International Engineering & EPC Main Contractor
PRESENTATION AGENDA:

ENPPI PROJECT ENGINEERING

I. HERITAGE.

II. TODAY.

III. FUTURE.
Established in 1978 under the Egyptian Investment Law to provide engineering, procurement, construction, and project management services for the petroleum and process industries in Egypt, Middle East and North Africa.
35 Years of Experience

International Business
- 11 Countries
- MENA Region
- South America

Resources:
- 2300 Staff
- 2.5 Million Technical Man-hour Yearly

Engineering
- EPC Main Contractor
- Egypt / International

Paid Capital: US$ MM 220
Value Chain Roles

Main Contractor
Engineering, Procurement, Construction & Project Management

- Engineering
- Procurement
- Construction Management
- E&I Installation
- Overall Project Management
EXPERIENCE
Enpssi Since 1978

1978
Consultant & Multidiscipline Engineering Services - Egypt

1980s
1st LSTK Responsibilities Refinery Project – Egypt

Mid 90’s
International Business UAE, Syria

2000 - Present
Gaining reputation as a world class EPC contractor MENA region – South America
Thinking Globally

- Syria
  - Engineering And Design Services Project – Total
  - Tanak/Omar vapor recovery / Tanak water injection – Shell/AFPC
- Jordan
  - Development of the Jordanian gas transmission pipeline – FAJR
- Venezuela
  - Fractionation Capacity Increase
  - Extraction and compression Project
  - PAGMI Project
  - Ethane Recovery Project
- Libya
  - Sharara Mellita Pipeline
- Sudan
  - Neem Export Pipeline
- Qatar
  - Global Re-assessment of Structures in MM & BH Field, Phase 2
- UAE
- Egypt
  - UGDC, NGL Project at Port said
  - Simian Sienna Gas Development
  - E-Styrenics Production
- Yemen
  - Kharir Field Development
- KSA (Saudi Aramco)
  - Yanbu Gas Plant Expansion
  - Yanbu Export Refinery Project
  - Safaniya Water Disposal System Upgrade
- KSA/Kuwait (KJO)
  - Al-khafji Field Development Plan Phase-I
  - Expansion of Hout Crude Onshore Production Facility
T O D A Y
Engineering development

Reasons for engineering development

- Very hard competition for EPC projects.
- Increase ENPPI capabilities for MEGA projects execution.
- Cope with market requirement.
- Introduce new scope of work (fertilizer, subsurface projects, petrochemicals, renewable projects, mining, ….)
Project Engineering Arms:

- Manpower Resources (training).
- Facilities (software, etc).
- Engineering management (reporting).
- Workflow and Inter-discipline interface Improvement.
MANPOWER RESOURCES
A) ENPPI Academy

- Established for upgrading new graduates capabilities to keep pace with the ongoing changes in technological developments, the increasing workload and employees turnover.

- Duration for new graduates: 6-8 months theoretical and practical training in labs and at sites.

- Duration for experienced engineers: 1-2 months in-house orientation and theoretical technical training.
Module to the Oil & Gas Industries - (for new comers)

- Fundamentals of Oil & Gas Industries
- Main Equipment in the Oil & Gas Industry
- Engineering Documentation
- Introduction to Project Management & Controls
- Introduction to Oil & Gas HSE
- Training at Site
Information Technology

Facilities
Enppi Headquarters

- Inclusive task force area
  - 18300 Sq. Mt.
  - 12300 Sq. Mt. Lease
- Auditorium (Capacity 250)
- Training Center / Enppi Academy
- Reprographic Center
- Cafeteria

Facilities

- Computer Network
- CAD Network
  - (PDS License)
  - (PDMS License)
- Integrated Communication System
- HSE / Detection & Alarm / Security Systems
SOFTWARE

Piping
PDS
PDMS
AUTOCAD
CAESAR II

Civil
SACS
SAP 2000
FRAME WORK +
3D STUDIO
STAAD PRO

Electrical
MICROSTATION
EDSA
Electrical Trans. & Dist.
Lighting Calculations
Cable Sizing & Lists

Pipeline Design
TLNET
TGNET
PIPEPHASE
OFFPIPE

Mechanical
Cadna Noise

Heat Exchangers
HEXTRAN
HTRI

Towers
FRI

Fire Fighting
IN-PLANT

Instrumentation
In Tools
Control / Relief Valve Sizing
Electronic Model (PDS & PDMS)
A 3D graphic model of site features including civil, electrical, instrument, piping and equipments in actual shapes and exact location.

