

16th Topical on Refinery Processing 2013

**Topical Conference at the 2013 AIChE Spring Meeting and 9th
Global Congress on Process Safety**

**San Antonio, Texas, USA
28 April - 2 May 2013 2013**

ISBN: 978-1-62748-455-8

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2013) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2013)

For permission requests, please contact AIChE
at the address below.

AIChE
3 Park Avenue
New York, NY 10016-5991

Phone: (203) 702-7660
Fax: (203) 775-5177

www.aiche.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

REBIRTH OF MANUFACTURING IN THE U.S.: WHAT ARE THE IMPLICATIONS FOR CHEMICAL ENGINEERS?	1
<i>Dan Romasko</i>	
A UNIFIED PID CONTROL METHODOLOGY TO MEET PLANT OBJECTIVES	2
<i>Gregory McMillan, Hector Torres</i>	
FUNDAMENTALS OF MODEL BASED LOOP TUNING	24
<i>James Beall</i>	
DETECTING LOSS OF FLAME IN OIL REFINERY FIRED HEATERS USING ADVANCED PRESSURE DIAGNOSTICS	39
<i>John P. Miller, Randy S. Stier</i>	
ABQAIQ PLANT VIRTUAL PLANT RTO IMPLEMENTATION	69
<i>Kuang-Yao Brian Peng</i>	
OPTIMIZATION OF AN INDUSTRIAL POWER PLANT	77
<i>Ravi Nath</i>	
CRUDE UNIT OVERHEAD SYSTEMS: PROCESS CONFIGURATIONS TO MITIGATE FOULING	96
<i>Andrew W. Sloley</i>	
IMPORTANCE OF FIELD TESTING LIQUID DISTRIBUTORS	97
<i>German A. Luna-Mejias</i>	
EVALUATING INDIVIDUAL INSTRUMENT READINGS AND POTENTIAL ERRORS IN THE ANALYSIS OF MONITORING DATA	117
<i>G. T. Polley, Elvis K. Tamakloe, Yash-Vardhan Kapoor</i>	
HOW TO GET THE BEST FROM YOUR PREHEAT TRAIN – AN UK REFINERY BASED CASE STUDY	119
<i>Edward Ishiyama, Simon J. Pugh, G. T. Polley, James Kennedy, D. Ian Wilson, Alison Ogden-Quin, Graham Birch</i>	
SULPHUR TECHNOLOGY TUTORIAL – CONVENTIONAL WISDOM AND INNOVATIVE FRONTIERS	131
<i>David Stevens, Angela Slavens</i>	
SUCCESSFUL SULFUR UNIT STARTUPS	132
<i>Doug Cicerone</i>	
SULFUR PIT EXPLOSION PROTECTION BY DEFLAGRATION VENTING	144
<i>Bill Dewees, Angela Slavens, Shadi Al Adel, Vincent Yih, Dan Samani</i>	
CONSIDERATIONS OF TEMPERATURE MEASUREMENT IN THE CLAUS THERMAL REACTION FURNACE	176
<i>Steve Croom</i>	
UNDERSTANDING TODAY'S LIMITING FACTORS ON REACTION FURNACE LININGS	189
<i>Andy Piper, Jeff Proctor</i>	
PILOT AND FULL-SCALE APPLICATION OF TECHNOLOGIES FOR MERCURY CONTROL	197
<i>Noah Meeks</i>	
ACID TUNNELING VS ACIDIZING : A CASE STUDY OF RUDATAIN OILFIELD-KUWAIT	198
<i>Adel Elsharkawy, Mohamed Al-Hadher</i>	
SUSTAINED CASING PRESSURE MODELING AND WELL INTEGRITY	199
<i>Tony Rocha-Valadez, A. Rashid Hasan, C. Shah Kabir, Sam M. Mannan</i>	
EVALUATION OF PARTICLE GROWTH IN AN ELECTROCHEMICAL FLUIDISED BED REACTOR	201
<i>Emmanuel Ehirim</i>	
DEBOTTLENECKING GAS DRYERS AND DESICCANT ADSORBERS	202
<i>Benjamin A. Schmitt, Michael Ekholm</i>	
DESIGN CONSIDERATIONS FOR EFFECTIVE LIQUID REMOVAL IN SUCTION DRUMS	204
<i>Kanti Patel</i>	
RENEWABLE FEEDSTOCK FOR STEAM CRACKERS: CATALYTIC UPGRADING OF CRUDE TALL OIL (CTO) INTO BIO-NAPHTHA	219
<i>Jinto Anthonykutty, Juha Linnekoski, Antero Laitinen, Ali Harlin</i>	
HIGH EFFICIENCY ETHYLENE CRACKING FURNACES	221
<i>Rajaram Ramesh, Marco W. M. Van Goethem</i>	

