

# HOW TO MAKE THE MOST OF YOUR UREA EQUIPMENT



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# AGENDA

01 INTRODUCTION

02 REPAIRS

03 LIFE-TIME EXTENSION

04 NEW EQUIPMENT  
/ INNOVATIONS

05 CONCLUDING REMARKS

01



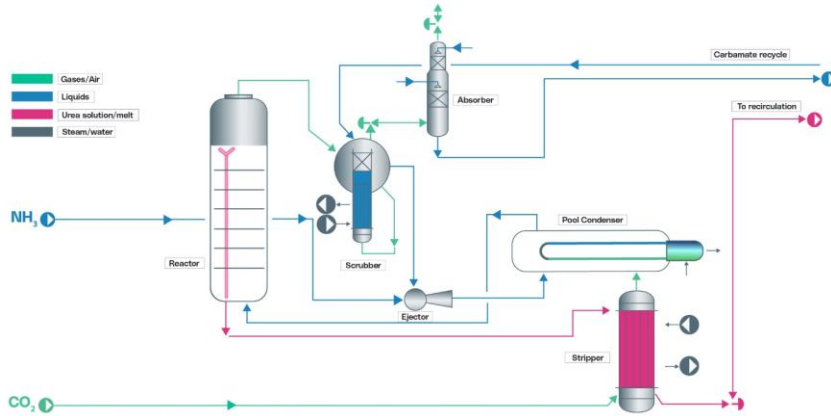
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**STAMICARBON**  
15<sup>TH</sup> SYMPOSIUM 2026

# INTRODUCTION

# INTRODUCTION



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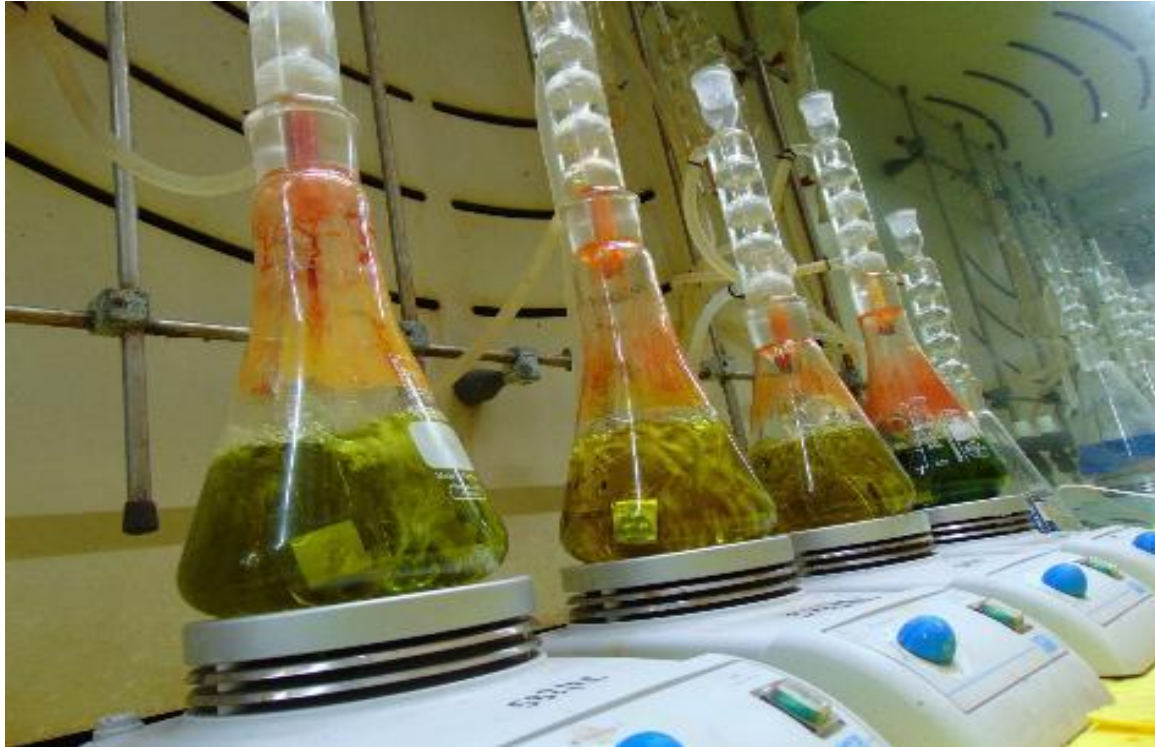
*High-pressure synthesis section*