This model provides isometric drawings; piping MTO, general arrangement drawings, orientation drawings, interference checks; Model walk throught and equipment clashes.
PDS & PDMS 3D Modeling (current)

STANDARDS

PROJECT REFERENCE DATA

CIVIL STRUCTURES
PIPELINES
PIPING BULK
EQUIPMENT
CABLE TRAYS
HVAC

PDMS & PDS 3D MODEL From partners

DRAWINGS:
- Equipment lay-out
- Piping arrangement
- Steel structures
- Above ground R.C.
- Architectural bldg
- Cable trays/ HVAC

Graphics Power Station

Piping Isometrics
Bulk Material List
Walk Through
Clash Report
ENGINEERING MULTI-DISCIPLINE INTEGRATION PLATFORM
Engineer, Design and Reporting (Ongoing)

Plant Products
- Diagrams
- P&ID
- Engineering
- Instrumentation
- Electrical
- Schematic 3D Integrator
- Global
- Review
- Review Share
- Clash Manager

Manage

PDMS
- Multi-Discipline Supports
- Cable Design
- Mechanical Equipment Interface
- Laser Model Interface
- Pipe Stress Interface
- Concrete Design
- Plant control Room
- ISOMETRICS

Enppli
• ENGINEERING MULTI-DISCIPLINE INTEGRATION SOFTWARE:

- Enables changes to be implemented more quickly, and controlled and communicated more effectively:
  reduced impact of change on cost, schedule, quality and risk.

- Enables a wider range of data inconsistencies to be detected during design:
  increased design quality and reduced risk of costly, late design changes and associated rework.

- Allows multi-discipline engineering teams to work together more effectively:
  increased design efficiency, quality and multi-location, global working.

- More effective management, control and exploitation of data.
Integrated Engineering Multi-disciplines

Offshore Engineering – SACS, Structure Analysis Computer System

Architectural Engineering – 3Ds Max

Civil Engineering- SAP, Structural Analysis Program

Electrical – ETAP – Power System Analysis and Design

Integrated Engineering Multi-Disciplines

Process Technology – VPE – Data sheet & Intelligent P&ID's as final deliverables

Pipeline – Input On-Bottom Stability (AGA PRCI)

Instrumentation – IN tools- Instrumentation system data bases

Piping – CAESAR II – Stress Analysis
EPC Process Overview

**Conceptual And FEED**
- Basic Engineering
  - Detailed Engineering
    - Equipment & Piping Design
      - Bidding Phase

**Engineering**
- Issuance of MRQ’s
  - Vendor Clarifications
  - Technical Evaluation Report
  - Pre-award Meeting
  - MRP

**Procurement**
- Constructability Study
- Logistics Study
- Construction Supervision
- Start-up

**Construction**
- Pre-Commissioning
- Commissioning
- Start-up

**Project Handover**

**Monitor and Control**
- Estimation
- Project Award
- Project Budgeting

**Information Management (Project Data & Documents) software**

**Cost Control Software**

- MRP Logistics Study
- Construction Supervision
- Start-up

- Pre-Commissioning
- Commissioning
- Start-up
E.P.C. REPORTING SOFTWARE:

End year 2012-2013
- Enables engineering management to focus on the real status of the project.
- Report missing / conflict data in different engineering deliverables.
- Improve the quality for the overall project deliverables.

Mid year 2013-2014
- Integrate the engineering, procurement and construction status.
FUTURE
New Fields

ENPPI
EPC

MINING
AND
SOLID
HANDLING
A- SOLIDS HANDLING Section in Enppi has been established in the year 2007 to cover engineering services for Petrochemical, chemical and Mining Industries, including:

- **Petrochemical industries**: Polystyrene, polyethylene and polypropylene.
- **Fertilizers industries**: Urea and Phosphate plants.
- **Sulfur recovery**: handling and storage in gas processing plants.
- **Mining Industries**, including handling & ore preparation and storage.

B- In addition to the available experience and capabilities of other disciplines, such as instrument control, Loss Prevention, Civil, material engineering and Electrical.
E-Styrenics Polystyrene Plant
Solids Handling Scope:

**Solids Handling activities covered the following areas:**

1- Rubber Dissolving Area.
2- Internal & External Lubricant Addition.
3- Pelletizing.
4- Pneumatic Conveying and Silos.
5- Weighing, Bagging & Packaging.
6- Dust Control.
E-Styrenics Polystyrene Plant

Rubber Bale Conveyor feeding the Rubber Chopper machine
- Capacity: 92 bales/h
- Bale weight: 34 Kg
E-Styrenics Polystyrene Plant

Pelletizer line in the HIPS production area
E-Styrenics Polystyrene Plant

Pneumatic Conveyor line
In the HIPS Plant:
- Capacity: 9750 Kg/h
E-Styrenics Polystyrene Plant

Top View of the pelletizer building and silos including Pneumatic Conveyors
E-Styrenics P.S Plant

Weighing, bagging and Packaging area, including 3 lines 2 lines in operation, the 3\textsuperscript{rd} is a stand-by:
- HIPS line
- SWING line
- Stand-by line

Capacity of each line 600 bags/h
Bag Weight 25 Kg
New Fields

- ENPPI
- EPC
- BROWN FIELD
  Rehabilitation projects
Gupco Rehabilitation Project SINCE 2005
Sample of Rehabilitation Performed Activities

Badri / July Turnaround

- Vessel replacement and repair
- Process piping repair and replacement
- Piping support replacements
- ESD and blow down valve replacement
- Instrument air system replacement
- Closed drain system repair
- Deluge system repair
- Centralized control room, DCS and ESDS installation
- Fire and Gas detections system installation
- Necessary fabric, boat landing, handrail, helipad repair to accomplish TAR
Gupco Rehabilitation

