GIAP experience in ammonia and ammonium nitrate plant revamps

Egor Krivchun CEO, OAO GIAP 16.9.2019



GTCC 2019, Moscow 4th Russia & CIS Gas to Chemicals Conference





# More than 80,000,000 \$

orders booked in 2019

operating since



Key services provided:

on fertilizer and gas monetzation

markets

Licensing
Engineering
EPC

More than

### projects completed during the last 20 years

in Russia, CIS, China, Eastern Europe and Middle East



Foundation of State Nitrogen Institute (GIA)

Reorganization to State Research, Development and Design Institute of Nitrogen and Organic Chemical (GIAP)





Foundation of JSC GIAP

1994

2008

2010

Foundation of Novomoskovsk

Institute of Nitrogen industry

GIAP implements management system ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007

2018

**Our History** 

1931



76 1991

#### 991 1992

AIVIGO

Foundation of Alvigo Group

GIAP rewarded with Order of the Red Banner of Labour

Foundation of Novomoskovskiy branch of GIAP

Foundation of Lisichanskiy branch of GIAP



Launch of EPC division

2013

NIAP successfully passed the certification of quality management system for ISO 9001-2008

Foundation of Research and Design Institute Khimtekhnologiya LLC





#### Today GIAP Group includes:

- **4 engineering companies** Alvigo, GIAP, NIAP and Khimtekhnologiya
- More than 500 highly-qualified people in nitrogen and related industries
- Near 90 years of experience in providing engineering solutions for minerals fertilizer and gas monetization industries





### **Our Services**









GIAP possess significant experience in revamps of ammonia, ammonia nitrate, nitric acid and methanol units

- GIAP offers:
  - Feasibility study
  - Licensing and Basic design
  - Project documentation
  - Detailed engineering
  - 'Turn-key' services (EPC)
  - Technical consulting





### Market vision(1)

#### **Background:**

- Global population is growing by 9 bln by 2050\* (World Bank)
- Increase in fertilizer consumption is expected to be 1-3% per annum on global level, mainly through in South-East Asia, South America and Africa regions
- Relatively low price of natural gas in Russia



#### Nitrogen consumption in key regions



### Market vision(2)



Main trends on ammonia and ammonium nitrate marks in Russia and FSU:

- Modernization on existing units with increasing capacity up to 2000+ tons per day
- Optimization of costs will require EPC services for both grassroots and revamps

## Ammonia

### ACRON, Velikiy Novgorod

#### Project: Construction of "Ammonia 4" on the basis of an unfinished AM-76

Target capacity: 2060 tons of ammonia per day Target energy consumption: Not more than 7.25 Gcal per ton of ammonia Basic project: Haldor Topsoe, Denmark

#### GIAP scope of works:

- Revision of the basic project, adaptation of the basic project to the Russian norms
- Project and detailed documentation
- Audit of equipment suppliers, analysis of documentation for equipment ordering and acceptance
- Designer's supervision of construction
- Development and use of 3D-models for units under construction to control construction stages



Start year – 2014 Commissioning – 2016 Actual capacity achieved: 2350 tons of ammonia per day

# Ammonia

### Gazprom Neftekhim Salavat Salavat

#### Project: AM-76 unit revamp to increase capacity up to 1750 MTPD

Project objective: To achieve 1750 MTPD of ammonia, and energy consumption not more than 8.4 Gcal per ton of ammonia

Technical solutions (basic project): OJSC GIAP

List of technical solutions:

- NG steam heater installation
- Desulfurization unit revamp
- NG saturation unit installation
- Heat exchanger revamps and replacements
- Syngas compressor pos.401 revamp
- · Air cooler revamps and replacements
- Additional water cooler installation pos. 1604
- MUG drying unit installation
- Hydrogen recovery from purge gas installation
- Auxiliary boiler (pos. 108) burners replacement



- Feasibility study
- Basic design



Project start: 2019 Project status: in progress

# Ammonia

### Dorogobuzh Verkhnedneprovskiy

#### Project: TEC unit capacity increase

Target capacity: 2100 MTPD of ammonia Target energy consumption: Not more than 8 Gcal per ton of ammonia Basic project: KBR, USA

