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Project No. UC/EGY/87/214

FINAL REPORT ON THE

10TH UNIDO WORKSHOP

ON FERTILIZER PLANT

1. **MAINTENANCE**
2. **UREA PLANT OPERATION**
3. **AMMONIA PLANT OPERATION**

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1. MAINTENANCE

Period: Nov. 9, to December 18, 1987

Participants:	Mohamed Hadidy	Maintenance Engineer
	Raouf Mekheal	Maintenance Engineer
	Adel Kamel	Maintenance Engineer
	Ashraf El Sawy	Maintenance Engineer
Company:	ABU QIR Fertilizers & Chemical Ind. Co.,Egypt	
Lecturers:	Mr. Fink	Managing Director Technique
	Mr. Riener	Superintendent Central Workshop
	Mr. Lechner	Technical Manager ammonia plant
	Mr. Simon	Technical Manager urea plant
	Mr. Meyer	Manager Electrical & Instrument Workshop

Aim of the project: to upgrade the skills of maintenance personnel selected from the technical staff of the Abu Qir Fertilizers and Chemical Industries Co.

to acquaint 4 maintenance engineers with the technical problems encountered and maintenance techniques applied in utilities and fertilizer plants

to transfer experience in maintenance planning, preventive maintenance, organization of central workshops, repair and overhaul of the electrical equipment, servicing at electronic equipment and instruments

to provide a possibility of making observations and monitoring of maintenance work and procedures in practice during normal operation of plants and annual shutdowns for inspection and repair of machines and equipment

to increase the participants knowledge of the equipment in ammonia, urea and utilities plants

to increase the participants skills in the field of material testing

Programme:

The programme had been mainly adapted upon request of the participants

Organization of engineering department - activities, competence planning, errection of plants, processing of projects
Predictive and preventive maintenance
Maintenance activities in utilities, ammonia, resp. urea plant

Material problems - testing of material destructive & non-destructive tests. Corrosion problems in urea plant. Machining, welding. Dynamic balancing, vibration monitoring - portable instruments
Instrument department - measuring facilities - controller, transmitter etc.
Planning of turnaround etc.

Upon request of the participants specific maintenance problems were treated as foliows:

1. Suggestions were made by CL to solve the problem with manually closing of the minimum flow valve - BFW pump

2. Methods for repairing defected labyrinths of BFW pump-turbine

3. Discussions about the reason of leakage of the seal ring of mechanical seal - solution pump

4. Procedure and method for maintenance of the expansion valve - modification made by CI

5. Methods for checking reformer tubes (approved by TÜV and Ministry of Engineering & Construction)

6. Solution for retubing the process gas cooler in ABU QIR

7. General knowledge about methods which CL applies for checking oil quality (lubricating oil) for high speed rotating machines

8. Inspection system of CL for production facilities out of various materials used in chemical plant

9. Discussion on advanced methods which are in use for assembling and disassembling of bearings with shafts

10. Application of vibration as the most common destructive test. Vibration measurement to check performance of bearings

11. Deep discussions about the new modified centrifugal pump which will be installed in the new plant extension

12. Policy and economic situation of predictive maintenance (comparism of costs & benefits)

13. Overall discussions about control mechanism with computerized programs used in CL

14. Discussions about variable speed motors in BFW plant at the flocculator (thyristor controlled) to increase the range of speed

15. A draft of the preventive maintenance manual for urea plant was worked out for comparism between CL and ABU QIR

Study visits:

Study visits appropriate to their training had been conducted as follows:

Visit to ELIN company Weiz in Styria, manufacturer of electrical equipment, generator, transformer, turbines etc.; Implementer of power station, chemical plants

Visit to STEYR works in Upper Austria, manufacturer of roller bearings

Visit to HÖRBIGER factory in Vienna, manufacturer of compressor valves

Visit to EBG in Linz, manufacturer of electric equipment (transformer, installation & switch cabinets for the chemical industry

Visit to OCHSNER, manufacturer of customer - designed pumps & compressors

Visit to VÖEST Alpine, manufacturer of heavy equipment - turbines, vessels, reactors; Planning, engineering, erection of chemical plants

Visit to state of the art sewage treatment plant of Linz in Asten.

2. UREA PLANT OPERATION

Period: Nov. 23, to Dec. 18, 1987

Participants:	Gamal El Washahi	Operating Engineer
	Ashraf Abd El Baky	Operating Engineer
	Younes Enany	Operating Engineer
	Aly El Fatcuh	Operating Engineer
	Ebrahim Ragab	Operating Engineer
Company:	ABU QIR Fertilizers & Chemical Ind. Co., Egypt	
Lecturers:	Dr. Sykora	Superintendent Urea plant
	Mr. Coufal	Deputy Manager Urea plant
	Mr. Schnellinger	Manager Laboratory
	Mr. Simon	Technical Manager Urea Plant
	Mr. Wolfmeier	Deputy Manager Urea Plant Operation

Aim of the project:

to upgrade the skills of operating personnel selected from the operating staff of the Abu Qir Fertilizers and Chemical Industries Co.

to acquaint 5 operating engineers with the operating problems encountered and operating techniques applied in urea plant

to provide a possibility of making observations and monitoring of operating procedures in practice during normal operation of plants, annual shutdowns and starting up

to transfer concentrated practical experience in modern methods and techniques of urea plant operation

to familiarize the participants with the computerized process guiding system

Programme:

The programme had been arranged according to the specific activities of shift engineers:

Organization of urea plant

Introduction to process steps

Comparism of different urea processes P & I scheme - modifications made by Chemie Linz AG

Waste water treatment - prilling section

Energy control - balance

Energy input - output

Utility situation

Detection of losses by effluent control

Co-operation with technical departments

Preventive and predictive maintenance

Fundamentals of process control

Start up and shut down procedures

Specific problems such as power failures, corrosion and sealing

Upon special request of the participants also specific problems were treated.