MODERNIZE CONTROL FUNCTIONALITY, EASY STEPS TO START PROCESS OPTIMIZATION	235
<i>Laurie Ben, James Beall</i>	
PARALLELED DOUBLE-EFFECT DISTILLATION: SIMULATIVE CASE STUDIES	253
<i>Jinsheng Sun, Pei Wang, Hong Gao, Fan Wang</i>	
IN SITU TRANSESTERIFICATION OF JATROPHA CURCAS SEED PARTICLES WITH ALKALINE PHASE TRANSFER CATALYST	267
<i>Subbarao Duvvuri, Shuhaimi Mahadzir, Sintayehu Hailegiorgis</i>	
CATALYZED-ASSISTED MANUFACTURE OF OLEFINS (CAMOL): UPDATED FOR USE IN NAPHTHA SERVICE	268
<i>Maximilian Walter, Suzanne Rech</i>	
EXTENDING FURNACE RUN LENGTH AND COIL LIFE BY OPTIMIZING DECOKING	269
<i>Vinod Mishra, James Brigman</i>	
SOLVING OPERATIONAL PROBLEMS IN NAPHTHA SPLITTER	270
<i>Giorgio Franceschetti, Carolina Ponce De Leun, Flavio Weissheimer, Rafael Henrique Camparin</i>	
SMARTPROCESS® APPLICATION STRATEGY ACHIEVES FASTER AND MORE EFFICIENT CONTROL OF AN ETHYLENE COMPLEX	277
<i>Patrick Truesdale</i>	
ETHYLENE FURNACE HIGH TEMPERATURE IMAGING CAMERAS TO MONITOR BURNER FLAMES ,TUBE TEMPERATURE AND TUBE FAILURE DETECTION	286
<i>Tod Canty</i>	
STRAIGHTEN UP! NON-LINEAR COMPENSATION USING FEED FORWARD CONTROL	294
<i>Barbara Hamilton</i>	
ADSORPTION OF CO2 BY ALKALINE ACTIVATED CA-AL2O3-SIO2 MATERIAL	295
<i>Naim Faqir, Reyad Shawabkeh</i>	
PRESSURE GAUGES: HIDDEN DANGER OR VISIBLE SAFETY	296
<i>Jeff Placek</i>	
CFD SIMULATION OF LAMINAR LIQUID FILM CONDENSATION ON THE ENTRANCE REGION OF VERTICAL PLATE	305
<i>Bo Sun, Botan Liu, Chunjiang Liu</i>	
IMPROVING FIRED HEATERS USING CFD	320
<i>Ashutosh Garg</i>	
ASSESSMENT OF AN EULERIAN-EULERIAN MULTIPHASE CFD FRAMEWORK FOR A THREE DIMENSIONAL MODELING OF A TRICKLE BED REACTOR IN COUNTER-CURRENT OPERATION	345
<i>Sebastian Moreno Cardenas, Vivian Passos De Souza, Adriana De Souza Ferreira, Carlos Alberto Araujo Monteiro, Jose Roberto Nunhez, E. M. Matos</i>	
USE OF COLD FLOW MODELING AND CFD FOR NEW PRODUCT DEVELOPMENT	346
<i>Zhanping Xu, Pengfei Chen</i>	
EVALUATION OF THE DISPERSION COEFFICIENT AND RESIDENCE TIME DISTRIBUTION IN PACKED BED USING COMPUTATIONAL FLUID DYNAMICS	347
<i>Hadjira Iddir, Quan Yuan</i>	
PERFORMANCE ENHANCEMENT & PROFITABILITY IMPROVEMENTS OF REFINERY OPERATIONS USING 3-D FLOW MODELING TECHNIQUES	348
<i>Praveen Kumar, Amarvir Chilka, Damodaran Vedapuri</i>	
PROFITABLY RECOVER NGLS, HYDROGEN AND ETHYLENE/PROPYLENE FROM REFINERY FUEL GAS	356
<i>Guang Lee, Jie Yu, Sudhir Golikeri, Benjamin Klein</i>	
EXPLOITING HYDROGEN PLANT TO IMPROVE REFINERY MARGINS	369
<i>Sanjiv Ratan</i>	
OPTIMIZED COMBUSTION OF HYDROCARBON AND HYDROGEN FUEL MIXTURES USING CORIOLIS-BASED MEASUREMENTS	378
<i>Andrew J. Verdouw</i>	
SETTING THE REVAMP BASIS: WHAT IS CURRENT OPERATION?	379
<i>Andrew W. Sloley</i>	
THE DESIGN AND REVAMP OF COOLING WATER NETWORKS	380
<i>Graham T. Polley</i>	
WATER / WASTEWATER OPTIMIZATION METHODS FOR INDUSTRIAL SYSTEMS	411
<i>Joseph W Guida</i>	
BALANCING ACT - SIMPLE TECHNIQUES FOR STEAM HEADER CONTROLS	412
<i>Barbara Hamilton</i>	

