

MAPNA
BOILER



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2

3

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. With the conviction of social responsibility, the company

has been creating value for all beneficiaries, setting the goals of social responsiveness, economic dynamic, and environmental sustainability for its activities, toward sustainable development, and advancing to national advantages. In 2003, in line with 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 160 HRSG units, to date, having been supplied and operated or under execution downstream of Gas Turbines (GTs). Meanwhile, in industrial watertube boilers, cooperations with MACCHI (Italy) and THERMODESIGN (Canada) Companies, have helped us earn technologies for the design,

manufacture, installation and commissioning of industrial boilers; and more than 40 boiler units has been delivered to and in operation by clients.

Aiming at fulfilling new power generation market needs, the company signed a technology transfer and license agreement in 2017 with John Cockerill, formerly Cockerill Maintenance & Ingénierie (CMI) in Belgium, large-scale HRSGs behind F- and H-series and future series of larger electrical capacity Gas Turbines are thereby granted as Licensed Products. MAPNA Boiler is 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, employing inter-

national 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 is worth mentioning the 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 1397 and 1400 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 270 MWe in capacity
- **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

On the path of its progress and development, MAPNA Boiler and Equipment Manufacturing and Engineering Company 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. In this direction, over past years, the company has set out the establishment of the standards ISO 9001, ISO 17025, ISO 27001, ISO 45001, and ISO

14001 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 trophy of national organizational excellence award- 2018
- Crystal trophy of national organizational excellence award - 2015
- Among top 5 boiler manufacturers in the world as per McCoy power report
- Silver trophy for the title of green industrial unit
- Trophy for best safe workshop in the country
- Trophy of national industry and mine award
- Silver 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 45001:2018, ISO 9001:2015, ISO 14001:2015, and ISO 13485:2016
- Three-star golden rank in business cards ranking
- Certification of test and calibration laboratory accreditation compliant with standard ISO025
- Certificate of subcontractors safety accreditation



STEAM GENERATORS

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



WATER PRODUCTION AND TREATMENT PRODUCTS

- Seawater and Brackish Water 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



PACKAGE PRODUCTS

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

FIXED EQUIPMENT

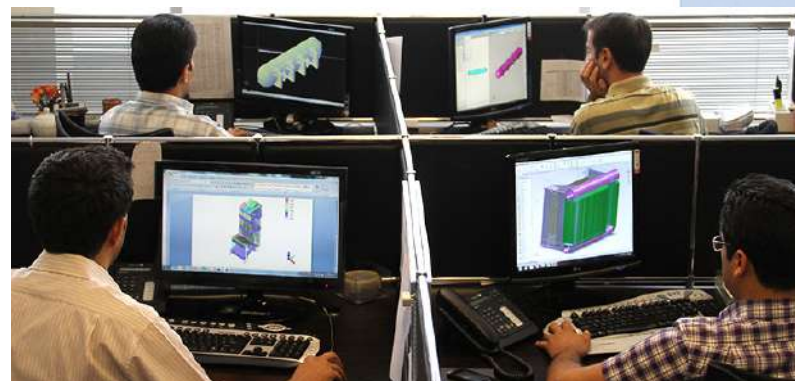
- Deaerator
- Shell & Tube heat exchangers
- Pressure vessels

SERVICES



- Execution, installation, commissioning, and operation of equipment in power plants, oil, gas, and petrochemical industries, water and wastewater units, steel-making, 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 (in products area)
- 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

PRODUCT DESIGN AND DEVELOPMENT-RESEARCH AND TECHNOLOGY



8

MAPNA Boiler and Equipment Manufacturing and Engineering Company enjoys incomparable capabilities in design and engineering, uses updated softwares worldwide, and employs 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.

