŞOĞLU (then Fleet Commander of the Turkish Navy), to promote the maritime culture and to raise naval awareness and interest among the Turkish Youth.

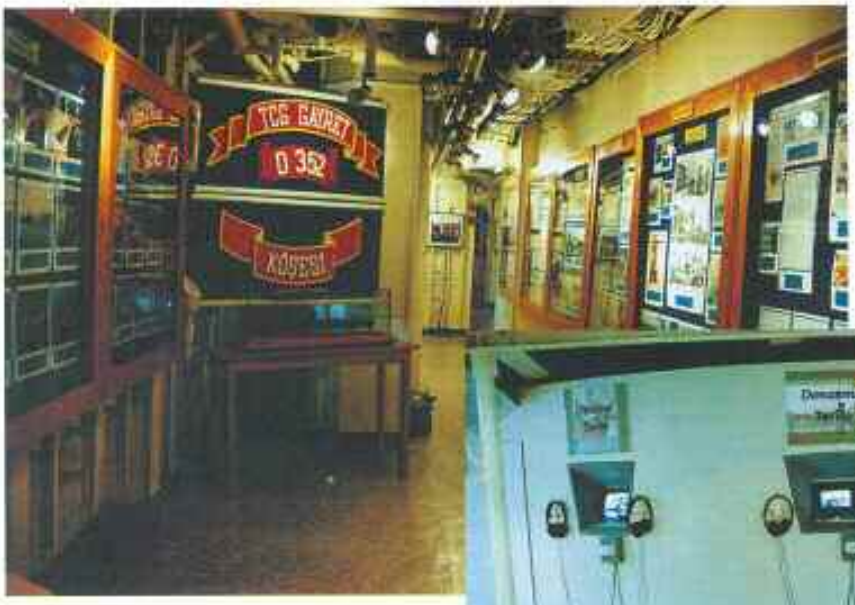
View of Gayret museum in İzmit.

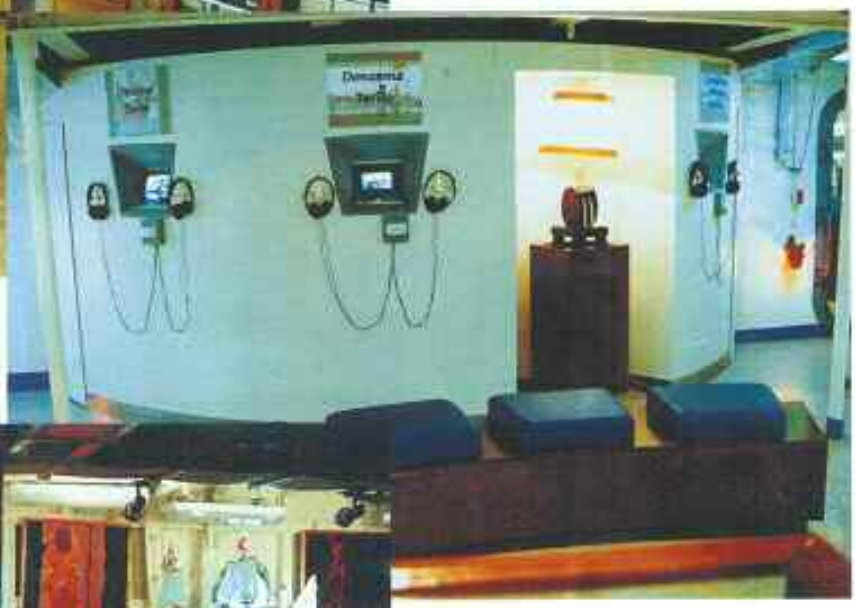
A view of the bridge

A view of the CIC



A view of the machine room

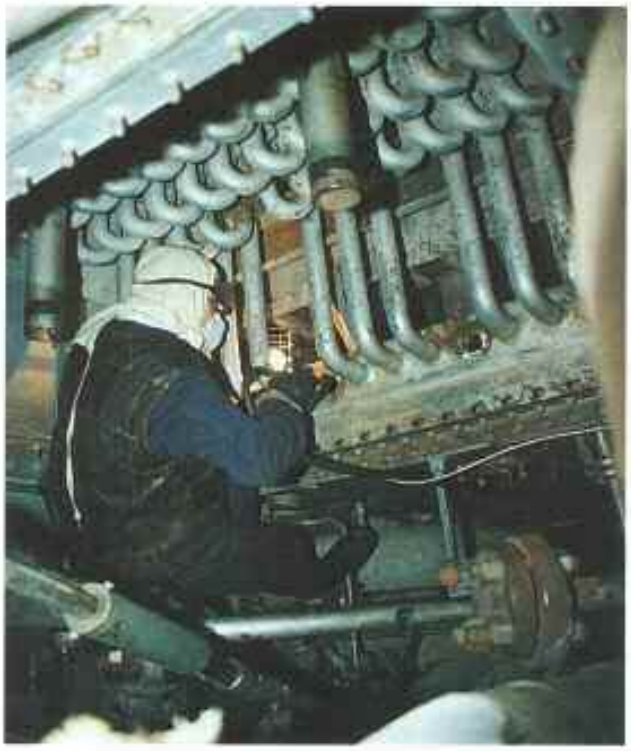




Views from Gayret museum

A view of exhibition room

Marine history section of the museum



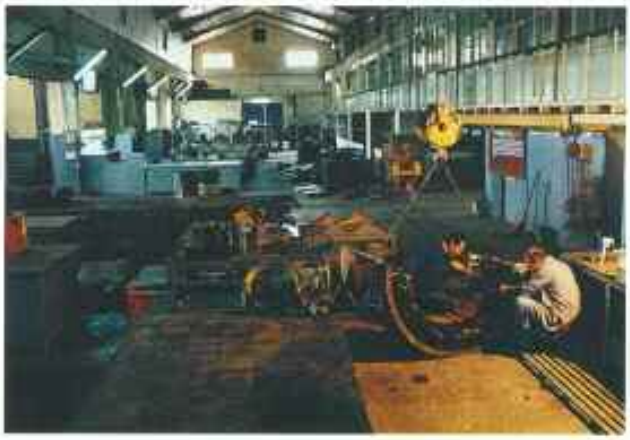
All kinds of machines and boiler repairs of steam powered ships are made in the GNSY.

Thanks to extensive training programs to keep pace with the modern technology and the expertise acquired, overhaul of hull, mechanical, electrical, electronic and weapon systems for surface and submarine combatants is being carried out successfully. Repair activities started between 1964-1968 with the repair and overhaul of submarines and combatants, which later continued with overhauling of AY class submarines in 80's, and TEPE class frigates in 90's followed by YAVUZ class frigate's overhauls.

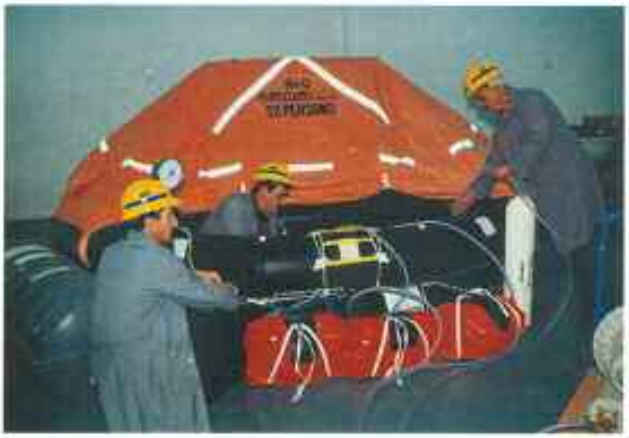
After entry of the TEPE (ex-US KNOX) class high-pressure (1200-psi) steam powered ships into the inventory, the need to overhaul these frigates became a necessity. Having developed the necessary background and having been certified, GNSY became the only site outside the USA where these frigates can be overhauled and repaired.