THERMAL FLUIDS: THE KEY TO OVERALL SITE INTEGRATION	413
<i>Graham T. Polley</i>	
AN ETHYLENE PLANT START-UP WITH TOTAL RECYCLES: DYNAMIC SIMULATION OF DE-ETHANIZER TRANSIENT BEHAVIORS	427
<i>Ha Dinh, Shujing Zhang, Jian Zhang, Qiang Xu</i>	
A PROCESS-INTEGRATION FRAMEWORK FOR ABNORMAL SITUATION MANAGEMENT (ASM): A SYSTEMATIC APPROACH WITH APPLICATION TO QATAR'S INDUSTRIAL NEEDS AND OPPORTUNITIES	428
<i>Fadwa T. Eljack, Mahmoud El-Halwagi, Qiang Xu</i>	
EFFECT OF CROSSWIND ON FLARING COMBUSTION EFFICIENCY AND SUBSEQUENT INCREASE IN 8-HR OZONE CONCENTRATION IN THE HOUSTON-GALVESTON OZONE-NONATTAINMENT AREA	429
<i>Ziyuan Wang, Jian Zhang, Qiang Xu, Thomas C. Ho</i>	
CFD SIMULATIONS AND SIMPLE CORRELATIONS TO PREDICT FLARE PERFORMANCE UNDER VARIOUS OPERATING CONDITIONS	430
<i>Kanwar Devesh Singh, Preeti Gangadharan, Daniel H. Chen, Helen H. Lou, Tanaji Dabade, Xianchang Li</i>	
MODELING DATASET SELECTION IN MULTIVARIATE STATISTICAL PROCESS CONTROL	431
<i>Zheng Li, M. Nazmul Karim</i>	
CONTINUOUS DATA MINING TO SUSTAIN ADVANCED PROCESS CONTROL AND PROCESS CAPABILITY	432
<i>John Antanies</i>	
AN ADVANCED CONTROL PLATFORM FOR SMALLER PLANTS	433
<i>John Keenan</i>	
A CASE STUDY OF THE USE OF INTEGRATORS IN MODEL PREDICTIVE CONTROL	434
<i>Chad Segura</i>	
NON-INVASIVE CLOSED LOOP STEP TESTING TECHNOLOGY FOR MPC APPLICATIONS	435
<i>Quinn Zheng, Michael Harmse, Hong Zhao, John Campbell</i>	
AN AFFORDABLE NON-LINEAR APC TECHNOLOGY FOR DISTILLATION COLUMNS USING FIRST PRINCIPLE MODELS	436
<i>Bert Plummers, Edwin M. C. J. Weetink</i>	
HYDROCRACKING OF AROMATICS AND NAPHTHENO-AROMATICS	447
<i>Pedro Rojas, Gilbert F. Froment</i>	
MODELING AND SIMULATION OF CYCLIC OPERATIONS APPLIED TO TRICKLE BED HYDROTREATERS	448
<i>Jinwen Chen, Mohsen Hamidipour, Faical Larachi</i>	
ACTIVATION OF HYDROPROCESSING CATALYSTS: AN IN-DEPTH UNDERSTANDING OF DIMETHYLDISULFIDE (DMS) DECOMPOSITION CHEMISTRY ON HDP CATALYSTS DURING THEIR ACTIVATION VIA SULFIDING	449
<i>Francis Humblot, Vijay Srinivas</i>	
HYDROTREATING REACTION OPTIMISATION USING CARBON NANOTUBES SUPPORTED NIMO AND MO BASED CATALYSTS IN REFINING CRUDE OIL	463
<i>Aman Dhanani</i>	
UTILIZATION OF LOW-GRADE HEAT AND PROCESS INTEGRATION IN OXY-COMBUSTION COAL BASED POWER PLANTS	474
<i>R. Soundararajan, Truls Gundersen</i>	
ENHANCING ATMOSPHERIC AND VACUUM DISTILLATION UNITS' ENERGY EFFICIENCY USING NEW HEN RETROFIT APPROACH	476
<i>Abdulaziz Al-Najjar, Mahmoud Bahy Noureldin</i>	
ADIABATIC COMPRESSION AS AN OPEN HEAT PUMP FOR PROCESS INTEGRATION WITHIN OXY-COMBUSTION COAL-BASED POWER PLANTS	488
<i>Chao Fu, Truls Gundersen</i>	
IDENTIFYING HEAT RECOVERY PATHS TO BE USED IN IMPROVING THE ENERGY EFFICIENCY OF PRE-HEAT TRAINS	490
<i>G. T. Polley, Elvis K. Tamakloe</i>	
ENERGY AND CAPITAL SAVINGS IN DME PROCESS DESIGN AND INTEGRATION	508
<i>Mansour Entir, Elmahboub Edreder</i>	
DEVELOPMENT OF HEAT EXCHANGERS FOR USE AS REPLACEMENT PLATES	509
<i>G. T. Polley, Enrique Vasquez Ramirez</i>	
NONLINEAR APC SOLUTION FOR POLYPROPYLENE PLANTS	531
<i>Brian Lines, Hanif Poorkar, Mohammad Ali Al-Zahrani, Kambiz Sefidrou</i>	

