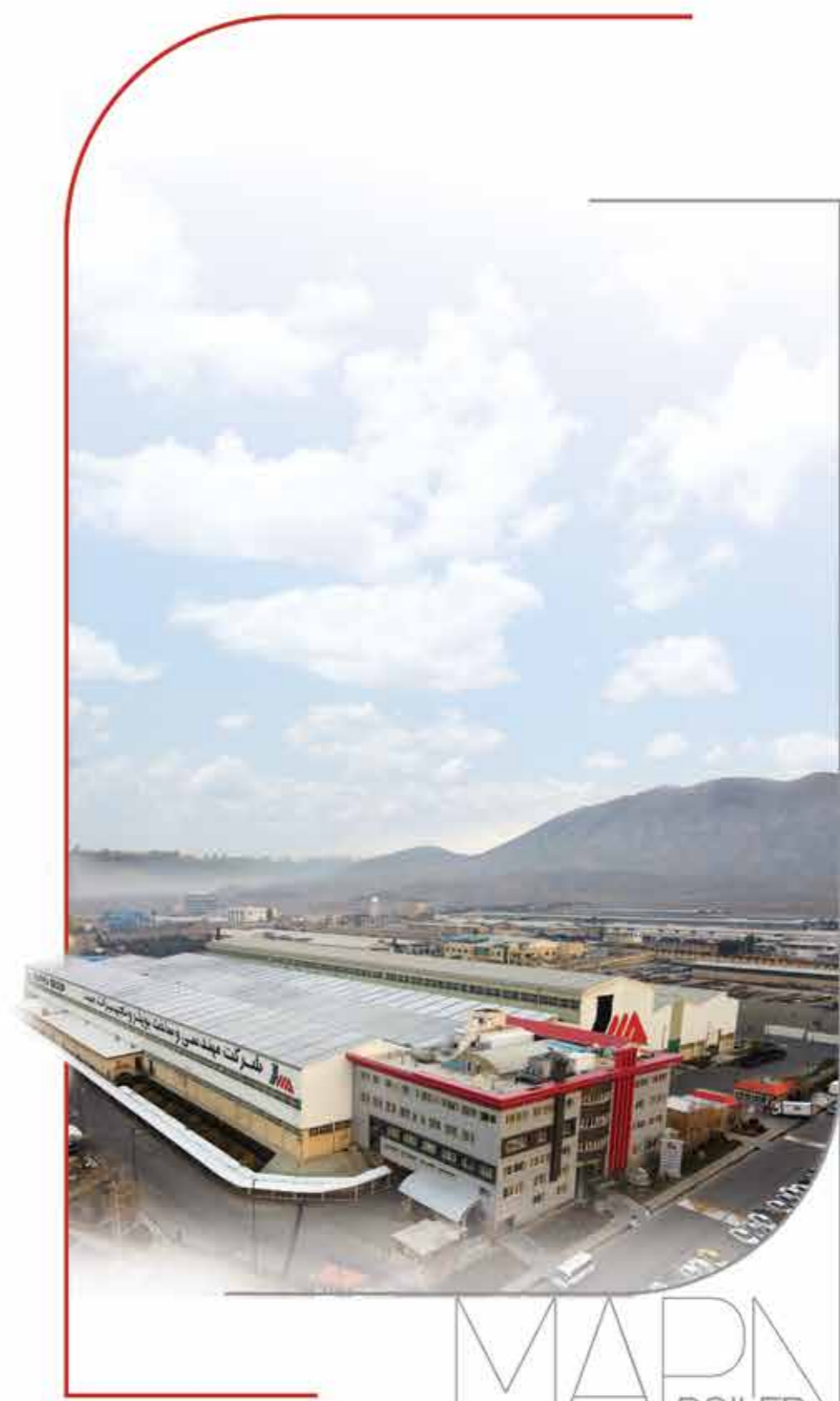




MAPNA
BOILER



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INTRODUCTION

MAPNA Boiler and Equipment Manufacturing and Engineering Company is a knowledge-based and capable company that engages as EPC and EPCF contractors in the design, procurement, manufacturing, installation and commissioning, finance, and aftersales, technical consultation, and project management services of different types of Heat Recovery Steam Generators (HRSGs), Combined Heat and Power (CHP) steam generators, package, industrial, and steam thermal power plant watertube boilers, water pretreatment, treatment, and desalination systems using membrane technologies such as RO and EDI, and auxiliary equipment being utilized in power, oil, gas, and petrochemical plants and other industries in domestic and overseas markets. Base on the social responsibility, the company has been creating value for all beneficiaries

