Oil and Gas

Control Systems
## Oil and gas industry

### Process control

#### GAS

**PRODUCTION AND PROCESSING**
- Podravina and Molve projects (INA)
- ETAN - gas treatment plant (INA)
- Bu Attifel - Libya (AGIP)
- Oil platform - Barbara (AGIP)

**TRANSPORT**
- Gas transport system (PLINACRO)
- Gas transport system (Plinara Pula)

**STORAGE**
- Underground gas depot Okoli (INA)

#### OIL

**PRODUCTION AND PROCESSING**
- ASAB II - Abu Dhabi - U.A. Emirates
- Oil fields - Val d’Agri - Italy (ENI/AGIP)

**TRANSPORT**
- Oil pipeline Conpet - Ploiesti - Romania
- Black Sea crude oil pipeline - Unloading ramp Grushovaya - Russia
- Crude oil pipeline pumping station Ammal - Libya (Veba oil)
“Podravina” and “Molve”

“Podravina” is INA Naftaplin project, which comprises facilities and systems for gas and other hydrocarbons production, originating from northwest Panon Area of approximately 250 km². About fifty oil/gas wells, five gas stations (Stari Gradac, Kalinovac I, Kalinovac IP, Kalinovac Zapad i Molve I) and central gas treatment stations Molve 1, Molve 2 and Molve 3, yield annual gas production of 2.5 billions m³. Control system is based on communication network connecting some thirty ABB Master and Advant controllers and operator stations.

Scope of activities
Development and commissioning of complete application (all controllers and operator stations) for central gas treatment station Molve III was completed by INTEA engineers.

Activities included:
- software design
- programming - level 1: (databases and type circuits in controllers)
- programming - level 2: (logic, sequences)
- visualization - MasterView and Advant OS: configuration, application, process displays and dialogs development
- simulation programs
- Factory Acceptance Test with customer
- site installation (partly)
- commissioning
- operator training

Other controllers were installed, mostly, in period 1987 - 1992. INTEA engineers have been involved (until 1991. as "Končar" company employees) in "Podravina" project since the very beginning of ABB control system installation.

2001. CPS Molve III "Step-up" project. ABB Master equipment has been replaced with ABB Advant equipment. Application for new ABB Advant operator stations has been developed by INTEA.

Since 1993, INTEA received 16 orders related to MOLVE automation equipment and software.
ETAN Gas treatment plant Ivanić Grad

Annual production of the plant is about 85000t of ethane, 55000t of propane, 37000t of butane and 40000t of condensate or about 130000t of natural gas liquid in total.

Since September 1995 ABB Master and ABB Advant distributed control systems have been installed.

Scope of activities
INTEA participated in all phases of ETAN plant control system development and installation:
- application design
- equipment delivery (partly)
- programming - level 1: (databases and type circuits in controllers)
- programming - level 2: (logic, sequences)
- operator stations - configuration, application, process displays and dialogs development
- simulation programs
- factory acceptance test with customer
- site installation
- commissioning
- operator training

Post startup - INTEA
- 1996. Annual overhaul
- 1997. New substation PS4, pentane and butane production support
- 1999. Ensuring Y2K compliance
- 2000. Annual overhaul
- 2000. New PLC and support for 15.1MW oil heater
- 2001-2010. Annual maintenance, process & DCS extensions, ...

Since 1993, INTEA received 53 orders related to ETAN DCS.
Gas

PRODUCTION & PROCESSING

Bu Attifel - NGL recovery plant

Bu Attifel is gas processing plant situated on the east of Libyan desert. Regarding technology and structure it is similar to Central gas treatment plant “Molve III”, but with four times greater capacity.

*Complete production process is controlled by ABB Master and Siemens control systems.*

Scope of activities

INTEA participated in commissioning phase of Bu Attifel control system project.

Included activities:

- application analysis
- programming - level 1 i 2: database and PC program changes
- operator stations - application and process displays changes
- site installation (partly)
- software development for communication with “shut-down” Siemens PLCs
- commissioning
- operator training

Subsequent activities

- 1999. Ensuring Y2K compliance
- 2000. Additional equipment delivery, survey and technical training
PLINACRO - Gas transport system

Gas transport system INA Naftaplin, spreads over area of north Croatia. Main facilities are: central gas treatment plant Molve, underground gas depot Okoli, compressor stations Bokšić, Legrad and Stružec, about 30 measuring-pressure reducing stations from Županja to Varazdin and adequate gas pipelines. Distribution centre and central operator's place (Zagreb-Šubićeva) processes and displays data, retrieved via radio link from all above mentioned facilities. Remote terminal units are based on process controllers: ABB, Opto22 and Mitsubishi.

