Advancements to MEG Recovery Processes

Bryan Bussell

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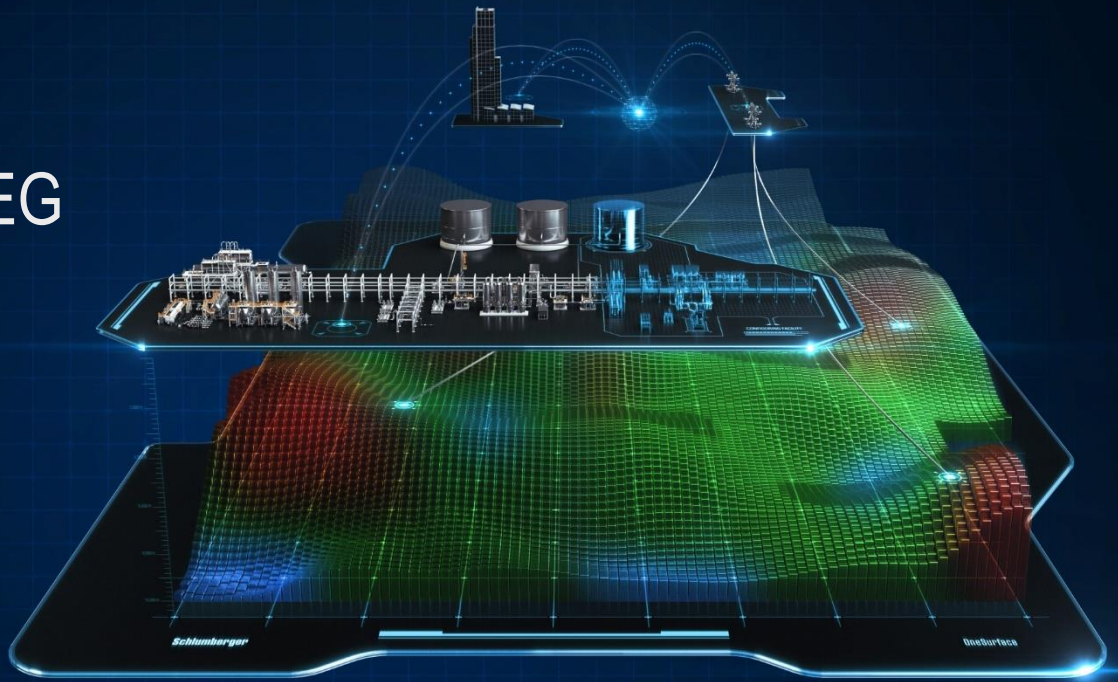
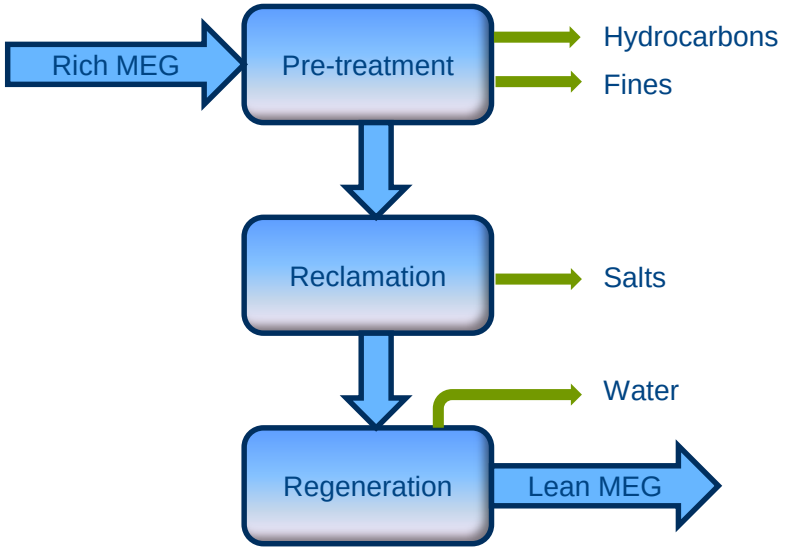


OneSurface

Schlumberger

MEG Recovery Process



Advancing the Technology to Enhance Performance

The challenges:

- **Increase availability,**
  contaminants in the feed, production chemistry can impact performance
- **To reduce operator intervention,**
  complex systems require frequent attendance
- **Optimize module size and weight,**
  one of the largest modules on the vessel

#1 A Fully Integrated Reclaimer

Traditional Technology:

- Separate Flash Separator, Downcomer, Salt Vessel, salt transfer pumps,
- Narrow Downcomer limits salt handling capability,
- Vessel supported from upper deck increasing structural weight
- Typical footprint 60 m^2 deck area