and has set the goals of social responsiveness, economic dynamic, and environmental sustainability for its activities, toward sustainable development, and advancing to national benefits. In 2003, toward the country's policies and objectives of development programs, a license agreement for the transfer of design and manufacturing technologies of HRSGs was concluded with DOOSAN (South Korea), which gives rise to more than 170 HRSG units, to date, having been supplied and operated or under execution downstream of Gas Turbines (GTs). Also, in industrial watertube boilers, cooperation with MACCHI (Italy) and THERMOD-ESIGN (Canada) Companies, have helped us earn technologies for the design manufacture, installation and commissioning of industrial boilers; and more than 50 boiler units has been

delivered to and in operation by clients. In order to supply drinking and industrial water, 15 projects in the field of water have been implemented or are being executed, and with the full execution of these projects, more than 100,000 m³ of water will be treated and desalted daily. Toward meeting the new needs of the power market, this company signed a contract in 2015 for the transferring technology and license of Heat Recovery Steam Generators (HRSG) with a high capacity to be installed downstream of Gas Turbine class H, F and above with the well-known company, John Cockerill, Belgium (CMI). MAPNA Boiler is one of organizations that has steadily held itself responsible for all beneficiaries including society and attempted to take steps toward fulfilling this duty. This company has laid the foundations of its comprehensive social responsibility system, em-

ploying international accredited standards and benchmarking superior companies, with the mission of social responsiveness, economic dynamic, and environmental sustainability and, alongside its annual business goals, the company sets its social responsibility objectives and actions in the frame of a social responsibility roadmap. Developing society's required products, planning and conducting voluntary works, and codifying and executing the document of relation with beneficiaries have constituted a part of programs in this area. It should be mention that collection of company's activities in social responsibility is arranged every three years in a sustainability report format and published on company's website. The 2018 and 2021 social responsibility reports are presently available on the website to public study.

CERTIFICATES OF LICENSE AND TECHNOLOGY TRANSFER: CMI-MAPNA BOILER

- **Licensed Product Specification:**
 - Horizontal HRSG (drum-type) downstream of large-scale gas turbine machines ranging from F, H, and J class to higher capacities.
 - Vertical HRSG (once-through and drum-type) downstream of gas turbine machines having power output range from 25MWe to large-scale gas turbine machines F-, H-, and J-class and higher capacities.
 - Stand-alone HRSG which is equipped with fresh air firing
- License Effective Date: February 2017
- Territory: I.R. of Iran exclusively and other countries under the conditions mentioned in the Agreement
- Scope of License: Design, Engineering, Manufacturing, Installation, Commissioning and after-sales service

CERTIFICATES OF LICENSE AND TECHNOLOGY TRANSFER: DOOSAN-MAPNA BOILER

- **Licensed Product Specification:**
 - Horizontal HRSG (drum-type) downstream of gas turbine machines up to capacity of 270 MWe .
- License Effective Date: 2013
- Territory: Iran, Africa, Middle-East, India, South America, and the Commonwealth of Nations
- Scope of License: Design, Engineering, Equipment Procurement, Manufacturing, Installation, Commissioning, and Maintenance.

MANAGEMENT SYSTEMS

MAPNA Boiler and Equipment Engineering and Manufacturing, on the path of its progress and development, has continually kept taking into consideration using suitable management systems.

The commitment of company's management and human resource to meeting beneficiaries' needs and expectations, attention to sustainability concepts in social, economic, and environmental dimensions, and utilization of modern scientific management systems herald a bright, promising future for gaining customers' satisfaction and loyalty as well as expanding company's participations in domestic and overseas markets. Toward this policy, over past years, the company has set out the establishment of the standards ISO 9001, ISO 14001,

ISO 45001, ISO 17025, and ISO 27001 and the acquisition of associated certificates and, using comprehensive human resource planning approach, it has implemented SAP integrated system in procurement chain processes and automated its operational cycle. In addition, MAPNA Boiler has succeeded in receiving the organizational excellence award silver trophy and taking a place among Iranian superior companies with the implementation of strategic management approaches, according to Balanced Scorecard (BSC) model, and organizational excellence model, the design and establishment of management dashboards (BI), the development of technology and knowledge management systems, project management system PMBOK, and social responsibility system GRI.