Modernization, calibration, and alignment of various engines, weapon and command & control systems are also carried out at the GNSY. Mobile repair teams are ready to provide support to combatants round the clock at sea or abroad.

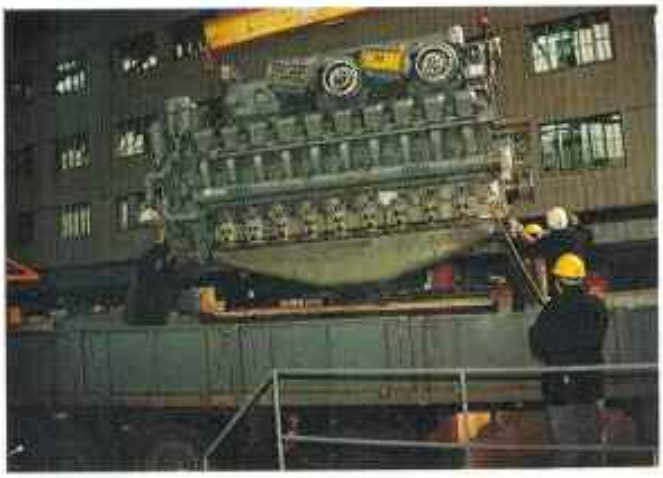
When required, repair services are provided to friendly and allied naval units.



In the electrical workshop, AC-DC generator-motor coiling, varnishing, furnacing and all kinds of ship electrical systems maintenance and repairs are performed.

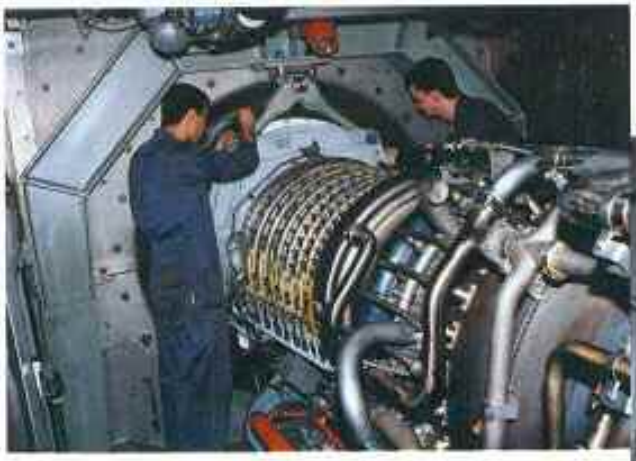


In the life-raft-repairing workshop, 20 different types of life rafts in the Turkish Navy are tested and certified.

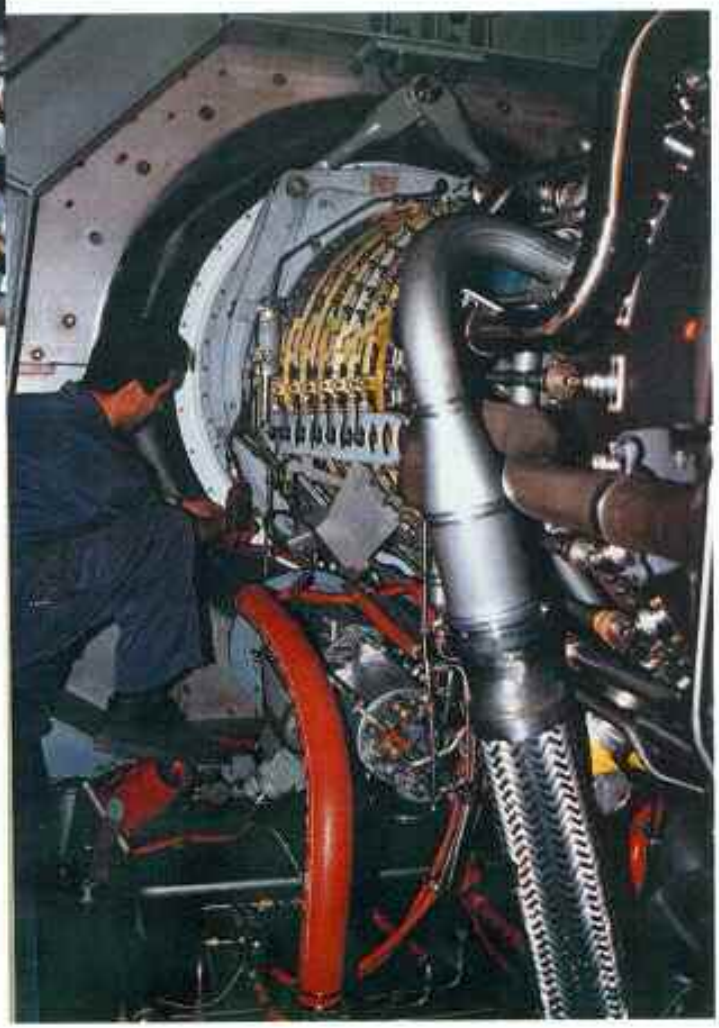


Overhauling the main propulsion of a frigate.

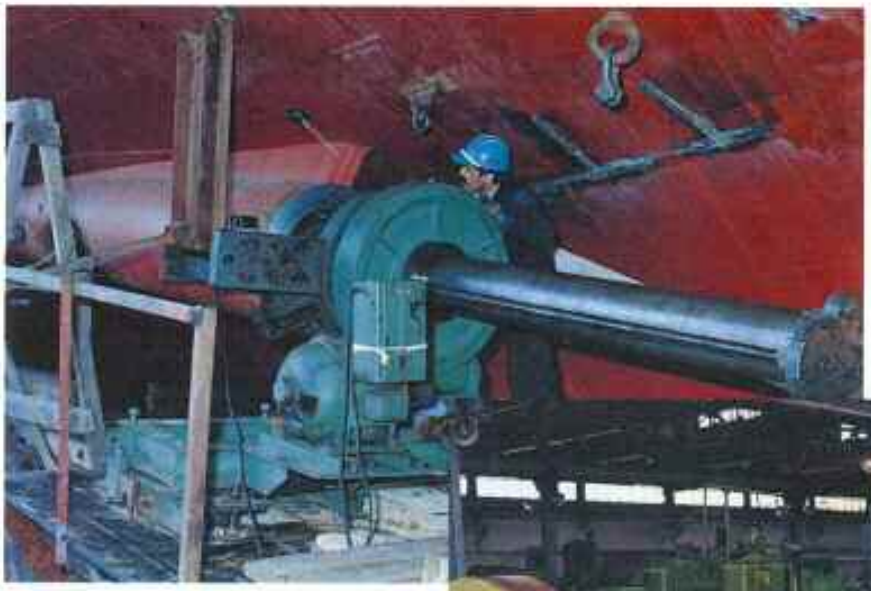
Overhauling of a steam turbine.