*Catastrophic failed reactor of a 200 mtpd urea plant*

- Critical Urea Equipment
  - High Pressures ~145 barg (~2100 psig) & Temps. ~165C - 185C (330F – 365F)
  - Process highly corrosive and toxic
- Risk for catastrophic failures
- Mitigation strategies
  - Best corrosion resistant materials
  - Control supply chain
  - On-line monitoring systems
  - Control - Integrity Operating Windows
  - Condition based Inspections
  - Life-time extension assessment

# INTRODUCTION



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## CONTROL SUPPLY CHAIN

- Combining know-how and expertise of
  - Steel manufacturers
  - Equipment manufacturers
  - Stamicarbon process knowledge
- Partnerships throughout supply chain
- Stamicarbon specifications
- Innovations



# INTRODUCTION



*Repair of HP Scrubber sphere*



*State-of-the-Art ULE Pool Condenser*



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How to get the most of your hp urea equipment?

## Existing plants (aging equipment)

- Repairs
- Life-time extension
- Improvements

## Grass root project (new equipment)

- State-of-the-Art design
- Process design
- Mechanical design

02



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# REPAIRS

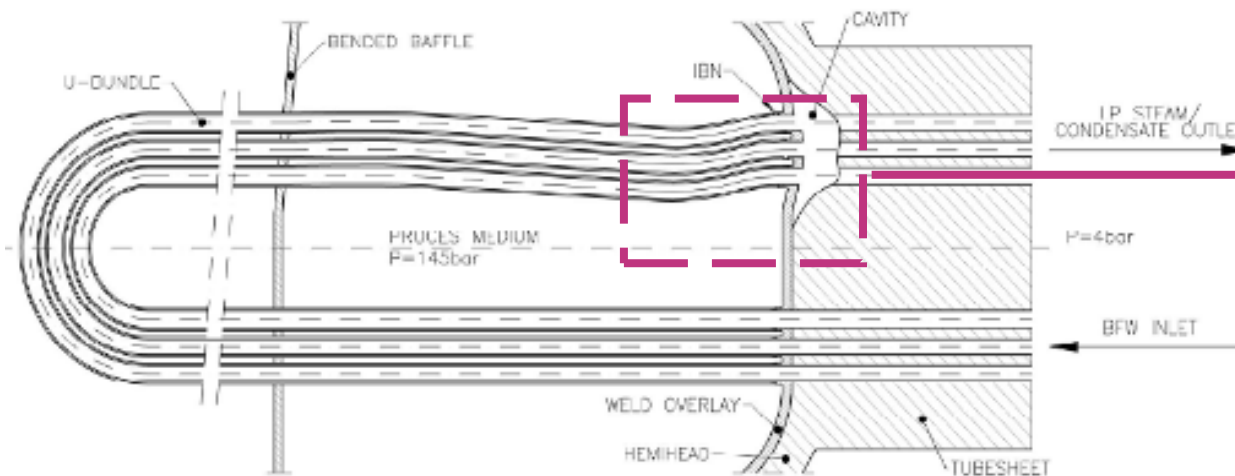
# REPAIRS CASE

- Emergency (to bridge time for replacement)
  - Repair tube-sheet Pool Condenser
  - Repair: 4 months; PC replaced in 2 years



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*Urea 2000<sup>plus</sup> urea plant with Pool Condenser*