List of technical developments :

- Reformer debottlenecking KRES heat
- Exchange reactor installation
- CO<sub>2</sub> removal unit revamp according to Giammarko-Vetrocoke process
- Additional ammonia synthesis converter installation
- Air compressor revamp
- NG compressor and turbine revamp
- Syngas compressor and turbine revamp
- Refrigeration turbine revamp

#### GIAP scope of service:

- Project documentation
- Detail design
- Authority supervision



Project start: 2018 Project status: in progress Planned commissioning: 2019

#### Проект: AC-72 ammonium nitrate unit revamp

Project objectives:

- Ammonium nitrate AC-72 unit capacity increase up to 2100 tons per day.
- New «NS» unit construction with capacity of 16 t/hour

List of technical solutions:

#### AS-72 revamp

- Additional neutralizer for 90% ammonia nitrate solution
- Additional finishing neutralizers
- · Additional ammonia heater
- Additional nitric acid heater
- Additional evaporator
- Washing scrubber
- Additional fans

New "NS" unit construction

GIAP scope of service:

- Project documentation
- Detail design



**URALCHEM** 

**Berezniki** 

Project status: in progress

### Dorogobuzh Verkhnedneprovskiy

#### Project: AC-72/1 capacity increase

Project objectives:

- 1. Capacity increase up to 2300 t/d
- Prilling tower emission reduction: NH<sub>3</sub> not more than 10 mg/m<sup>3</sup>, NH<sub>4</sub>NO<sub>3</sub> not more than 50 mg/m<sup>3</sup>

List of technical developments :

- Neutralizer (ITN pos. P-3/1) replacement
- Two existing nitric acid heater (pos. T-2/1,2) replacement
- Both finishing neutralizer pos. P-4 and 'checking' neutralizer pos. P-4a connection to functioning ITN pos. P-3/2 only
- Additional finishing neutralizer pos. P-104 and 'checking' neutralizer pos. P-104a installation; both connected to new ITN pos. P-3/1
- · Additional evaporation line installation
- Secondary steam additional purification
- New ammonia nitrate melt storage pos. E-115 installation, semi-submersible melt pump installation
- · Four existing granulators replacement
- Air conditioning installation
- Atmospheric exhaust gas cleaning system revamp
- Installation of an additional node for processing weak solutions of ammonium nitrate

#### GIAP scope:

- Feasibility Study
- Project documentation
- Detail design
- Construction estimate (SMETA)



Project completed: design completed In 2018

### URALCHEM Kirovo-Chepetsk

#### Project: AC-72/2 capacity increase

Project objectives:

- 1. Capacity increase from 1630 up to 2100 t/d
- 2. Emissions into atmosphere reduction

List of technical developments :

- Use of two existing neutralizers (ITN reactor)
- Replacement of finishing neutralizer pos P-4A
   with

new one having increased reaction volume

- Additional evaporation line installation (evaporaror, air heater, air supercharger washing scrubber)
- Use of two existing lines in parallel with an increased diameter of pressure pipe
- Third ammonia nitrate melt storage and pump installation
- Fan pos. B-39 installation
- Granule extra cooling installation

#### GIAP scope:

- Basic project
- Project documentation
- Detailed design
- Industrial safety expertise
- Authority supervision



Project completed: 2011

### KAO AZOT Kemerovo

#### Project: AC-72 №1,2 revamp

Project objectives:

- 1. Capacity increase up to 2300 t/d
- 2. Prilling tower emission reduction:  $NH_3$  not more than 30 mg/m<sup>3</sup>,  $NH_4NO_3$  not more than 50 mg/m<sup>3</sup>

List of technical solutions:

- New neutralization and evaporation sections With capacity of 1500 t/d (as per 100% NH<sub>4</sub>NO<sub>3</sub>)
- New ammonia nitrate melt feed unit to deliver melt from new neutralization and evaporation units to existing prilling towers of AC-72/1,2 units
- Prilling and cooling sections of AC-72/1,2 units revamp