Gas turbine repairing

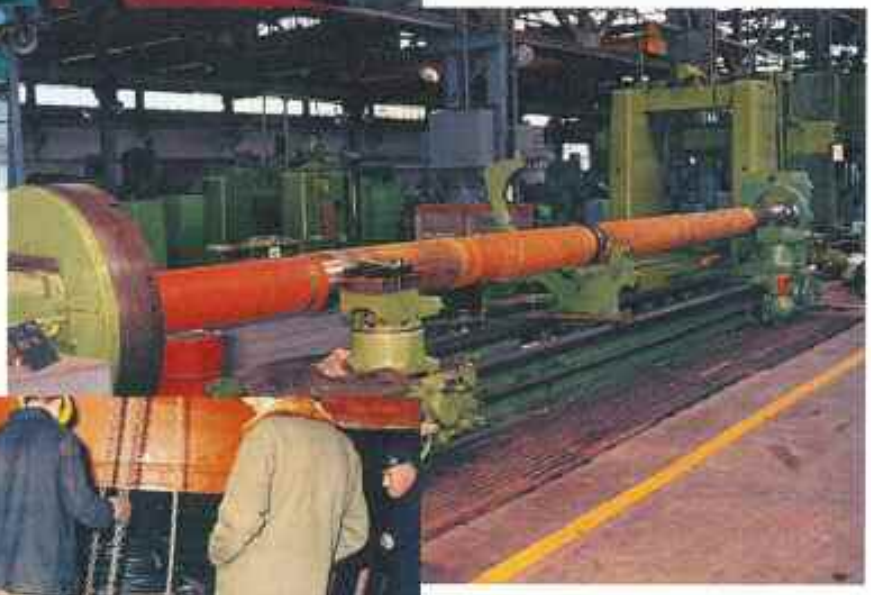


LM 2500 Gas turbine intermediate level inspection, overhaul and repair of different types and modes of diesel engines, grinding of cranks up to 5.35 m in length and 0.5 m in diameter, and rectifying cylinders are all performed in the motor work shop.



The machinery workshops are capable of repairing any kind of material up to 10 m in length and 1.6 m in diameter.

Shaft boring of a new construction.



Machining of a propeller shaft.

All kinds of sonar equipment maintenance and repairs in submarines, frigates and other vessels can be carried out successfully.

Gyroscope repair

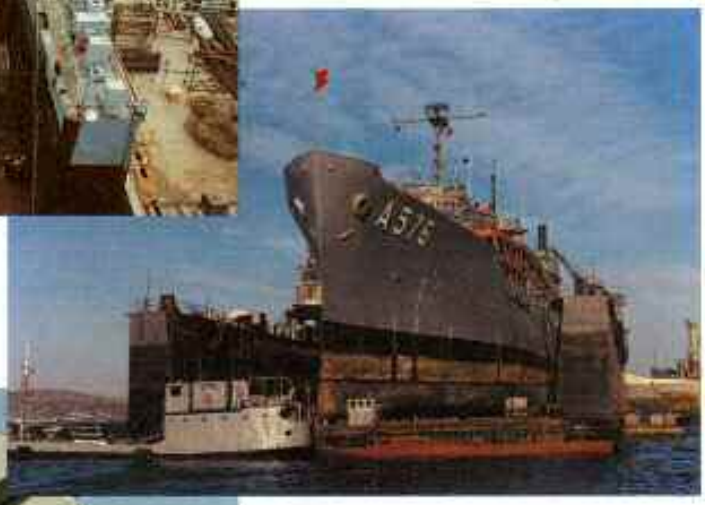
PCB repair shop

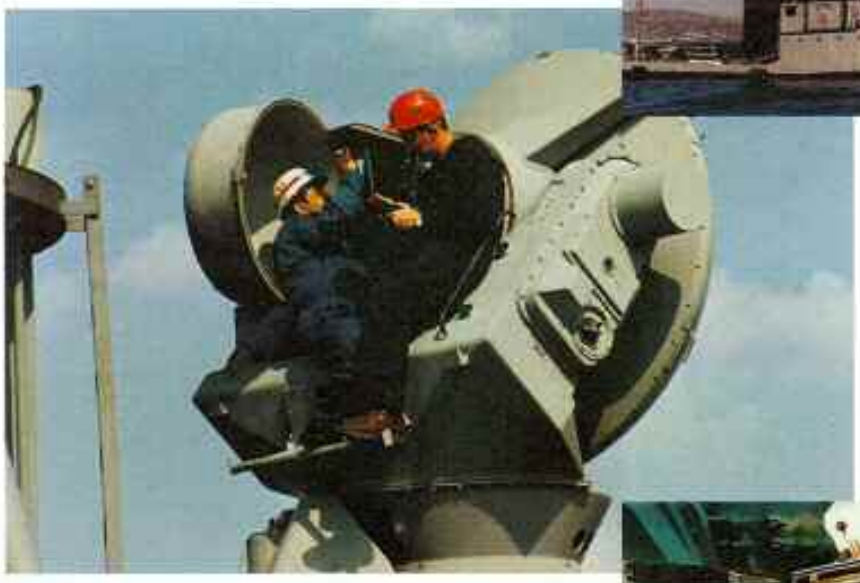
All radio, radar and IFF equipment in the Navy can be maintained and repaired.

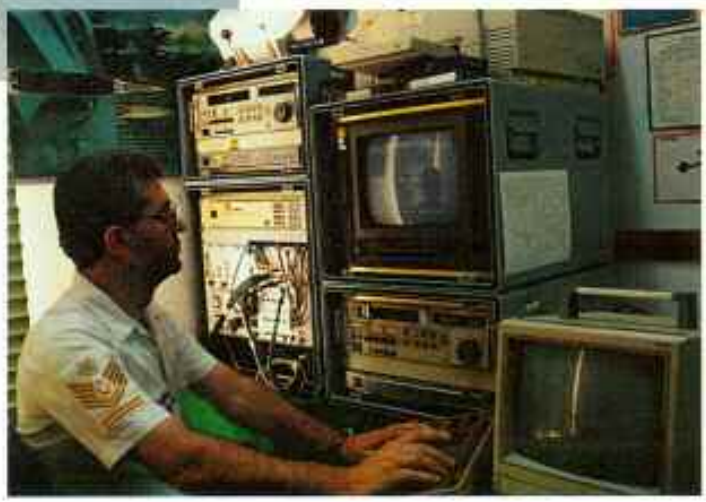
Maintenance, repairs and testing of command & control systems.

Repair of Marconi radio equipment

Frigates, submarines and other vessels of up to 20.000 tons can be dry- docked in the GNSY.