TWO-LEVEL ALGORITHM FOR GASOLINE BLEND PLANNING USING INVENTORY PINCH POINTS TO REDUCE NUMBER OF BLEND RECIPES	541
<i>Pedro Castillo Castillo, Vladimir Mahalec</i>	
HYDROTREATER OPTIMIZATION BY DIRECT ONLINE CONTROL OF THE ACCUMULATED PRODUCT TANK SULPHUR.....	543
<i>Bhaskar V Iyer, John Macgowan, Huang Shu, Vimal Doraj, Pradeep Appasani</i>	
REAL-TIME MONITORING OF TRACE GAS CONCENTRATIONS IN SYNGAS	544
<i>Gerald Sprachmann, Rene Gutmann, Jens Herbig, Klaus Winkler, Armin Hansel</i>	
REAL-TIME OPTIMIZATION OF A GASOLINE RUN-DOWN HEADER BLENDING OPERATION	545
<i>Shashi Mistry, Craig Mangan, Jim Eshpeter, Sanjay Sharma</i>	
SUSTAINABILITY IN INDUSTRIAL WATER TREATMENT SYSTEM	563
<i>Vina Arjomandnia</i>	
OVERVIEW OF BOILER WATER TREATMENT AND ASSOCIATED WASTES.....	564
<i>William Moore</i>	
GENETIC ALGORITHM APPROACH FOR OPTIMAL CONTROL OF AIR EMISSIONS FROM AN OIL REFINERY	565
<i>Mohammad S. Ba-Shammakh</i>	
PRETREATMENT STUDY ON HIGH CONCENTRATION CAUSTIC SLUDGE WASTEWATER OF CATALYTIC GASOLINE.....	573
<i>Qiu Li-Ping</i>	
HYDROCRACKER REACTOR TEMPERATURE CONTROLS FOR GREATER SAFETY, RELIABILITY AND PROFITABILITY	582
<i>Allan G. Kern</i>	
HYDROGEN GENERATION FROM RESIDUUM.....	590
<i>Girish Srinivas, Steven Gebhard, Robert Copeland, Jeff Martin</i>	
HEAVY OIL UPGRADING VIA SLURRY HYDROCRACKING	598
<i>Andy Towarnicky</i>	
TOOLS TO MAXIMIZE RESIDUUM CONVERSION.....	599
<i>Stephen Warnock, Eloy Flores, Hsiang Yee Lai</i>	
FCC RISER HYDRODYNAMICS IMPROVEMENT USING SIMULATION TOOLS	600
<i>Lev Davydov, Reza Mostofi</i>	
MOLECULAR BASED ASSAYS FOR THE PRACTICAL CORRELATION AND PREDICTION OF CRUDE OIL AND PETROLEUM FRACTION PROPERTIES.....	602
<i>Chau-Chyun Chen, Stephen Dziuk</i>	
PETROBRAS IN-HOUSE PROCESS SIMULATOR AS A STRATEGIC ADVANTAGE.....	604