Badri 2008

Before and After Photographs
New ESR ROOM

PRODUCTION SEPARATOR
NEW AIR COMPRESSOR

NEW GAS GENERATOR
J10 PLATFORM
New Flare Installation on J10 PLATFORM
Extension Deck EL-Maadeya

ESR Deck being Lifted
Enppi Engineering Plans for Future Rehabilitation Projects

- Establish New Rehabilitation Division.
- Develop and Issue Design Guides and Engineering Instruction.
- Conduct International training Sessions.
- Renewal of current risk basis certification
- Consultation of Expats as needed.
- Enhance current available Rehabilitation software resources.
New Fields

ENERGY

ENPPI EPC
New Fields: Energy Generation Fields

- Fossil Fuel Power Plant
- Nuclear Power Plant
- Hydroelectric Power Plant
- Geothermal Power Plant
- Solar Thermal Power Plant
- Wind Power Towers
Egypt need to **Triple** Power Capacity by 2027

**New Fields : Energy Forecast For Egyptian Power Demand**

![Bar chart showing Egyptian Consumption](image)

- 2010: 25,000 MWatt
- 2027: 58,000 MWatt
New Fields: Renewable Energy - Solar
Particularly, Solar power generation plants are considered achievable for Enppi, since their design knowhow draws various parallels to the Oil and Gas industry.
Mirrors concentrate light on a boiler. This facility is in Spain.
Solar electricity - photovoltaic power

- Sunlight can produce electricity directly. This is called photovoltaic power.
- Solar cells contain specially treated thin silicon wafers. Light is absorbed in the cells, freeing electrons and producing an electrical current.
- Arrays of solar cells can produce electricity at a home or school.
- Larger arrays are being built by utility companies to reduce the need for fossil fuels.
• Wind has been used as an energy sources for over 2000 years.
• Rotor blades rotate around a horizontal hub.
• The hub connects via a gear box to the generator.

Current Capabilities:
Enppi Engineering can influence Wind Power Projects through different engineering disciplines as electrical, civil, Mechanical, etc.
New Fields

Combined Cycle Plants
**Current Capabilities:**
Enppi Engineering already performed combined cycle in Oil and Gas Projects through different engineering disciplines such as, UGDC, GASC0 and PDVSA Projects.
New Fields

Water Desalination

ENPPI EPC
Desalination
The separation and removal of ions, salts and other dissolved solids from water.

- Heat Based
- Membrane Based
Water Desalination

- Water desalination projects particularly in Egypt and the Gulf area, as KSA plan to invest 20 billion SR in water projects in the next 15 years. On the other hand our local water desalination market is expected to be a massive one due to the expected development in the western desert and Sinai.
Water Desalination

Conceptual unit design and construction

- Schematic
- Product design

Current Capabilities:
Enppi Engineering capable to perform detailed engineering activities of desalination Projects through different engineering disciplines. (Piping, Vessels, Heat Exchangers, electrical Instrumentations, Civil, etc)
WASTE TO ENERGY
What is Waste-to-Energy?

Waste-to-Energy is a specially designed energy generation facility that uses household waste as fuel and helps solve some of society’s big challenges.

Municipal Solid Waste
1 ton

- Power: up to 750 kWh
- Metal: 50 lbs
- Ash: 10% of original volume
Waste-to-Energy Facility

Reducing the Volume of Waste & Saving Space in the Landfill while Generating Clean, Renewable Energy

100 cubic yards of waste

90% volume reduction

10 cubic yards of (inert) ash

13,000 KWh generated
Biofuel projects
As the new world trend is to use alternative fuels rather than gasoline and diesel, especially with low NOx and CO emissions and higher calorific value, the Biofuel world market became a massive one nowadays.

When applied at the national level:
- 1,000,000 tons of rice straw which will not be burnt in the fields.
- 1,000,000 tons of municipal waste that will be beneficially diverted from landfill.
- Saving approximately 1,000,000 tons of natural gas and reducing Egypt’s CO2 emissions by approximately 1,600,000 tons.
Waste-to-Energy

• Establish New Department.
• Establish Partnership with competent Licensors in this field
• Develop and Issue Design Guides and Engineering Instruction.
• Conduct International training Sessions.
• Consultation of Expats as needed.
New Fields

ENPPI
EPC

SUB-MARINE & DEEP WATER
PREVIOUS PROJECT:

WEST DELTA DEEP MARINE CONCESSION SCARAB / SAFFRON DEVELOPMENT PROJECT
Action Plan:

• Develop the current capabilities of Deep Water Team.
• Establish Partnership with specialize contractors in this field
• Develop and Issue Design Guides and Engineering Instruction.
• Conduct International training Sessions.
• Consultation of Expats as needed.
New Fields

- **ENPPI EPC**

- **ENERGY**

- **MINING AND solid handling**

- **BROWN FIELD** rehabilitation projects

- **SUB-SURFACE**

- **PETRO CHEMICAL & FERTILIZER**

- **Water Storage & Desalination**

NEW FIELDS
Thank You For Your Attention

Engineering for the Petroleum and Process Industries