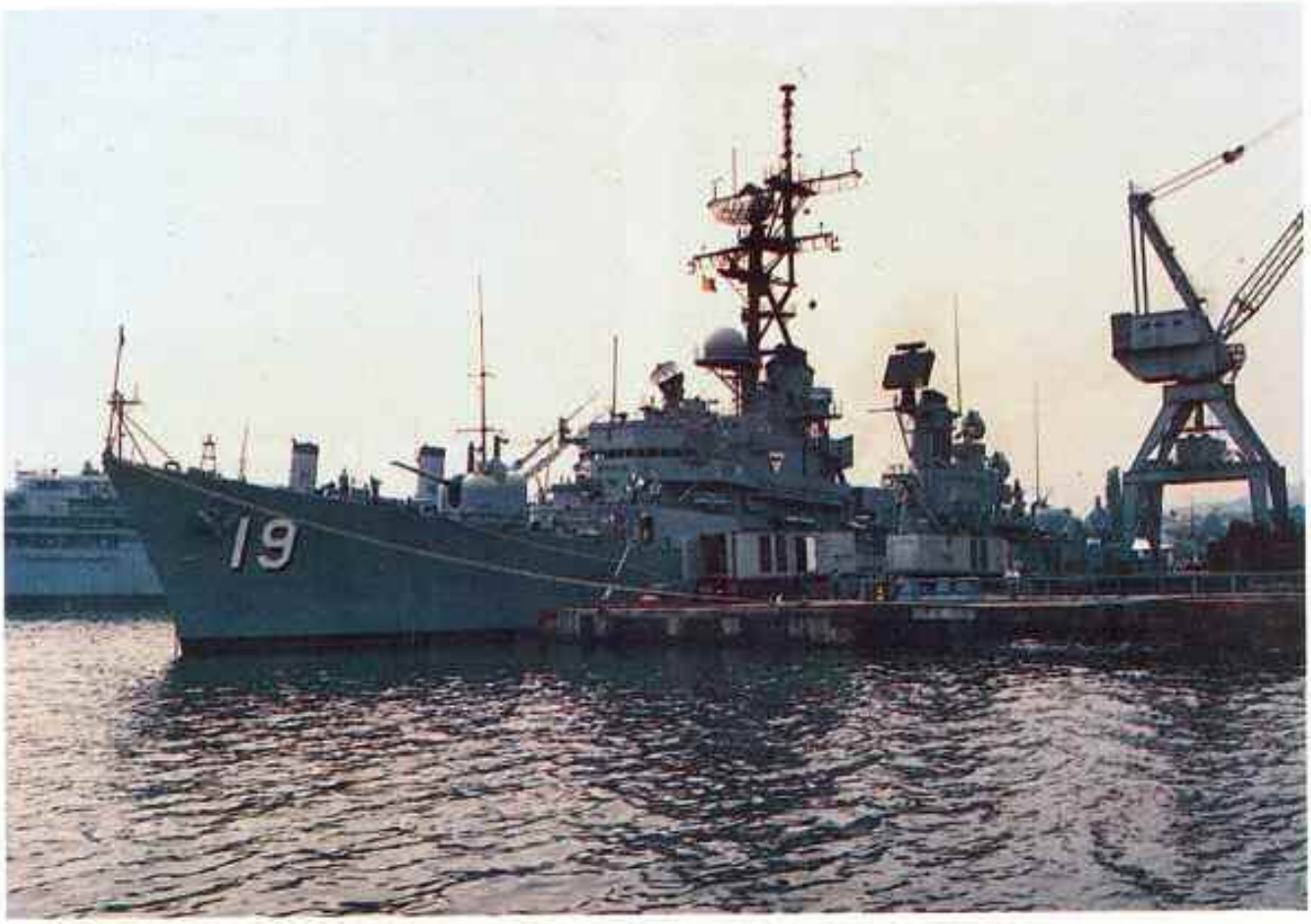


In the weapons workshop,

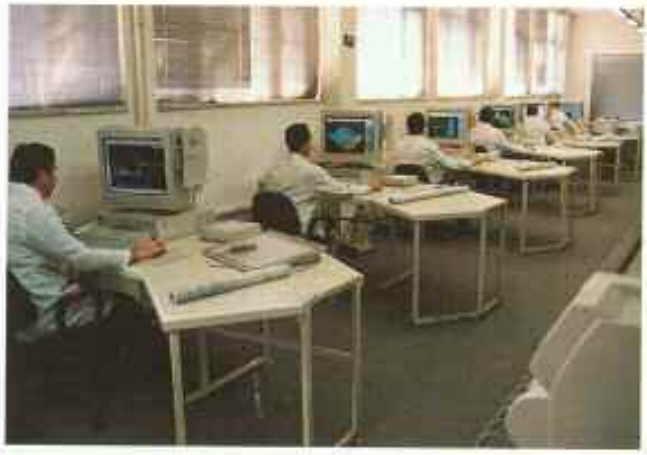
- Torpedo tubes,
- Different type of guns,
- Guided missile launchers,

In the fire control workshop,

- Search and attack periscopes,
- Different types of fire control systems,
- Mobile fire control radars are maintained, repaired and overhauled.



Some allied warships repaired in the GNSY



The material needed for production and ship construction is manufactured in the GNSY by using the CAD system, which provides basic engineering calculations, design optimization and preparation of technical drawings.

The technical drawings and the plate cutting data, prepared using the computer system are transferred to the CNC plasma- cutting machine numerically. In this way all processes are accomplished very fast, with high quality and optimum cost.

Some critical materials, which are difficult to procure or deemed to be impossible to obtain under special circumstances, are manufactured by the GNSY.

Sand casting

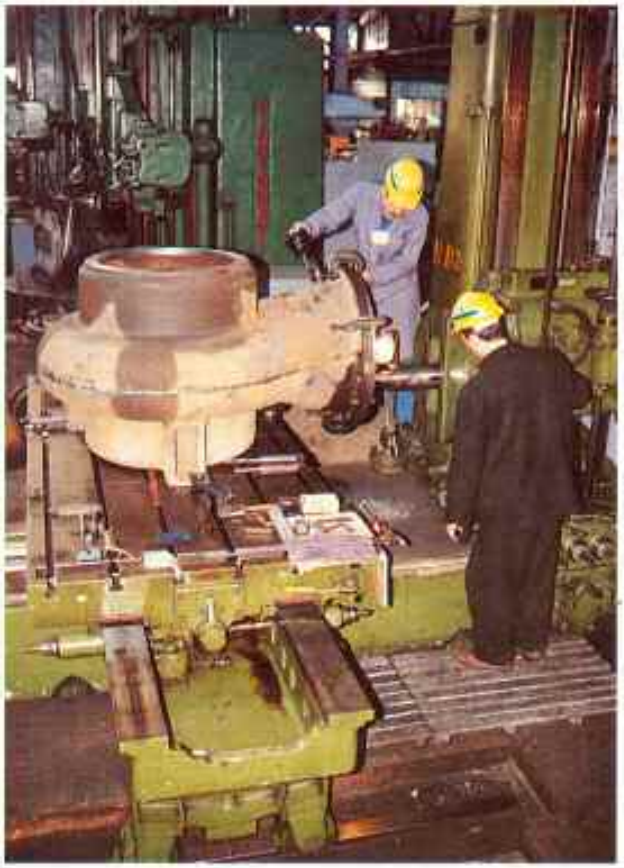
Metal melting pot

Various steel, copper and aluminum alloy materials are cast in the foundry workshop, controlling their composition by optical spectrometer. The furnace is used for annealing the steel material. The capacity of the foundry is four tons for non-ferrous and three tons for ferrous materials. High-pressure valves for submarines are also manufactured.

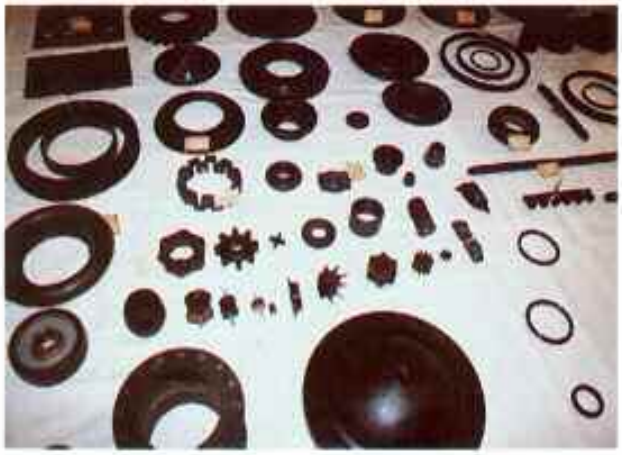
Paint production

All types of paints are produced to high quality standards in the paint plant, which has a capacity of 3000 tons/ year to meet the demand of the GNSY.