Stripper - performance, passivation, corrosion

Problems with level measurement

Formation of tyrolite in separator of the first stage evaporation

Flodding phenomena in HP-section (stripper)

Knocking off carbamate - high pressure pump. Accumulation of urea on scraper and on the wall of the prilling tower.

Study visits:

Study visits appropriate to their training had been conducted as follows:

Visit to HÖRBIGER factory in Vienna, manufacturer of compressor valves

Visit to EBG in Linz, manufacturer of electrical equipment (transformer, installation & switch cabinets for the chemical industry)

Visit to OCHSNER, manufacturer of customer - designed pumps & compressors

Visit to VÖEST Alpine, manufacturer of heavy equipment - turbines, vessels, reactors; Planning, engineering errection of chemical plants; Machine tools

Visit to state of the art sewage treatment plant of Linz in Asten.

3. AMMONIA PLANT OPERATION

Period: Nov. 23, to Dec. 18, 1987

Participants:	Moh. Ibrahim Mousa	Operating Engineer
	Mahmoud Hanafi El Zoheri	Operating Engineer
	Khaled El Sayed	Operating Enginer
	Mohsen El Sabkhy	Operating Engineer
	Gamal Abd. Ashour	Operating Engineer
	Mohamed El Morsi	Operating Engineer
	Aly Hassan Madkour	Operating Engineer
	Ibrahim El Sayed	Operating Engineer
Company:	ABU QIR Fertilizers & Chemical Ind. Co., Egypt	
Lecturers:	Dr. Lehner	Superintendent Ammonia Plant
	Mr. Sambs	Deputy Manager Ammonia Plant
	Mr. Lehner	Manager Laboratory
	Mr. Lechner	Technical Manager Ammonia Plant
	Mr. Schatzl	Supervisor Ammonia Plant Operation

Aim of the project: to upgrade the skills of operating personnel selected from the operating staff of the Abu Qir Fertilizer and Chemical Industries Co.

to acquaint 8 operating engineers with the operating problems encountered and operating techniques applied in ammonia and utilities plants

to provide a possibility of making observations and monitoring of operating procedures in practice during normal operation of plants, annual shutdowns and starting up

to transfer concentrated practical experience in modern methods and techniques of ammonia and utilities plant operation

to familiarize the participants with the computerized process guiding system

Programme:

The programme had been arranged appropriate to the duties of shift engineers.

Introduction to ammonia plant process steps - desulphurization steam reforming, CO conversion CO_2 removal, Argon plant, Catalyst performance - reduction, Start up - shut down procedures

Interlocking system

Quality control - laboratory analysis

Energy control - energy balance

Efficiency

Utility situation

Co-operation with maintenance department - mech. equipment compressors, turbines, pumps etc. measuring instruments

Fundamentals of process control

Upon request of the participants specific problems were treated as follows:

1. Benfield solution system problems - high temperature in the desorber - CL has changed ceramic filler material (Raschek rings) to rings out of carbon steel

2. Damage of packing material - ceramic material (saddles of desorber) CL has changed the desorber beds to carbon steel with a layer of stainless steel at the top

3. Catalyst performace calculations - primary reformer - secondary reformer HT converter, LT converter

4. Calculations on energy balance (computer aided) utility situation etc.

5. LT gas bed - shifting of beds approx. every two years - catalyst performance can be extended to 4 - 6 years, compared to usually 2 years

6. Discussion on ammonia converter performance - Raising efficiency by accurate observing different parameter in the recycle gas

7. Start up - shut down procedures, co-operation with maintenance departments. Due to prudently planned maintenance CL has reduced unscheduled maintenance down time to approx. 1 % continuous operation of the ammonia plant varies from 21 - 24 months

8. Fundamentals in instrumentation - pneumatic equipment - detection of faulty operation by production people

9. Waste heat boiler - damage of tubes due to power failure. Suggestions from CL to minimize damage

Study visits:

Study visits appropriate to their training had been conducted as follows:

Visit to HÖRBIGER factory in Vienna, manufacturer of compressor valves

Visit to EBG in Linz, manufacturer of electrical equipment (transformer, installation & switch cabinets for the chemical industry)

Visit to OCHSNER, manufacturer of customer - designed pumps & compressors

Visit to VÖEST Alpine, manufacturer of heavy equipment - turbines, vessels, reactors; Planning, engineering, errection of chemical plants;

Visit to state of the art sewage treatment plant of Linz in Asten.