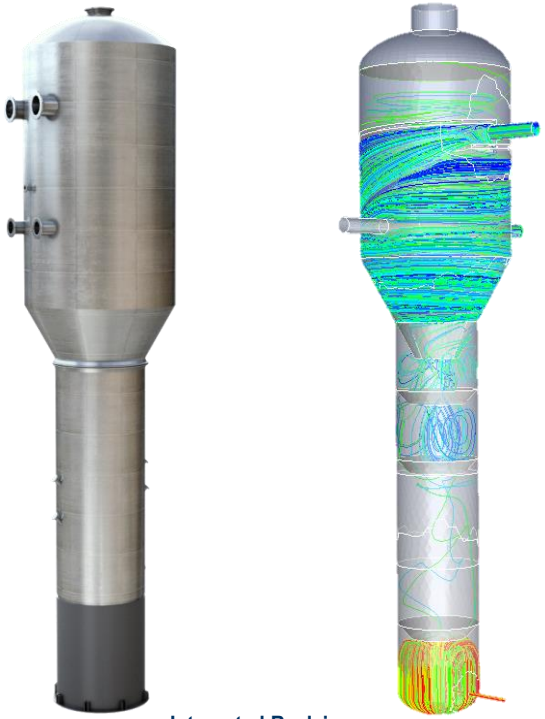
Future Technology:

- Integrated Flash Separator, Downcomer and Salt Vessel
- No pumps,
- Free-standing, skirt mounted from lower deck, reducing structural weight
- Wider downcomer improves performance
- Typically reduces deck space by 35 m^2

Integrated Reclaimer

#1 A Fully Integrated Reclaimer

- Combined flash vessel, downcomer, salt tank and pumps
- Improved performance
- Reduced complexity
- Self-Supporting – reduced module structural support or can be free-standing vessel
- Footprint reduction



Integrated Reclaimer

#2 A Simpler Salt Removal Process

Traditional Technology:

- Duty/Standby Centrifuges, elevated to allow centrate degassing & circulation
- Separate Salt Dissolving Tank, Pumps, Centrate Vessel
- 6 MCC cabinets required
- UCP required
- Large instrument and valve count
- Typical footprint 80 m^2 deck area
- Weight ~25t dry, 35t operating

Future Technology

- Simple, reliable separation of salt from brine
- Separates & dissolves salt in a single vessel
- Eliminates control and MCC cabinets
- Typical footprint ~5 m^2 deck area
- Weight ~5t dry, 6t operating

Desalting Hydrocyclone

#2 A Simpler Salt Removal Process

Desalting
Hydrocyclone

- Replaces the complex desalting centrifuge
- Reduction in pump systems
- No off-skid space requirements (MCC/UCP)
- Increased reliability
- Minimal operational and maintenance attendance
- Minimal deck space required

#3 Optimized Heat Exchanger Systems

Wide Gap Exchanger offers:

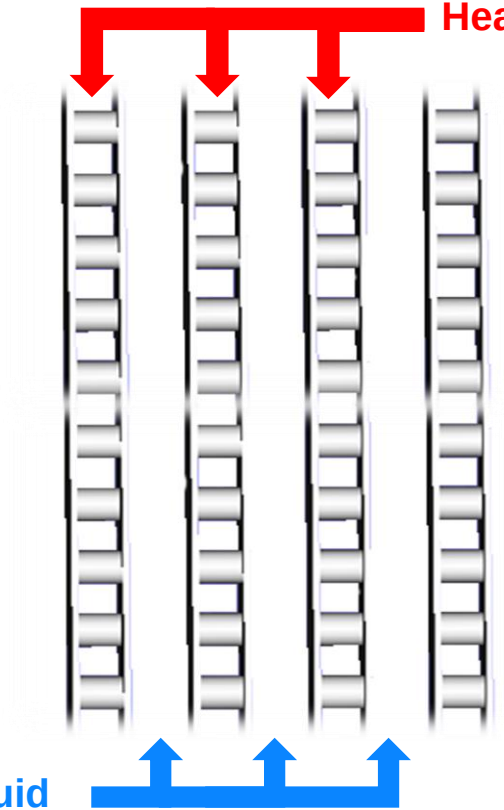
- Reduced footprint
- Increased operational envelope
- Operational cost improvements
- System reliability improved
- Similar resistance to scaling/fouling

Conventional
Spiral Exchanger

Wide Gap Exchanger

#3 Wide Gap Plate Exchanger

- Eliminates solid particle build up
- Even heat distribution
- Higher heat duty through a single unit
- Clean through access for maintenance and cleaning
- Improved drain down



Exchanger cut-through

#4 Filtration in half the Footprint

Precoat Filters, Media Handling Systems

Traditional Technology:

- Precoat Filters, Precoat Vessel, Pumps, Media Bag Handling System, large skips for increased solids loading.
- High operator attendance
- Typical footprint ~200 m^2 deck area. Weight ~100t dry, 140t operating

Future Technology:

- DCF Filters, no large vessels or media handling,
- No nitrogen required for drying
- Typical footprint 80 m^2 deck area
- Weight ~40t dry, 50t operating

Compact Dynamic Crossflow Filters

#4 Filtration in half the Footprint

Dynamic Crossflow Filter

- Substantial space and weight savings
- Replaces conventional pre-coat filtration systems
- Handles wide range of particle size and distribution
- Pristine liquid product
- Minimal MEG losses
- Improved reliability, reduced maintenance
- Minimal operator interface

Schlumberger advancements to the conventional MEG module design