Central role of product design and develop-



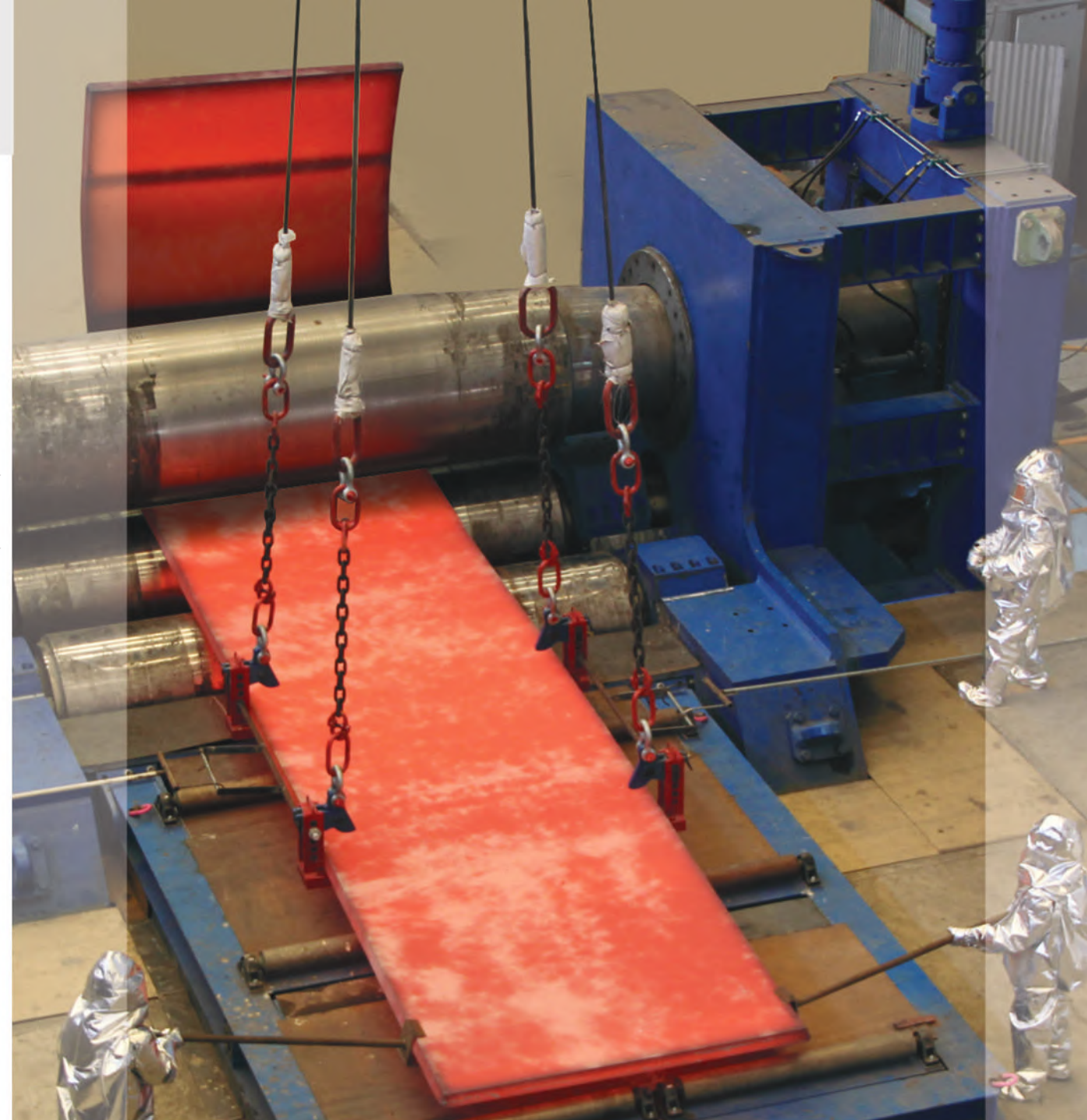
ment sections in improving current products' technological features and upgrading their performance as well as developing new products results in the growing movement of the company for supplying client's requirements with the most flexibility. Feedbacks received from clients and realized projects, research and technology plans and projects, and identifying and obtaining the latest world technology and knowledge have been utilized through the way. Observing safety and environmental criteria is accounted of the most noticeable axes in projects and products design and assures clients about the company's commitment to enduring value creation.