COMPANY ACHIEVEMENTS

Participating in awards, audits, rankings, membership in scientific-management societies, this company has paved the way for knowledge transfer and utilization of other companies' experience, and has managed in total to win various honors and certificates, the most important titles of which are as follows:

- Silver prize winner of organizational excellence (Second Level)-2022
- Silver prize winner of organizational excellence (First Level)-2018
- Crystal prize winner of organizational excellence - 2016
- Among top 3 boiler manufacturers in the world as McCoy power report
- trophy for the title of green industrial unit
- Trophy for best safe workshop in the country
- Trophy of national industry and mine award
- trophy of the third national award for best country project (South Pars-phases 15 and 16 development project)
- Title of knowledge-based industrial company- 2014
- Letter of commendation from the third national productivity festival
- Certificate of Information Security Management System (ISMS)
- Certificate of standards ISO 14001:2015, ISO 9001:2015, ISO 45001:2018, and ISO 13485:2016
- Three-star golden rank in business cards ranking
- Certification of test and calibration laboratory accreditation compliant with standard ISO17025:2017
- Certificate of subcontractors safety accreditation



STEAM GENERATION PRODUCTS

- Heat recovery steam generator in various industries
- Water tube boiler (Package/Industrial/Utility)
- Steam thermal power plant water tube boiler
- Municipal solid waste incinerator



WATER PRODUCTION AND TREATMENT PRODUCTS

- Reverse Osmosis (SWRO & BWRO) membrane desalination system
- Demineralized water production system and Water Treatment Plant (WTP) using resin, RO, and EDI methods
- Condensate Polishing Plant (CPP) and De-Oiling Unit
- Water pretreatment system including media bed filter, Ultrafiltration (UF), and Dissolved Air Flotation (DAF)
- Industrial and municipal wastewater treatment and reuse system



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PACKAGE PRODUCTS

- Containerized oxygen generator package
- Containerized BWRO desalination package
- Containerized WTP package



FIXED EQUIPMENT

- Deaerator
- Shell & Tube heat exchangers
- Pressure vessels
- Duct Burner
- Silencer
- Stack Damper
- Reactor & Distillation Towers in Oil, Gas & Petrochemical industries
- Feed Water Heater in power plants



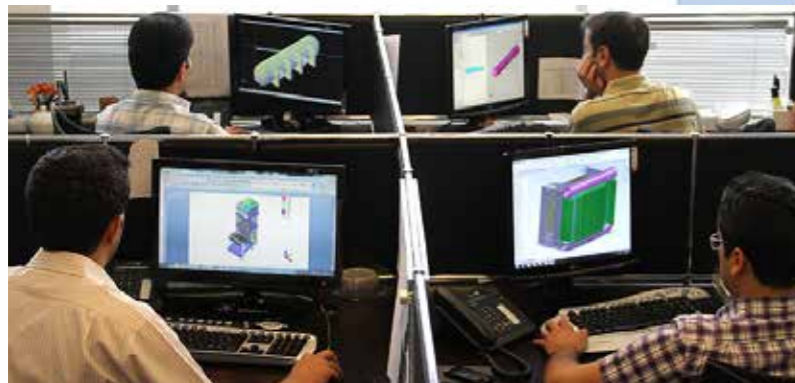
SERVICES



- Execution, installation, commissioning, and operation of equipment in Power Plants, Oil, Gas, and Petrochemical industries, Water and Wastewater units, Steel and other industries.
- Management of projects based on MC contracts
- Overhaul, repowering, and renovating of boilers and other products
- Metallurgical laboratory and calibration services
- Steam generation units upgrading and development
- Procurement of materials and equipment/spare parts (related to products)
- Support of products under long term service providing contracts
- Consultation, failure diagnosis, and periodic and case maintenance of boiler
- Technical training programs for boiler and auxiliary equipment

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DESIGNING AND RESEARCH & DEVELOPMENT OF TECHNOLOGY



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MAPNA Boiler and Equipment Engineering and Manufacturing Company with unique capabilities in design and engineering, using updated software's internally and worldwide, and employing experienced experts in basic, process and equipment, water, chemistry, and material, steel structure, electrical, instrument and control, mechanic, and piping design in order to constitute an integrated and consistent assembly for designing projects with an approach of technical needs fulfillment.