*Severely damaged tube-sheet due to flow-accelerated-corrosion*



*Repair strategy*



03



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# LIFE-TIME EXTENTION

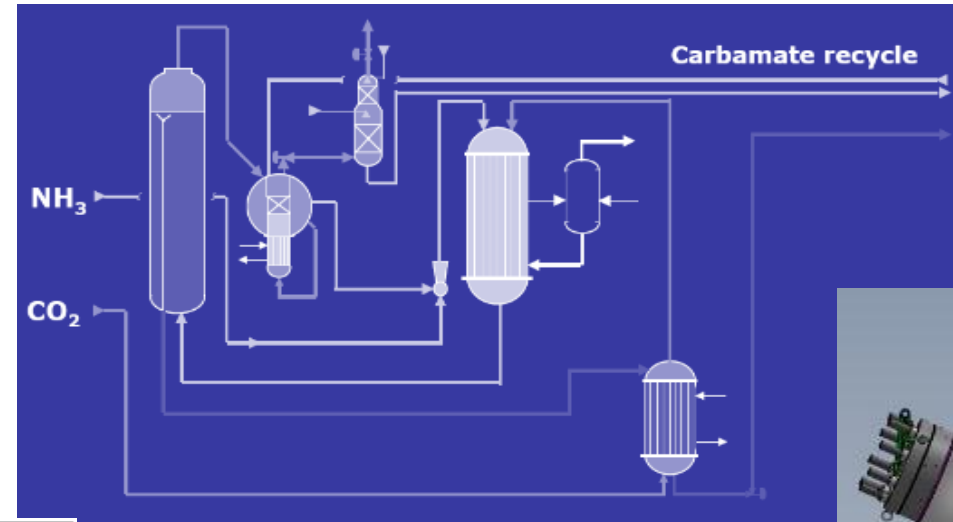
# LIFE-TIME EXTENSION: RETUBING HP SCRUBBER



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## HP SCRUBBER

- M.O.C.: 316L UG
- # tubes: 501 (length: 2770 mm)
- Commissioned: 1996 (26 years in operation)
- Stamicarbon CO<sub>2</sub> stripping plant
- End of life due to:
  - Wall thinning HX-tubes
  - Cross cut end attack



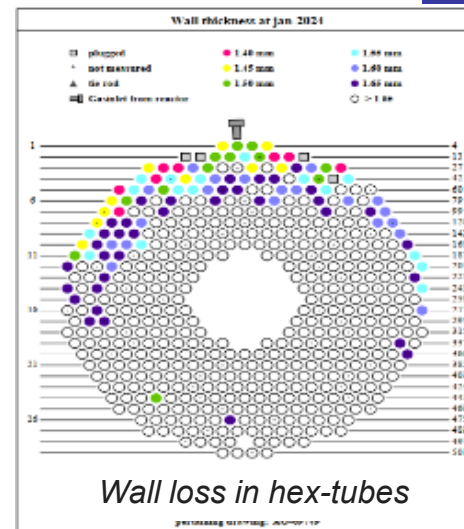
Stamicarbon CO<sub>2</sub> stripping process