#### GIAP scope:

- Project documentation
- Detail design



Project status: in progress

### KuibyshevAzot Togliatti

Project: Increasing the overall performance of granulated ammonium nitrate through the construction of a new unit Project objective: Design capacity – 2300 t/d

**Design sections:** 

- Feed of ammonium nitrate solution
- Evaporation to produce melt
- Ammonium nitrate melt granulation
- Cooling ammonium nitrate granules in fluidized bed vessel
- Air conditioning and water cooling in absorption chillers
- Air-steam mixture purification

#### GIAP scope:

- Basic project
- Project documentation
- Detail design
- Equipment supply and construction
- Authority supervision
- Start-up service



Project status: in progress



### **Our Clients**





### References (1)

Year	Project	Customer	Scope of Work
In progress	5000 tpd Methanol Plant construction	Confidential	General Designing, Project Documentation, Engineering Services
In progress	2300 tpd Ammonium Nitrate Granulation Plant	JSC KuibyshevAzot, Togliatti, Russia	EPC, own Proprietary Technology
In progress	Revamp of Methanol Plant with capacity increase	LLC Tomet, Togliatti, Russia	Design Documentation and Detail Design Documentation
In progress	Revamp of Ammonia Plant with capacity increasing up to 2100 tpd	PJSC Dorogobuzh, Dorogobuzh, Russia	Design Documentation and Detail Design Documentation
In progress	Ammonium Sulphate-Nitrate Plant construction	JSC KuibyshevAzot, Togliatti, Russia	Design Documentation and Detail Design Documentation
In progress	Revamp of AK-72 Plant with capacity increasing	Confidential	Turnkey Construction using Proprietary Technology
In progress	Revamp of AC-72 Plants No.1,2 for capacity increasing up to 2300 tpd	JSC SDS-Azot, Kemerovo, Russia	Design Documentation and Detail Design Documentation
In progress	Designing of synthesis-gas units and oxo-unit as part of 75 ktpa 2-Ethylhexanol Plant	Confidential	Design Documentation and Detail Design Documentation
In progress	Revamping of AM-76 Ammonia Plant to achieve daily capacity of 1750 tpd	JSC Gazprom Neftekhim Salavat, Salavat, Russia	Basic Design



### References(2)

Year	Project	Customer	Scope of Work
2018	Neutralization and evaporation section of Ammonium Nitrate Plant construction	KazAzot JSC, Aktau, Kazakhstan	Detail Design Documentation
2018	Revamping of AC-72 No.1 Ammonium Nitrate Plant to achieve capacity of 2300 tpd	Dorogobuzh PJSC, Dorogobuzh, Russia	Design Documentation and Detail Design Documentation
2018	Design development for revamp 1800 tpd production capacity of AC-72 No.1 and No.2 Plants	Dorogobuzh PJSC, Dorogobuzh, Russia	Design Documentation
2018	Nitrogen-Containing Fertilizers Production Plant	Quimimpex, Cuba	Surveying Services, Feasibility Study for Technical Re-equipment
2018	Supply of GTU-8 Gas Turbine Plants	ACRON PJSC, Veliky Novgorod, Russia	Licensing, Technical Support of Supply
2018	Urea-Ammonium Nitrate Plant neutralization unit construction	SDS Azot JSC, Kemerovo, Russia	EP-Contract using Proprietary Technology
2018	Technical re-equipment of AK-72 Plant with selective treatment conversion	Dorogobuzh PJSC, Dorogobuzh, Russia	Development of Basic Design
2018	Dimethyl Ether Plant construction	UCC Shchekinoazot, Shchekino, Russia	Design Documentation and Detail Design Documentation



Телефон: +7 (495) 9166501 Факс: +7 (495) 9166300 Е-mail: info@giap-m.com Адрес: 109028, Россия, г. Москва, ул. Земляной вал, 50А/8, стр. 4