Valve production



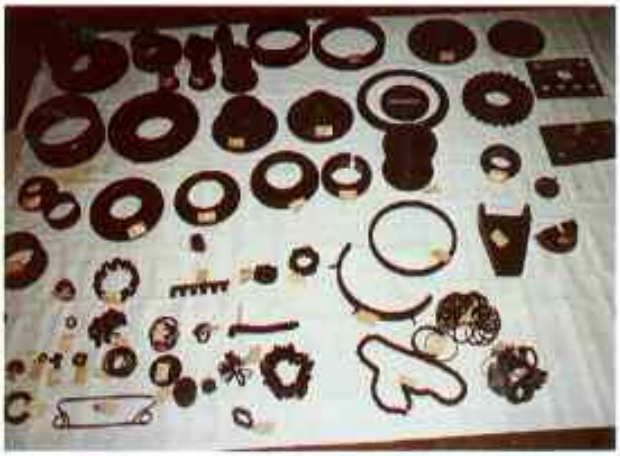
Bilge pump manufacturing



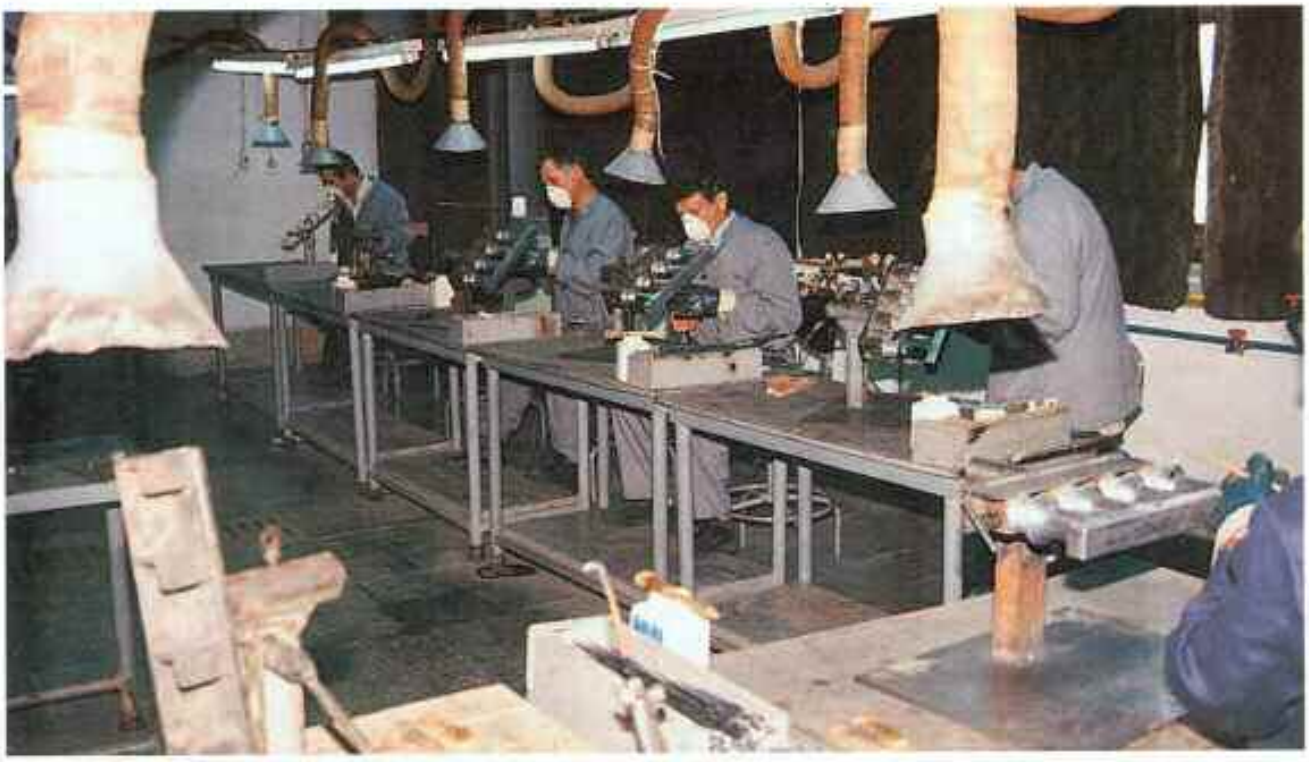
Rubber material production

The machinery workshop is capable of manufacturing valves, bilge pumps and propellers up to 600 mm.

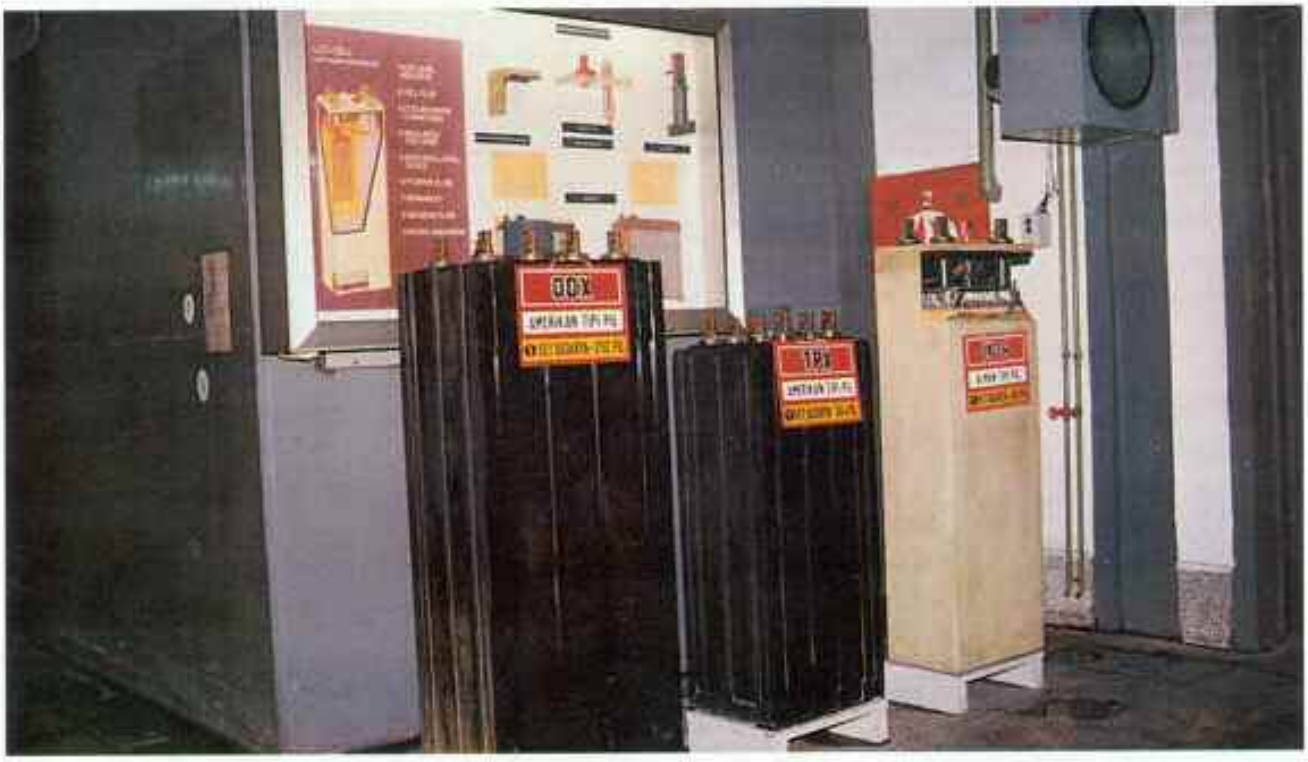
With 6000 molds and various rubber compounds in it's stock, the rubber manufacturing plant is capable of providing the rubber gaskets and rubber material to meet urgent needs of the Navy.



The submarine battery manufacturing plant, one of the newer facilities of the GNSY, has been producing three different types of high performance batteries (IK 14, TPX, ODX) since 1983.