Basic role of product design and development sections in improving current products' technological features and upgrading their performance as well as developing new products results in the growing movement of the company for supplying client's requirements with



the most flexibility. In this way, continuous receiving and effective implementation of feedbacks and ideas from various beneficiaries including clients, governing states, consultants, suppliers, contractors, international authorities, colleagues of this company and the and experiences gained from previous and current projects that require creating Innovation and flexibility are aligned with continuous improvement in products and services, they are given serious attention and are on the agenda.

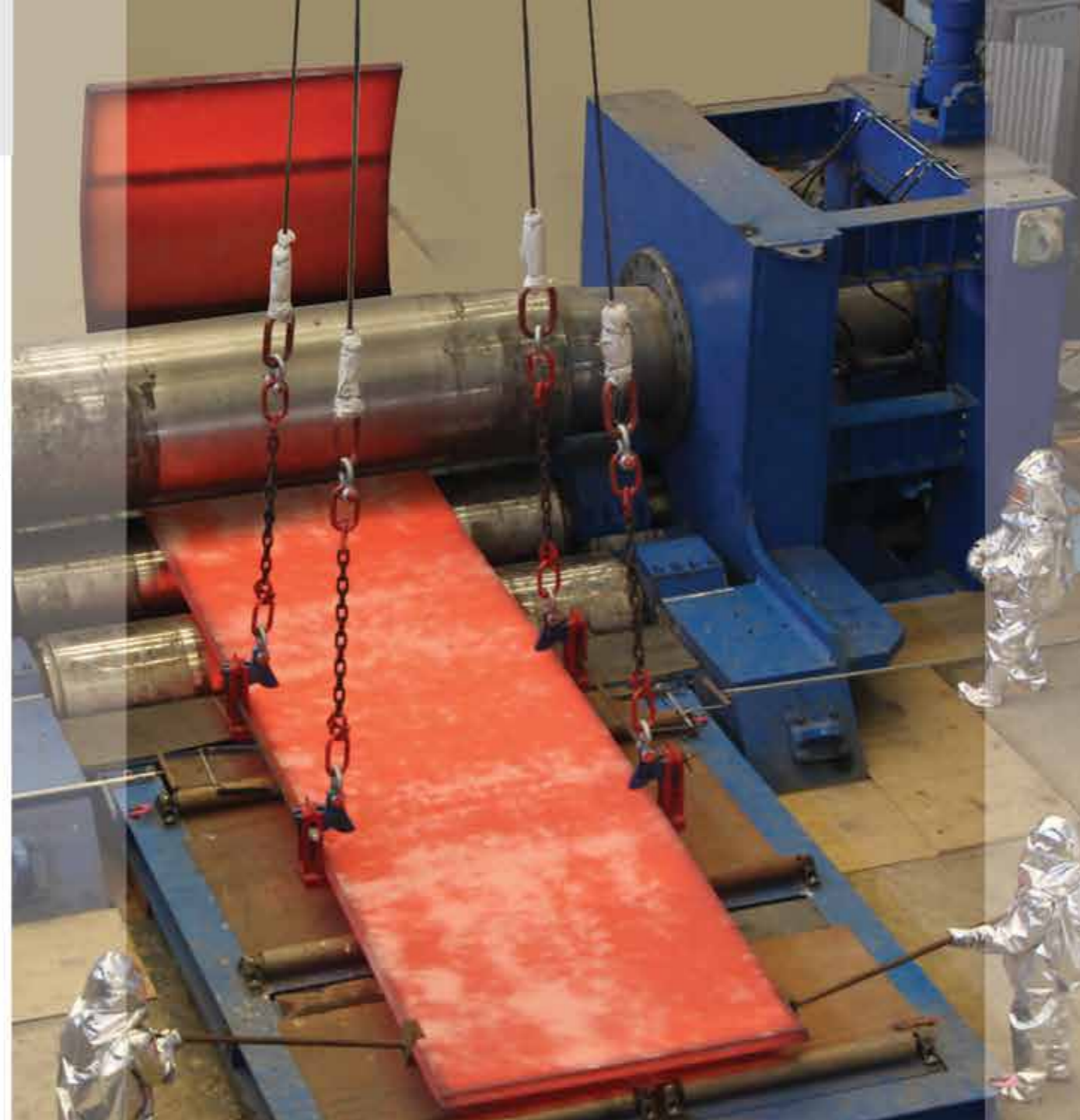
With the aim of increasing computing capabilities and detailed analyzes of technology-oriented issues in the development, promotion and improvement of products and services and solving design and engineering issues and problems, this company has hardware facilities and a unique and powerful computing network that has a high ability to perform complex simulations, and with high computing volume, it has provided that it helps the specialists in the company in various fields such as combustion, heat transfer, multiphase flows, turbulence and stress analysis.

