OPPORTUNITIES CREATED BY THE INNOVATIVE REVAMPING OF A METHANOL PLANT

Davide Carrara
THE CLIENT

• Active in methanol and derivatives

• Base materials for the production of plastics, paints, resins and adhesive, insulation materials, etc.

• Production sites:
  • TWO IN RUSSIA
  • ONE IN EUROPE

• Focused to new technologies
25 YEARS OF CO-OPERATION

- **1990’s**
  - Plant original design: 2000 MTD
  - Casale ARC technology: 2500 MTD

- **2000’s**
  - Plant capacity increase: 3000 MTD

- **2016**
  - Plant capacity maximization (Pox): 3375 MTD
FROM METHANOL WASTES…

333’000 MTY of NH₃
New frontiers and opportunities

...TO MELAMINE!
MAXIMIZATION OF THE BENEFITS

New plants nominal capacity

AMMONIA
15’000 MTY → 333’000 MTY → Zero import!

UREA
156’000 MTY → 583’000 MTY → 364’000 MTY

MELAMINE
40’000 MTY → 40’000 MTY → Zero import!

Current internal consumption

COVER INTERNAL NEEDS AND EXPAND THE BUSINESS
PRODUCTION AT HIGH EFFICIENCY

PRODUCTS FROM NEW COMPLEX

- LIQUID AMMONIA  45 MT/d
- SOLID UREA      1380 MT/d
- SOLID MELAMINE  120 MT/d

OVERALL NATURAL GAS CONSUMPTION 816 kNm3/d
Methanol Plant operation is a priority!

- Utilities fully independent from existing plant
- Minimization of interfaces
  - Nitrogen → existing ASU not affected
  - CO2 → no obstruction on flue gas stack
  - Purge gas → MeOH loop not disturbed
Raw water limitation

- Optimization of motor vs turbines drivers
- Optimization of H2O coolers vs air coolers

Power network reliability

- Continuous Melamine production in case power dip
- Selection of drivers and provision of UPS
REFERENCED TECHNOLOGIES

H2 purification → DESIGN OF PSA

• Hydrogen recovery  90%
• Hydrogen purity  99.9 %
• Hydrogen pressure  66 bar (referenced)
• Tail gas recovered as fuel → re-compression
ASU designed to generate **pure nitrogen** (low content of oxygenates)

- integrally geared compressor
- AMMONIA LOOP
New frontiers and opportunities

NH3 SYNTHESIS

INERT FREE SYNTHESIS LOOP

• Huge reference
• Axial radial 3 bed 2 ICH converter
• Integration with urea plant to prevent any disturbance in case of synthesis stop (ammonia delivered through tankage facilities)
**AMINE BASED PROCESS**

- Hydrogen free CO2 (advantage for urea synthesis)
- High CO2 purity 99.99% dry basis
- Pressure same as from traditional ammonia plants front end

**LP steam consumption**

**Steam Network design**
Urea plant

SPLIT FLOW LOOP technology

- High efficiency due to high CO2 purity
- Designed to recover melamine off gas
- Steam network fully integrated with melamine plant
REFERENCED TECHNOLOGIES - melamine

Melamine plant  ➔  LEM technology

- Standard and referenced plant
- Very low energy consumption
- Very low impact on utilities design
INTEGRATED APPROACH

- Referenced technologies
- Integration of new with existing facilities
- Interactions between process units
- Harmonization of utilities & off sites with process units
- Compliance with local regulations & financing lenders requirements
ADVANTAGES IN PROJECT EXECUTION

• 3 months after license agreement, LLI ready to be ordered
• 6 months after license agreement, complex lay out frozen according to local regulations
• Process design documentation ready for detail engineering development from the first issue
CASALE PROJECT SCOPE

- ISBL Basic and Detail Engineering
- OSBL Basic Engineering
- Overall project Management
  - Technical coordination of the parties involved
  - Overall time schedule management (progress monitoring)
- Overall management of construction activities
- Overall process performance guarantees
CONCLUSIONS

• Current Project status on schedule!
• 60% 3D model finalized and second MTO completed
• Site works on going for utilities
• Complex planned to be in operation by the middle of October 2020
The basic design requirements for such developments are quite specific.

Targeting future Clients running methanol plant who are wanting to exploit their product ranges.
Thank you

www.gpca.org.ae