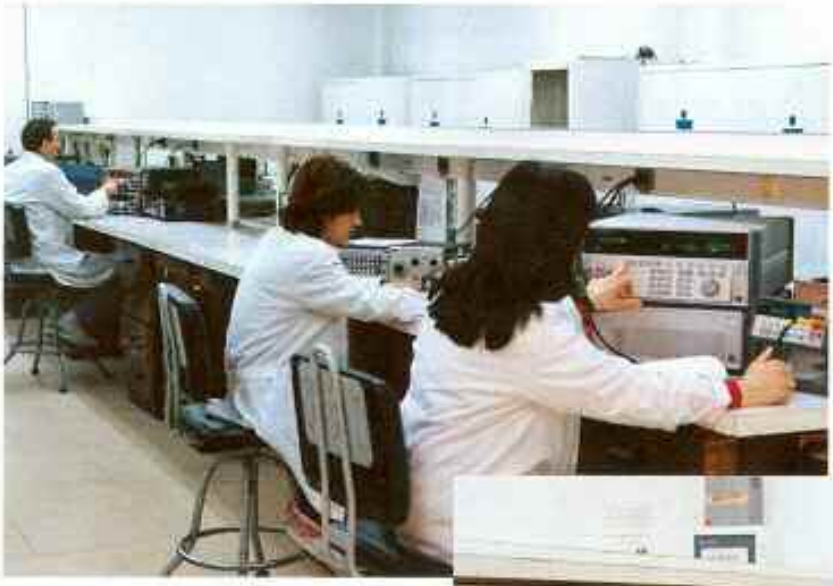


Battery production line



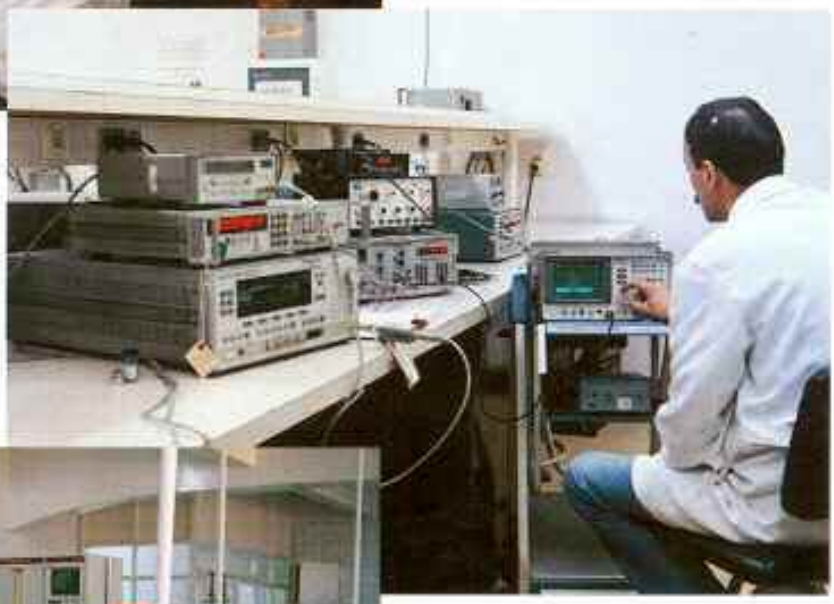
Different types of submarine batteries

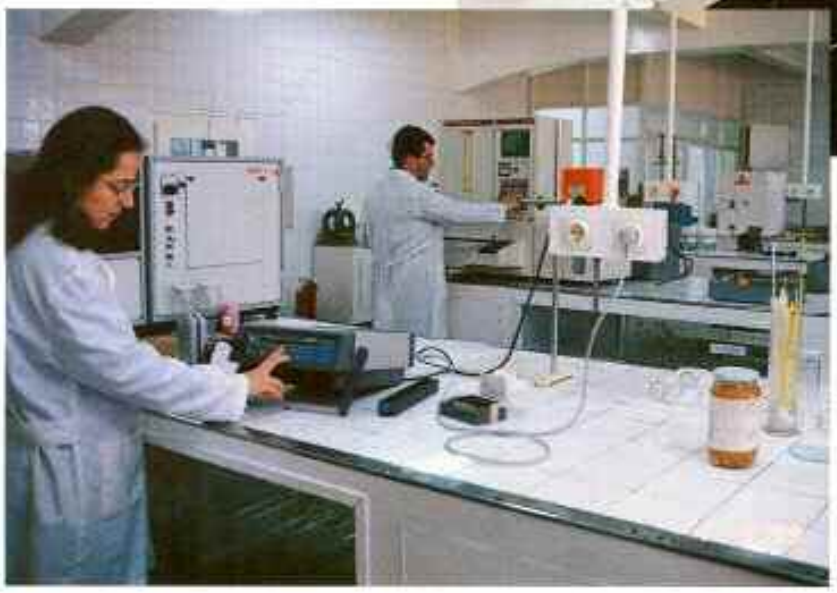
Within the Turkish Navy, the GNSY is the first unit to acquire the NATO quality certificate (AQAP 120). All repair and manufacturing processes are inspected thoroughly, starting from raw material to the end product or service. Among the countries that benefit from the USA aid, Turkey's GNSY is the first that performs welding and non-destructive inspections at NDT Level III with its trained and certified personnel. The calibrations of electronic and mechanical equipment are also done by certified personnel. Tension, stress, hardness and other necessary tests can be performed in the mechanical laboratory. Oil, water, paint and other chemical materials can be analyzed in the chemical laboratory.



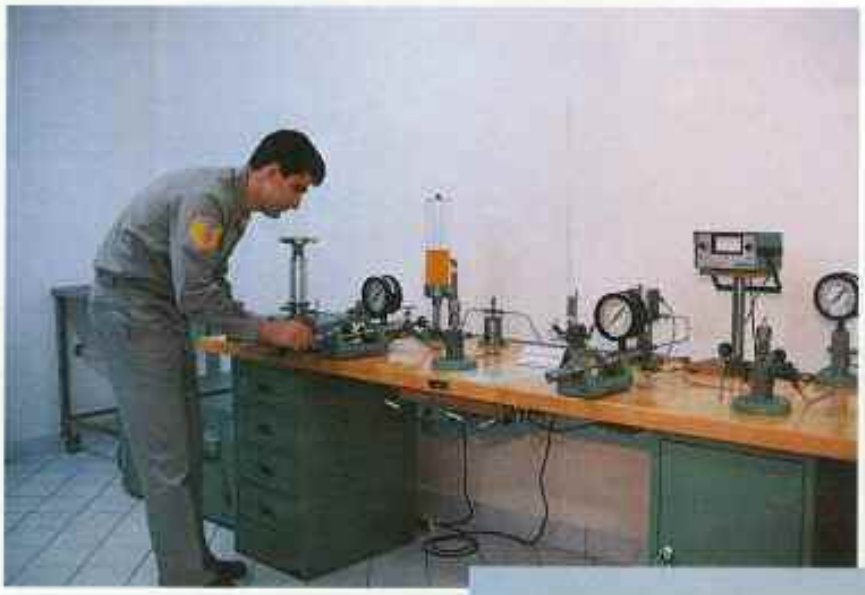
Electronic equipment calibration

All test and measurement equipment available in the Turkish Navy, such as oscilloscopes, counters, test sets, analog and digital multimeters, power meters, signal generators, spectrum analyzers are calibrated in the electronic equipment calibration lab.





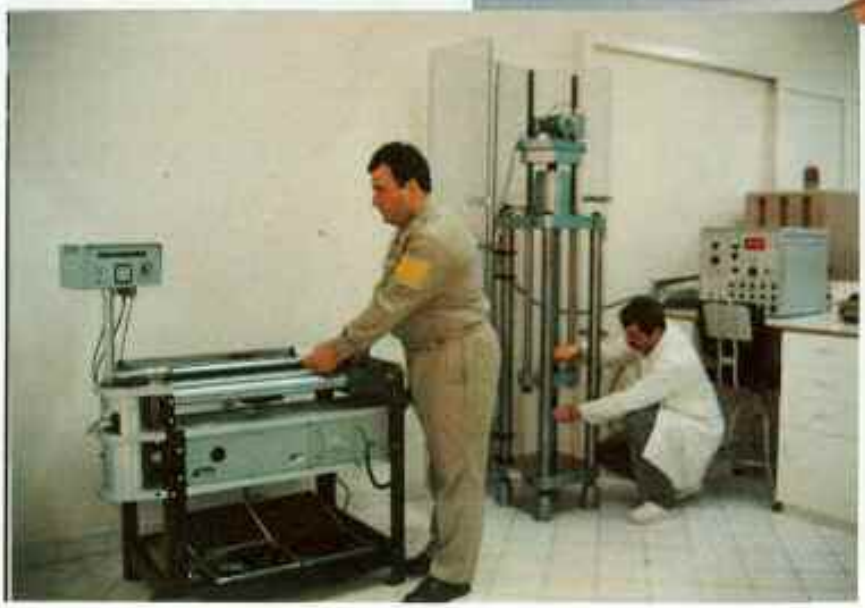
Oil, water, paint and other chemical materials can be analyzed in the chemical lab.