Also, compliance with safety criteria, environmental concerns and two new and special approaches of the circular economy and green and environmentally friendly innovative and technological solutions (such as production, storage and transportation of carriers of low carbon and green energy and absorption and reduction of carbon dioxide) in line with Climate changes, energy transition and megatrends such as digital transformation are among the most important axes of attention in the design of projects and development of new products and services, and it assures the beneficiaries of the company's commitment to sustainable value creation.

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EQUIPMENT AND FACILITIES

- Tehran Office: office space 4500 square meter effective sheltered space
- Haljerd Complex: 86,000 square meter area with 51,000 square meter sheltered spaces allocated for production, offices, facilities, and stores
- Elahieh Complex: 216,000 square meter area with 27,000 square meter sheltered spaces allocated for production, offices, facilities, and stores



DISTINCTIVE MACHINES



- Six fining machines with alloy and carbon steel fin and induction welding with work operation diameter of 25mm to 168mm and length of 3m to 23m.
- Heavy duty rolling machine for the production of pressure vessels of up to 180mm thickness and 4m width in cold rolling and 300mm thickness and 4m width in hot rolling.
- Induction bending machine of pipes ranging from 4in to 32in.
- Continuous tube bending machine for steam boiler tubes up to 76mm in diameter.
- Panel welding and bending machine for steam boiler membraned water wall tube panels up to 101mm in diameter and 20m in length.
- Three heavy duty boring machines with 12m in length and 4m in height.
- One 4-axis CNC grinding machine with the work operation dimension of 6m length & 1.5m width & 1.2m height.
- Carousel 5m diameter and 3m height.
- Forming machine for vessel heads up to 5m in diameter and 32mm in thickness for elliptical and 60mm in thickness for hemispherical with petals.
- Heat treatment furnace and preheater of metal structures with 17m length & 5m width & 6m height.
- Isolated radiographic room with cobalt and iridium radiography capability, 17m & 7m dimension.
- Shot blast space 25m length & 8m width & 8m height.
- Hydrostatic test equipment with the safety protection of up to 500 bar pressure.
- CNC machine, 4 axis, with a 6-meter operation diameter.

HSE PERFORMED STEPS IN PRODUCT DESIGN AND MANUFACTURING

Following its ethical commitments and social responsibility with respect to all beneficiaries, MAPNA Boiler and Equipment Engineering and Manufacturing Company has taken the approach of accident-free working and hazard management, considering harmful factors for occupational health and environmental aspects, accordingly, to smooth the path and as the proof of movement within the framework, the company has embarked on the creation of numerous approaches.

HSE IN DESIGN

- Risk study and assessment of routes and execution process using HAZOP study
- Analysis and revising of layout drawings and plant 3D modeling according to HSE requirements
- Upgrading of burners to enhance their efficiency aligned with environmental commitment
- Design and execution of electrical safety system in accordance with national and international rules and regulations
- Change of deaerator tanks layout toward reduced damage to harps in line with product efficiency and life cycle improvement (LCA)
- Design and execution of blowdown recovery to save water consumption



