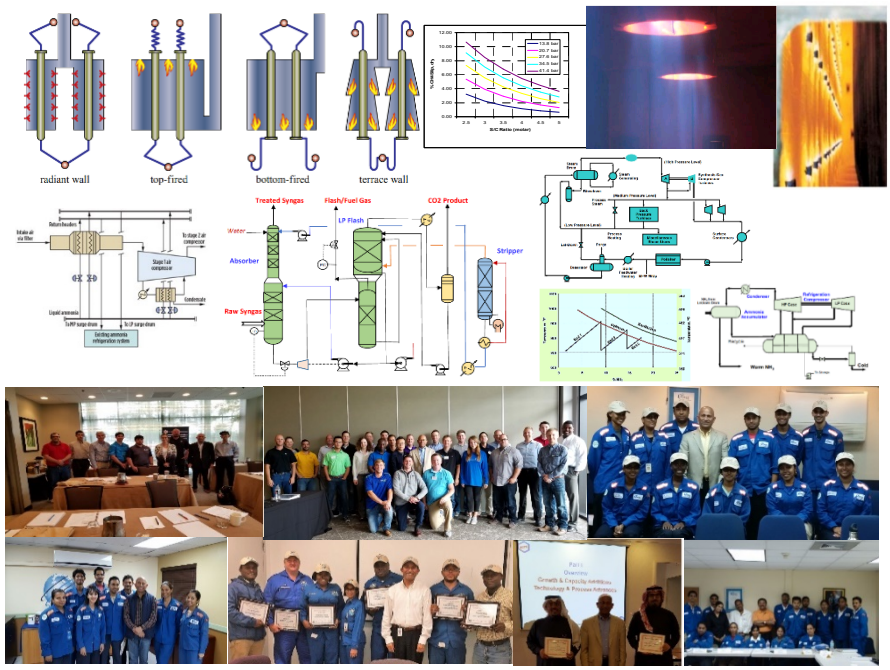

Ammonia Production & Troubleshooting Training

Including

Best Practices
Lessons Learned
Equipment Monitoring Improvements Tips
(Customized, as needed)

SIMPLE PRACTICAL IMPROVEMENTS & TROUBLESHOOTING TIPS

AMMONIA TRAINING SINCE 2006

Ammonia Plant Training Workshop

by Kinetics Process Improvements

OBJECTIVE: ***The comprehensive workshop provides practical insights with a focus on process, reforming, troubleshooting, performance improvements in Ammonia Plants to improve monitoring, maintenance, reliability & safety***

OVERVIEW

- Process & Technology advances
- Process configurations & analysis
- Best Practices/Lessons Learned

PROCESS & TROUBLESHOOTING

- Improve Reforming performance
- Minimizing inerts in MUG
- Minimizing pressure drop
- Improve Compressor capacity
- Improve CO2 removal performance
- Improve Mol. Sieve performance
- Cryogenic Purifier modeling & issues
- Optimize Synloop for max production
- Improve Ammonia Refrigeration
- Improve Steam system
- Process monitoring techniques
- Case studies/Lessons learnt
- Plant Modeling & Evaluation

CATALYST CONSIDERATIONS

- Feed Purification
- Reforming- Pre/Primary/Secondary
- Shift- LTS/HTS
- Methanation
- Ammonia Synthesis

PRIMARY REFORMER

- Thermodynamics and Chemistry
- Reformer Arrangements
- All about Radiant Tubes
- Critical design features
- Key Operating Variables
- Burners, Draft & Combustion
- Air Preheater & considerations
- Controls & Safety Systems
- NOx mitigation- pre- & post treatment
- Startup & Shut down consideration
- Re-harping considerations
- Catalyst evaluation techniques
- Efficiency evaluation & monitoring

AMMONIA SYNLOOP

- Converter types & Loop configurations
- Ammonia Refrigeration
- Optimize loop for max production
- H2 recovery improvements

PERFORMANCE MONITORING

- Primary Reformer Heat Balance, ATE
- Reformer Thermal Efficiency
- Compressor/Turbine Efficiency
- Heat Exchanger/Convection Fouling

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TRAINING FORMAT

- ***Interactive Q&A for practical learning***
- ***What-if scenarios for improvements***
- ***Analysis of Practical Case Studies***
- ***Models to demo Plant sensitivity***
- ***Simple to follow Training material***

TARGET GROUP

- ***Process/Operation Engr's***
- ***Production Sup'dt/Supervisors***
- ***Project/Mechanical Engineers***
- ***Reliability & Safety Engineers***
- ***Business Development/Analysts***

REFERENCES: ***CFI, NUTRIEN, SABIC, CNC, N2000, PLNL, AUM, ADVANSIX, MOSAIC*** *(Trained over 600 candidates with many repeats)*