### Scope of activities

Process controllers OPTO22 mistic were installed, in the period of 1994-1998, on 6 pipeline locations. Scope of INTEA activities included:
- application analysis
- project documentation
- choosing and configuring equipment
- programming - level 1: (databases and type circuits in controllers)
- programming - level 2: (logic, sequences)
- visualization SCADA “PCMAX”- configuration, application, process displays and dialogs
- simulation programs
- Factory Acceptance Test with customer
- site installation
- commissioning
- operator training

INTEA was engaged (till 1991, as “Končar”) in gas transportation project from the beginning of telemetry and process control installation in 1983.

### Subsequent activities - INTEA

- 1997. Annual overhaul - process control equipment on all sites.
- 2002-2010. Annual maintenance and modifications

Since 1993, INTEA received 37 orders related to automation of PLINACRO gas transport system.
PSP Okoli

Underground gas storage “Okoli” INA Naftaplin is a system for temporary gas storage during the periods of lower demand and consumption. The storage is assuring stable gas system distribution in Croatia. During 15 years of operation, the gas flow through the Storage was 9 billion m³ of gas which equals to annual average of 600 million m³.

Control system is based on ABB Master and Advant Controllers.

Scope of activities

The controllers were installed in 1996. INTEA was involved in most of the project phases on the Underground Gas Storage Okoli INA Naftaplin:

- application analysis
- equipment selection and configuration
- programming - level 1: (controller type circuits and data bases)
- programming - level 2: (process logic, sequences)
- visualization - Advant OS: configuration, application development, operator displays and dialogs.
- simulation programs
- factory acceptance test
- site installation (partial)
- commissioning
- project documentation
- customer training

The complete application (controllers and operator stations) for the Underground Gas Storage Okoli INA Naftaplin was designed and commissioned by INTEA engineers.
Barbara - offshore platforms

Offshore gas platform system named “Barbara” is AGIP’s significant project in Adriatic. Platforms are equipped with modern process controllers that control natural gas production, treatment and transport in full automatic. *Control system is based on ABB Master process controllers.*

**Scope of activities**

INTEA participated in “Barbara” process control project during commissioning phase. Special assignment was to establish serial communication link to other, non ABB equipment. Activities included:

- online application testing
- configuration of communication equipment
- modifications of application programs
- modifications of operator station displays
- preparing test procedures
- commissioning
- project documentation (partial)
**ASAB II - oil wells**

Project ASAB II - Abu Dhabi - U.A. Emirates comprises thirty wells and related facilities. Basic function of dedicated process controllers is supervision and control of water injection into the wells. Process control system is based on Siemens S5 controllers. Visualization and operator station utilize personal computers with Sinaut LSX SCADA application.

**Scope of activities**

INTEA was involved in process control project on ASAB II during commissioning phase. Activities included:
- live application testing
- PLC program changes
- operator display changes
- preparing test protocol
- commissioning
- site acceptance
- customer training
- project documentation (partly)

**Val d’Agri - oil wells**

The largest oil wells in Italy are located in Val d’Agri area. Val d’Agri Project, run by ENI and Agip consists of: 29 production locations, central plant with daily processing capacity of 104000 barrels, oil pipeline leading to Taranto Refinery (136km) and storage facilities. Production, processing and transport are controlled and supervised by process controllers. Central Plant process control system is based on ABB Master controllers.

**Scope of activities**

INTEA took part in process control project during the commissioning. Special task was to enable serial communication with other systems. Activities included:
- application testing
- communication equipment tuning
- controller programs modifications
- test protocols
- commissioning
- project documentation (partly)
CONPET – oil pipeline

Conpet Ploiesti – Romanian national crude oil pipeline. Basic functions of process controllers mentioned below are monitoring and supervision of the oil pipeline system. Process control system is based on ABB RTU 200 and AC410 process controllers. Visualization and operator workplaces are utilizing ABB “Micro” SCADA application.

AMAL - oil transport

Amal is large pumping station of Libyan crude oil pipeline, transporting oil from Libyan desert to the Mediterranean coast. Process control system is based on ABB Master process controllers.

Scope of activities

INTEA participated in oil pipeline control project design and development. Activities included:
- process analysis
- functional specifications
- as-built project documentation (partly)
- test procedures & protocols
- RTU programming (partly)

INTEA participated in “Amal” process control project during extension considerations phase. Activities included:
- site survey
- analysis of existing applications
- communication links analysis
- reporting
- system extension proposal
Crude Oil

Grushovaya - Black see pipeline

Unloading ramp and oil storage operation is monitored and controlled via operator screen and keyboard. *Control and supervision system is based on ABB Master process controller.* Operator’s place utilizes personal computer running “PCMAX” SCADA application. “PCMAX” is product of INTEA’s own development.

Scope of activities

INTEA took part in most of Grushovaya automation project activities:
- application analysis
- programming - level 1: (type circuits & database in process controller)
- programming - level 2: (logic & sequences)
- visualization - SCADA “PCMAX”: configuring, application design, operator displays & dialogs
- simulation programs
- factory acceptance testing with the client
- site installation
- commissioning
- end-user technical training
Ethane Plant – Ivanic Grad