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HSE IN EXECUTIVE OPERATION

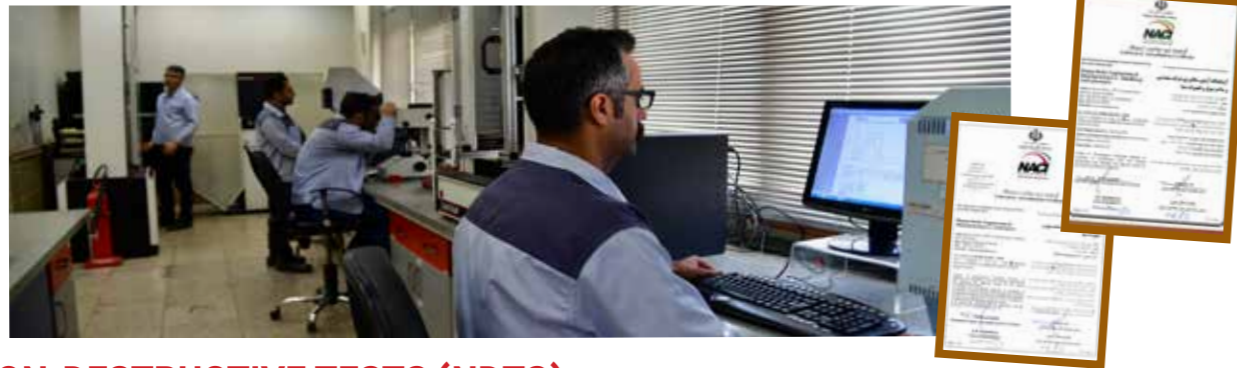


- Participation in tender and subcontractors preliminary and periodic audit process from HSE view
- Risk assessment of processes, hazards, and different aspects of the organization and subcontractors according to Hazard Control and Management System HCMS.
- Construction and operation of industrial radiographic space accredited by Atomic Energy Organization of Iran
- Construction and operation of shot blast space to eliminate contamination
- Upgrading of the company's wastewater treatment unit through WTP system to supply demineralized water and required water for the factory green space irrigation.
- Technical inspection of equipment and acquisition of their soundness certificate (crane, elevator, earth system, lifting beam, magnets, etc.)
- Procurement and application of 3D ultrasonic phased array device and reduction of radiographic hazard to the most possible extent.
- Preparation of lifting plan and procedure of power plant installation booklet.
- Review of lifting equipment of F-class and triple pressure HRSG harps as per the change in the way of lifting
- Codifying of hologram process for cultivation and improvement of proactive indications
- Getting the certification of medical physics responsibility from Atomic Energy Organization of Iran and radiography certification for Elahieh Complex
- Equipping the company with a fire truck.

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PRODUCTS QUALITY ASSURANCE AND CONTROL

Mapna Boiler and Equipment Engineering and Manufacturing Company by having experienced experts in quality control, material and welding engineering, laboratory and quality assurance departments as integrated and coordinated groups for the preparation and finalization of quality documents, quality planning, technical inspection and testing various products in the projects aim to guarantee and improve quality and increase customer satisfaction.



NON-DESTRUCTIVE TESTS (NDTS)

- Advanced Ultrasonic (Phased Array & TOFD) Test
- Ultrasonic Examination Test
- Radiographic Examination Test
- Magnetic Particle Examination Test
- Penetrant Examination Test
- Visual Examination Test

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DESTRUCTIVE EXAMINATIONS (HOLDING ISO 17025 CERTIFICATION FROM THE NATIONAL ACCREDITATION CENTER OF IRAN (NACI))

- Tensile, Wedge, and Proof Load test of different specimens up to 60 tons (force)
- Nick Break, Break, and Fracture Tests on weld samples in accordance with international standards
- Flattening, Flare, and Flange tests on tube and pipe specimens
- Bending test
- Impact test of energy capacity up to 300J
- Macro Hardness test (Rockwell B&C, Brinell and Vickers), Superficial, Micro (Vickers and Knoop), and Portable
- Chemical Composition test using Stationary Quantometer and Portable X-Ray Fluorescence (XRF) methods
- metallographic and Macrograph test

CALIBRATION LABORATORY

- Dimensional Quantity
- Pressure Quantity
- Temperature Quantity
- Electrical Quantity