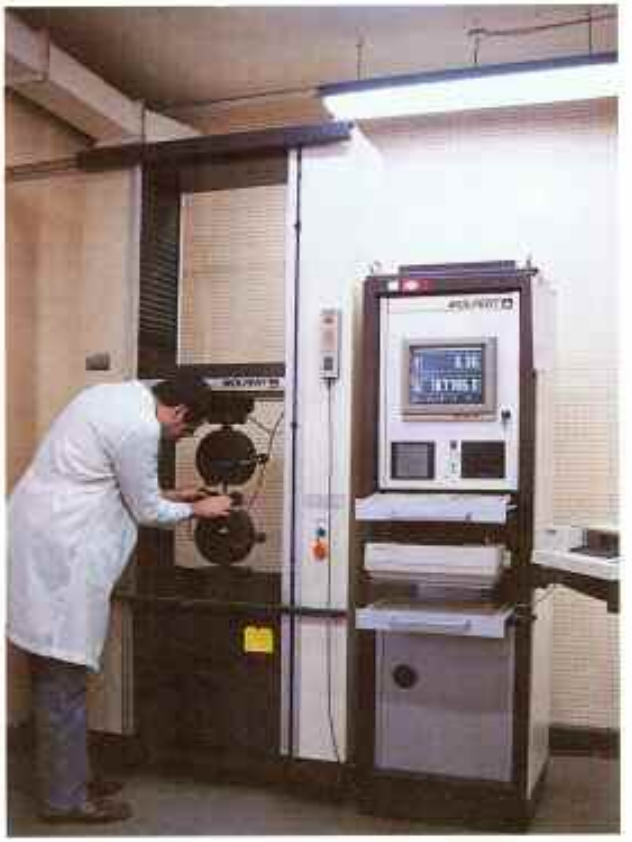
Pressure gauge calibration

In the mechanical calibration lab all revolution tachometers, pressure systems, temperature indicators, length measurement devices (micrometer, compass, and filer gauge), torque feeler meters, dynamometers, mass indicators (digital scales, mechanical scales) can be calibrated.

Calibration of length measurement devices



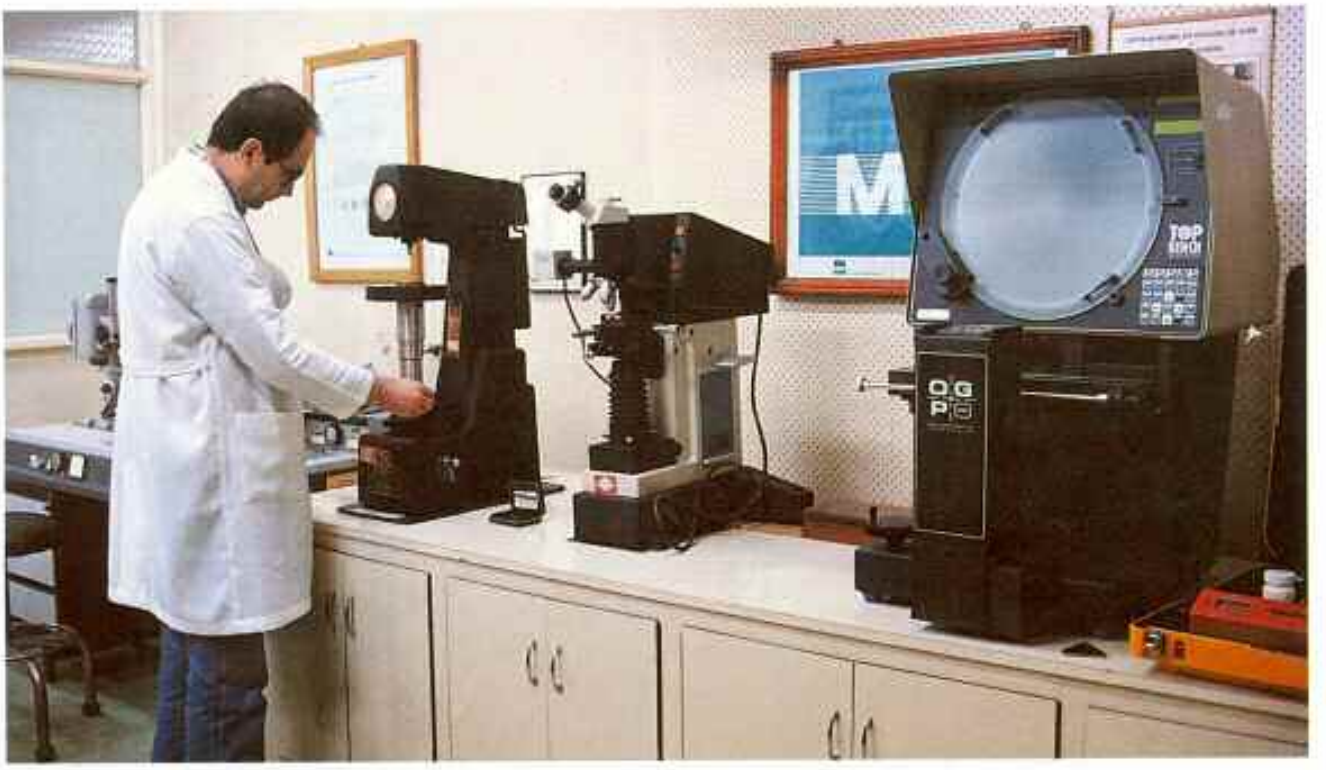
Torque meter and dynamometer calibrations



Tension test

Inspection of material structure by microscope

All the metal materials to be procured are tested for its compliance with the requirements of the Navy, regarding tension, stress, extension, hardness in Rockwell, Brinell, Vickers scale, Micro photographs are taken for micro structure analysis in the metallurgy and physics laboratory.

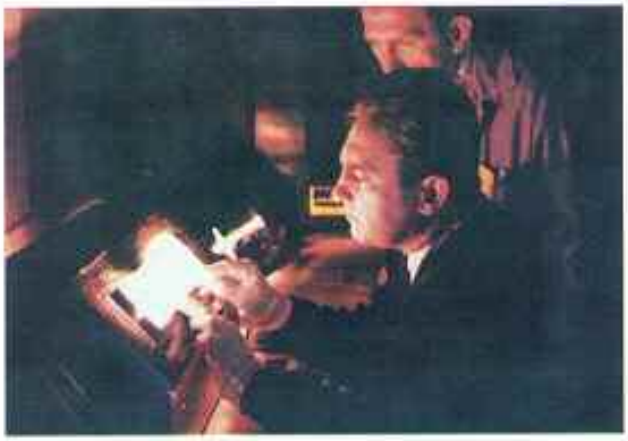


Hardness test

All of the systems of the Navy ships are inspected and tested after overhauling.