HP Scrubber



Severe cross-cut end attack



Retubing to extent life-time > 15 years

# LIFE-TIME EXTENSION: RETUBING HP SCRUBBER



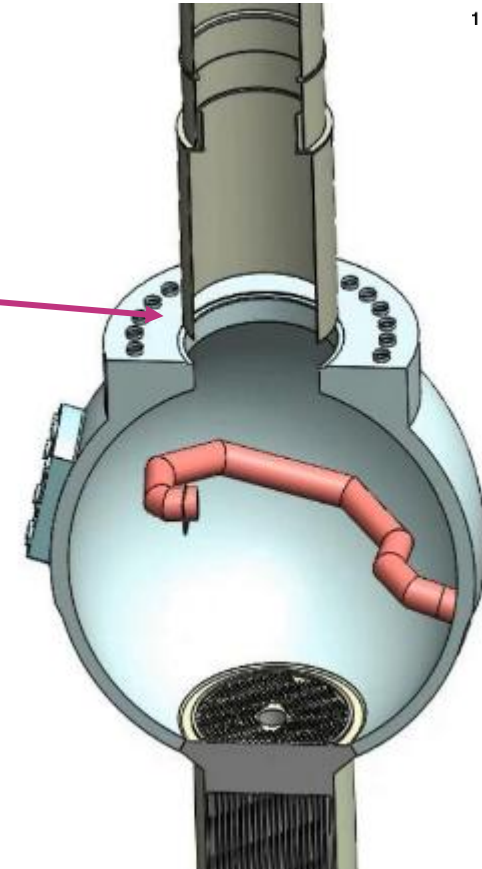
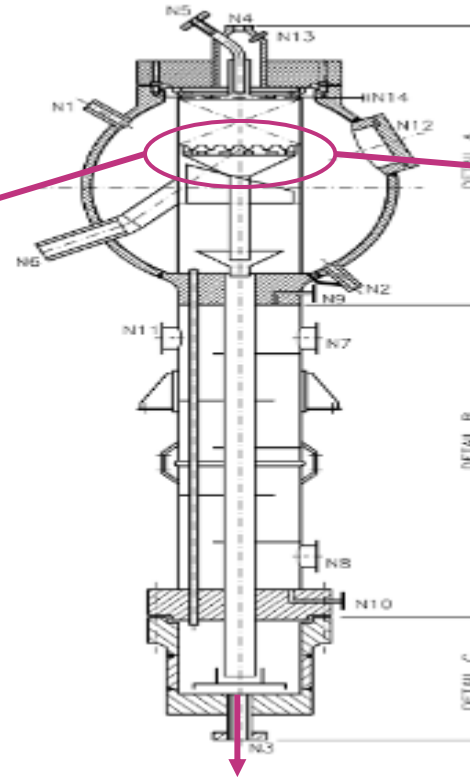
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## Challenges

- Creating accessibility



*Internal cylinder removed*



*Accessibility top tubesheet*

# LIFE-TIME EXTENSION: RETUBING HP SCRUBBER



- Welders / machine qualifications
- Removal internals
- Removal tubes
- Re-installation new tubes
- Welding
- Testing (DPT, UT)
- Re-installation internals
- Boxing up
- Hydro-testing /  $\text{NH}_3$  test
- Total time: 36 days

*Retubing sequence*





# LIFE-TIME EXTENSION: RELINING REACTOR



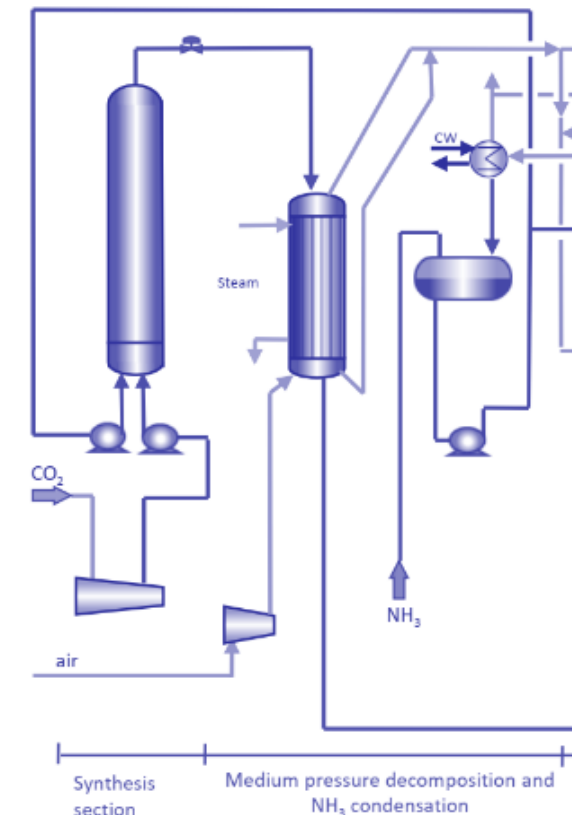
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## UREA REACTOR