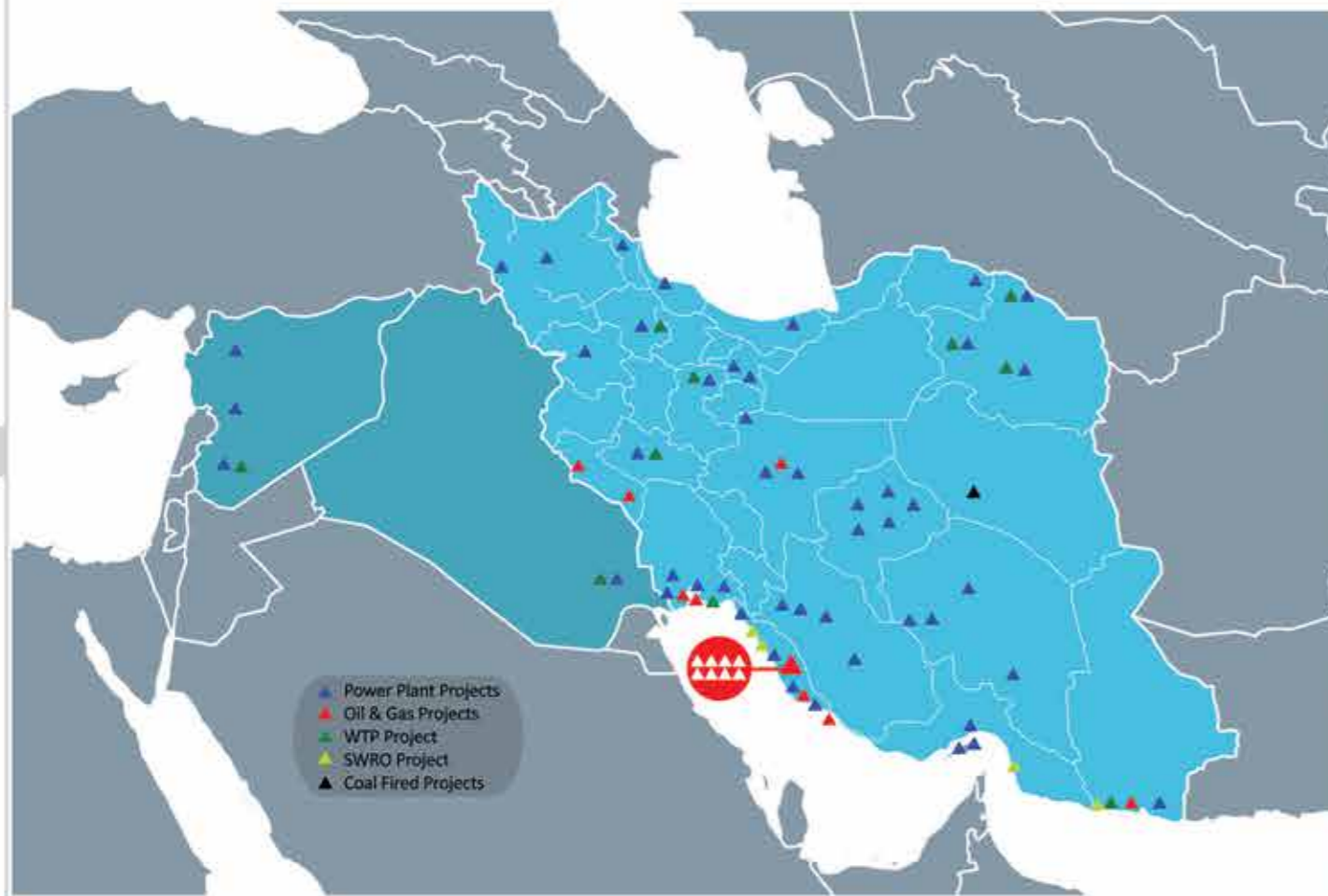
NON-DESTRUCTIVE TESTS (NDTS)

- 50% reduction in training time (removal of cooking time, cutting, fit up, etc.) and material consumption costs
- High training efficiency (possibility of more practice, stress reduction, etc.)
- Ability to simulate several arc welding techniques in one device (no need for different devices for each method)
- Absence of pollution caused by welding
- Easy to carry and adjust in new situations
- Increasing welding knowledge due to software feedback



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GEOGRAPHICAL DISTRIBUTION OF PROJECTS ACROSS MIDDLE EAST



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