<i>Renato A. Barbosa, Jacques Niederberger, Letícia C. Santos, Carlos A. D. Moura, Joyce S. S. Aires, Lara S. S. Teixeira, Victor R. R. Ahon, Vinicius M. Silva, Carmen E. Vargas, José A. Silva, Anna E. B. Zobolli, Cláudio A. S. Aquino, Ellen P. Silva</i>	
RELIABILITY & AVAILABILITY MODELING AS A DESIGN TOOL	606
<i>Peter Nick</i>	
EFFECT OF PROCESS CONDITIONS ON FILM TEMPERATURE IN FIRED HEATERS.....	648
<i>Arturo Morales-Fuentes, Martín Picon-Nunez</i>	
TROUBLE-SHOOTING AND OPTIMIZING ETHYLENE PLANT COOLING WATER NETWORKS BY USING ADVANCED PROCESS SIMULATION.....	656
<i>Swapnil Pathak, James Brigman</i>	
PROESA® TECHNOLOGY: THE PLATFORM TO ENABLE BIOMASS BASED INDUSTRY	669
<i>Dario Giordano, Delane Richardson</i>	
COMPOSITE FUELS PRODUCTION FOR COMBUSTION	670
<i>Harold N. Knickle, Adam Duszakiewicz</i>	
ALCOHOL TO JET FUEL	678
<i>Geoffrey Fichtl</i>	
TRANSPORTATION FUELS FROM THE CATALYTIC HYDRODEOXYGENATION OF BIOMASS PYROLYSIS OIL.....	679
<i>Lance Baird, Tim Brandvold, Steve Lupton, Tom N. Kalnes, Stanley Frey</i>	
DETAILED HYDROCARBON CHARACTERIZATION OF DIESEL FRACTIONS FROM CO-HYDROPROCESSING CANOLA OIL AND HVGO BLENDS.....	680
<i>Jimwen Chen, Rafal Gieleciak, Hena Farooqi</i>	
OPERATIONAL EXCELLENCE-ESSENTIAL FOR SUCCESS IN THE 21ST CENTURY.....	691
<i>John Mitchell</i>	
APM/ASSET PERFORMANCE MANAGEMENT: MORE THAN THE SUM OF ITS PARTS.....	731
<i>Paula Hollywood</i>	

GOING BEYOND ASSET MONITORING FOR IMPROVED RELIABILITY: REMOTE ASSET MONITORING AND ALERTS	732
<i>Aaron Crews, Nikki Bishop</i>	
EFFECTIVE AND OPTIMIZED ASSET STRATEGIES THROUGH COMBINING CONDITION DATA AND DIAGNOSTICS	738
<i>John Renick</i>	
RELIABILITY MONITORING FOR ADVANCED PROCESS CONTROL IMPLEMENTATIONS	739
<i>J. Ben Rodin</i>	
REMAINING LIFE ASSESSMENTS OF REFINERY COKR FURNACE TUBES USING OMEGA SIMULATIONS	747
<i>Gerald Wilks</i>	
Author Index	