- Non-Stamicarbon technology (Press. > Stamicarbon Oper. Pressure)
- Commissioned: 1965
- Liner: Zirconium
- Liner leakages (non-repairable)
- Complete relining
- Stamicarbon proprietary steel
  - Formerly known as Safurex®
  - Easy welding
  - Similar corrosion properties
  - No process changes
    - Oxygen level and Blocking-in
- Refurbishment LDS – New Grooves
- ~55 days from PO to full completion



Life-time extension > 15 years



Plant process scheme



# LIFE-TIME EXTENSION: RELINING REACTOR



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- Stamicarbon Procedure and Sequence Drafting
- Supplied Materials from Stock
- Relining in shop / cut shell
- Removal Zirconium liner
- Refurbishment LDS with new grooves/channels
- Installation new liners
- Fit-up and welding
- NDE testing (DPT)
- Welding both shells together
- Local PWHT
- Hydrotesting and NH<sub>3</sub> leak test
- Installation in structure and commissioning
- Total time: **65 days**



*Sequence relining project*



# NEW EQUIPMENT

# NEW EQUIPMENT (GRASS ROOTS PLANTS)



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## Energy savings

- New design Pool Reactor (ULE –design)
- High efficiency trays
- Lowering passivation air (Proprietary steels)
  - Higher reactor conversion

## Lower CO<sub>2</sub> footprint (Proprietary steel)

- Less inspections and maintenance
  - Proprietary steel (TA interval 6 years)
  - High reliable and stable process
- Unlimited blocking-in, less draining
- No limitations in plant capacity: turndown ratio



*ULE Pool  
Condenser*



*ULE plant*

# NEW EQUIPMENT

TO DATE > 200 HP EQUIPMENT SUCCESSFULLY DELIVERED

- Stamicarbon plants
- Non-Stamicarbon plants
  - HP Stripper in Snamprogetti plants
  - HP Stripper Toyo Plants
  - HPCC (Kettle type) Snamprogetti plants
  - HPCC Toyo plants
    - Process to LP Steam
    - Process to Process
  - Urea Reactor Snamprogetti plants
  - Urea Reactor Toyo plants
  - Urea Reactor Weatherly plants
- Internals
  - High Efficiency trays
  - Liquid dividers



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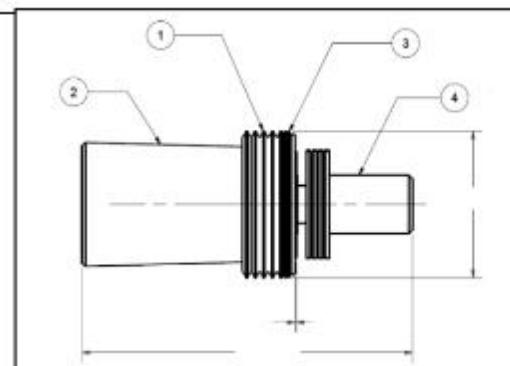
# NEW EQUIPMENT

## INNOVATIONS

- Improved proprietary steel grades
  - STAR
  - Degree
- Composite valves
- Pressure transmitters
- Radar level measurement
- Stripper shell design
- Compact flanges
- Mechanical plugs

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026



*Innovation examples*



05



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# CONCLUSION

# CONCLUDING REMARKS

Stamicarbon provides best solutions to get most of your equipment.

- Continuous Innovations
- Best materials (Stamicarbon proprietary steel grades)
- Control of supply chain
- Partnerships with manufactures and suppliers
- Know-how and experience
- Full life cycle support (cradle to grave)



# THANK YOU



QUESTIONS?