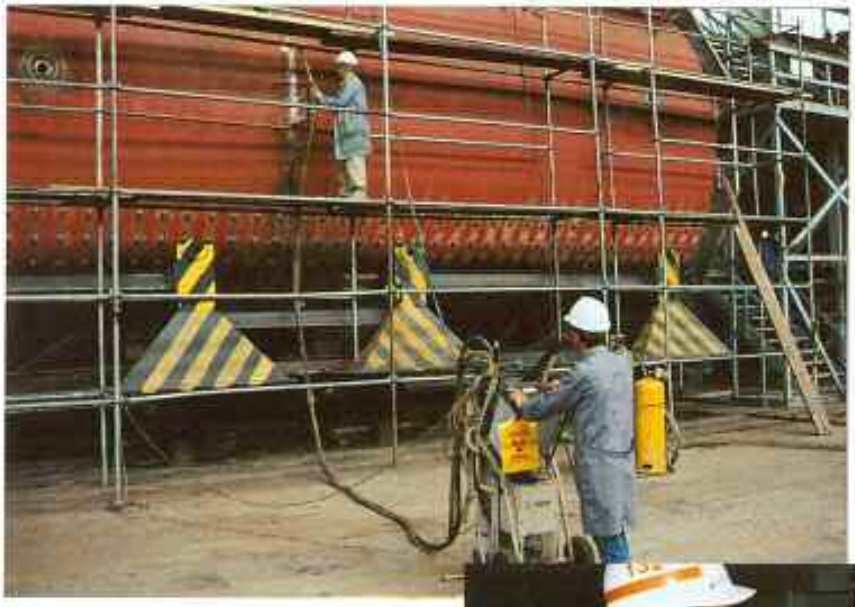
Acoustic noise measurement

Throughout the construction of frigates and submarines, all-important pipelines are X-rayed and controlled by certified personnel.

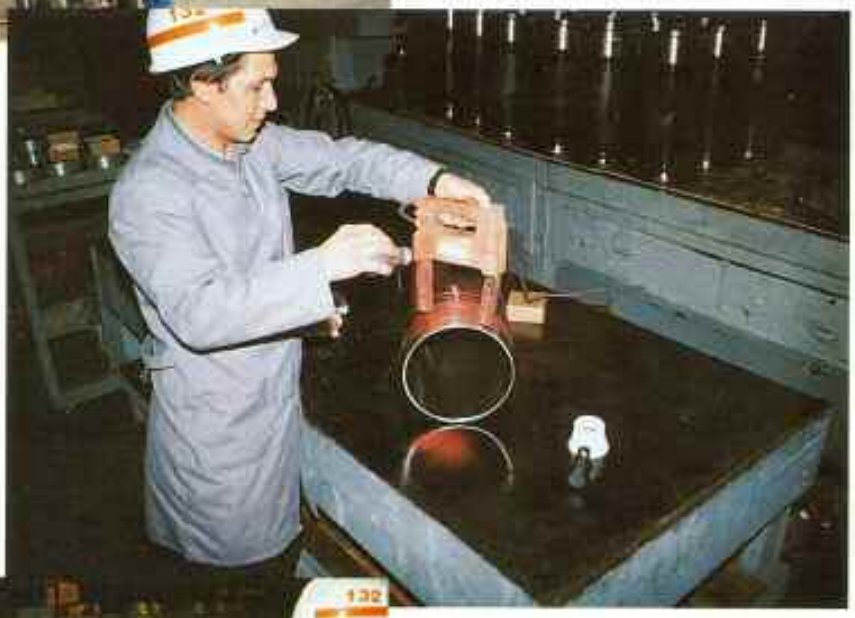


X-ray films are evaluated by personnel who have NDT level III certificate.

With non-destructive inspection methods not only the welding performed, but also the welders themselves are certified



The nondestructive tests of welding, that are of crucial importance in submarine construction are carried out by qualified personnel.



Machinery systems are tested by specialized personnel, using calibrated instruments.

The end goal regarding the quality issue is assuring the best Total Quality Management. The activities to reach this goal are growing in kind and intensity.

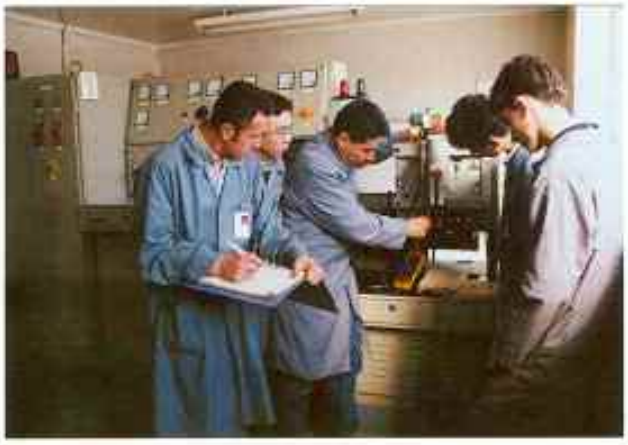
Being aware of the fact that The Quality of Services an establishment offers is directly linked to the quality of the training of the personnel we place the utmost importance in GNSY in training our personnel in the newest technology available, at facilities both at home and abroad. The experience and the knowledge acquired by our personnel are transferred to the friendly and allied country's shipyard

Foreign language training

Computer training

In the welding shop we comply with the international welding standards regarding all types of welding by certified personnel. Current capability is assured by training given within the workshop and when necessary abroad.

Welder certification activities



Students at training

QUALITY POLICY :

1. With the leadership of management and participation of all personnel, to supply constantly developing QUALITY PRODUCTS AND SERVICES supported with modern technology, which comply with national and international standards and established requirements.

2. To encourage teamwork through quality awareness.

3. To prevent waste of resources, and reduce rework to a minimum.

4. To manage human resources effectively and increase capacity.

5. To protect the natural environment and encourage recycling during the yard's activities.

QUALITY OBJECTIVES :

1. To improve the design, development, manufacturing and service capabilities in order to achieve the AQAP- 110 quality assurance level of NATO.

2. To increase the MTBF of the systems used on board ships constructed, overhauled or modernized in GNSY.

3. To calculate and to minimize quality costs.

4. To modernize the work machines and tools used during new ship construction and ship repair in parallel with advancing technology.

5. To institutionalize the Total Quality Management in GNSY, form Workgroups and Quality Circles, for solving problems and increasing teamwork.

6. To use maximum capacity via maintaining optimum stock level in new ship construction and ship repair.

7. To exploit Management Information Systems (MIS) in employing resources in the most effective way.

8. To expedite secure design work by using Computer Aided Design (CAD)

9. To promote awareness of job safety and accident prevention.

10. To take all necessary precautions to prevent environmental pollution.

REPUBLIC OF TURKEY
MINISTRY OF NATIONAL DEFENCE

INDUSTRIAL QUALITY ASSURANCE LEVEL CERTIFICATE

ANKARA
6 January 1997

COMPANY : Gölcük Tersanesi Komutanlığı.
Gölcük/Kocaeli

The investigation carried out to confirm if your company's quality assurance system complies with AQAP-120 requirements, has been completed.

It is certified your company's quality assurance system explained in quality manual GTK-KEK-01 dated August 1996 and complies with AQAP-120 requirements for production mentioned below.

- Construction, Repair, Docking of Frigate, Submarine and All Type of Auxiliary Fighting Ship and Commercial Vessels. Manufacturing, Repair, İnstallation, Engineering of Hull, Machinary, Electrical, Electronic and Weapon Systems. Production of All Types of Paint, Industrial Gasses and Submarine Batteries.

This sertificate is valid until 30 January 1999.

Republic of Turkey Ministry of National Defense, Industrial Quality Level Evaluation Commission will continiously monitor and audit effectiveness and application of the Quality assurance System.

If changes and renewals to be made in the system defined in quality control manual presented to the Turkish Ministry of National Defense are not submitted to and approved by Ministry of National Defense previously in the case that results of periodical reviews are negative, this certificate will be subject to cancel.

Cemal ALAGÖZ
Brigadier General
Chief of Tech.Serv.Dept.

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GÖLCÜK NAVAL SHIBYARD
PE&D DEPARTMENT, CODE : 200
41650 GÖLCÜK - KOCAELİ TURKEY

TEL : 0.90.262.414 15 38
FAX : 0.90.262.414 26 25