In Research and Technology division, benefiting from remarkable computational hardware facilities, high potential has been provided for carrying out research and design endeavors given to complicated simulations and precise solutions for problems on different grounds including combustion, heat transfer, and stress analysis.

9

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 finning machines with alloy and carbon steel fin and induction welding with workholding 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 waterwall 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 workholding 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

HSE PERFORMED STEPS IN PRODUCT DESIGN AND MANUFACTURING

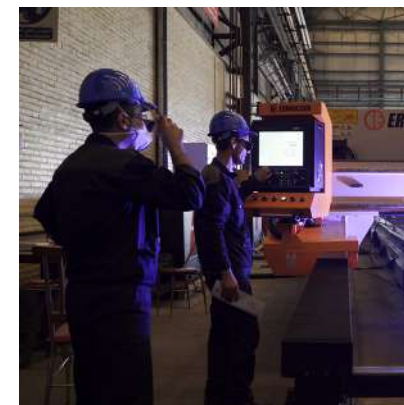
Following its ethical commitments and social responsibility with respect to all beneficiaries, MAPNA Boiler and Equipment Manufacturing and Engineering Company has taken the approach of accident-free working and hazard management, considering harmful factors for occupational health and environmental aspects. Accordingly, for that reason, 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



HSE IN EXECUTIVE OPERATION



- Participation in tender and subcontractors preliminary and periodic audit process from HSE view
- Risk assessment of processes, hazards, and 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 design and execution 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 booklet and procedure of power plant installation
- 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 culturalization and improvement of proactive indications
- Receiving of certification for medical physics responsibility from Atomic Energy Organization of Iran and radiography certification for Elahieh Complex

PRODUCT QUALITY DIVISION



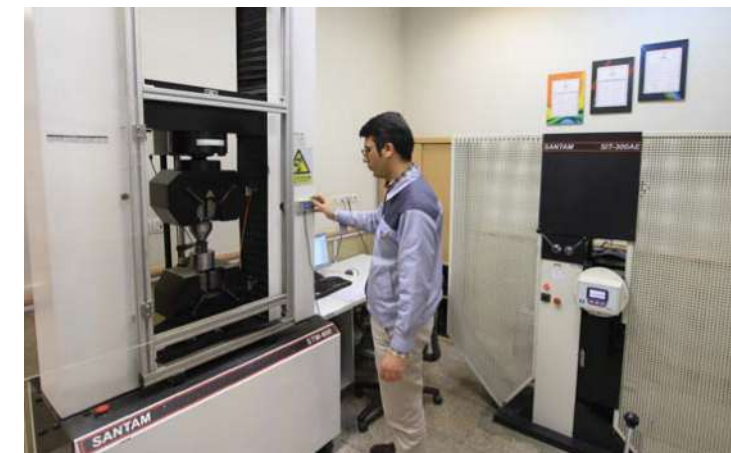
NON-DESTRUCTIVE TESTS (NDTS)

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



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 specimens 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
- Hardness test: Macro (Rockwell B & C scales, Brinell, Vickers), Superficial, Micro (Vickers and Knoop), and Portable
- Chemical Composition test using Stationary Quantometer and Portable X-Ray Fluorescence (XRF) methods
- Metallographic and Microscopic examinations



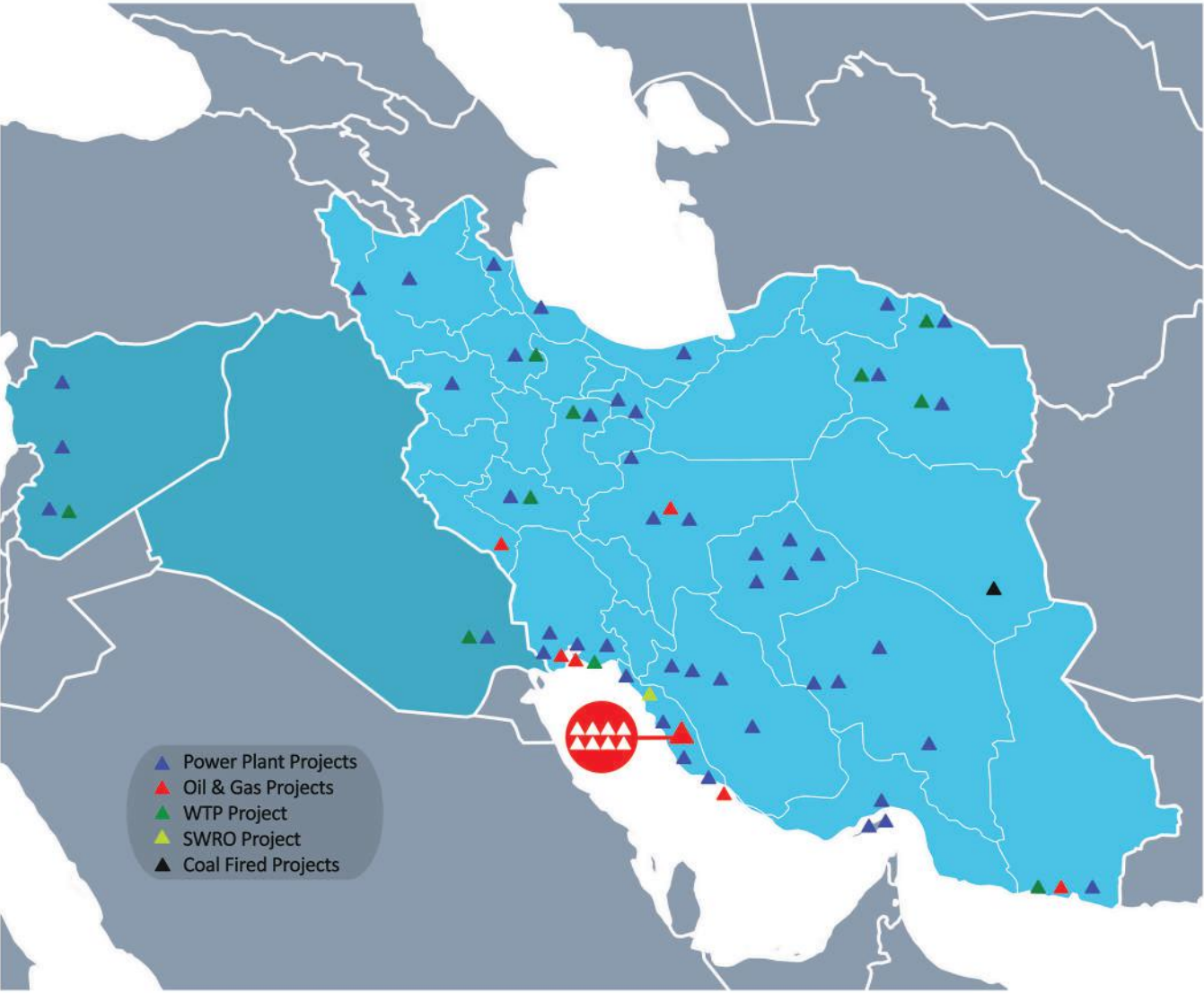
CALIBRATION LABORATORY

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

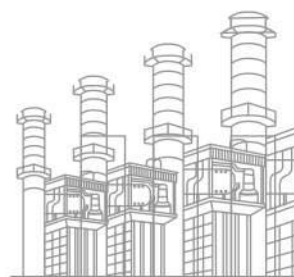


**GEOGRAPHICAL DISTRIBUTION OF
PROJECTS ACROSS MIDDLE EAST**

16



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