



# Cracking Furnace Workshop

May 2-4, 2018

Omni Hotel-Houston

PRACTICAL INSIGHT WITH CASE STUDIES & CRACKING HEATER MODEL DEMO

TRAINING SINCE 2006

## Cracking Furnace Workshop

by Kinetics Process Improvements

**OBJECTIVE:** 3-days of comprehensive workshop provides practical insight with an improved understanding of the fundamentals, operations and performance monitoring of Cracking furnaces which will assist attendees to effectively apply them in making better decisions in regular operations & maintenance

**Kinetics Process Improvements, Inc.**

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### PRACTICAL INSIGHTS\*

- Ethylene Process Overview
- Cracking Chemistry & Thermo
- Feedstock- design & operation
- Critical Design Features
- Coil & TLE Systems
- Coking & Mitigation
- Run-length improvements
- Firebox/Convection Sections
- Key Operating Variables
- Burners, Draft & Combustion
- Refractory/insulation
- Controls & Safety Systems
- NOx mitigation
- Startup & Shut down
- Yield model
- Cracking heater model
- Coking model
- Economic model
- Capacity Improvement options
- Efficiency Improvements
- New Developments

\*See Training outline on next page

### TARGET GROUP

- Operations Engineers
- Production Sup'dt/Supervisors
- Process/Tech Service Engineers
- Mechanical Engineers
- Project Engineers
- Maintenance/Inspection Engineers
- Planning Engineers
- Plant Management

### Workshop Includes

- Training material, B/Fast & Lunch

### SPECIAL WORKSHOP FEATURES

- Cracking Heater & Coking models demo for better understanding of operating variables with feed flexibility
- Practical Case Studies- Failures & Improvements
- Simple Practical techniques for Furnace monitoring
- Interactive discussion of plant troubleshooting
- Economic model to demo operating economics

E-mail Registration form to: [process@kpieng.com](mailto:process@kpieng.com)

# TRAINING OUTLINE

## Ethylene Process Overview

- ✓ Key historical technology developments
- ✓ Ethylene Production Process Schemes
- ✓ Feedstock Flexibility Considerations
- ✓ Ethylene Plant Capacity trends
- ✓ Environmental Challenges?

## Cracking Chemistry & Thermo

- ✓ Cracking fundamentals
- ✓ Key differences in liquid & gas cracking
- ✓ Key variables affecting yields

## Feedstock- Design & Operation

- ✓ Feedstock considerations
- ✓ Impact of Feedstock on design and operation
- ✓ Key Feedstock contaminants

## Critical Design Features

- ✓ Coils types & their arrangements
- ✓ Firing arrangements (floor/wall)
- ✓ APH or Economizer

## Coil & TLE Systems

- ✓ Short/Medium & Long Residence time coils
- ✓ Coil type- impact on Yield, TMT and R/length
- ✓ Coil selection considerations
- ✓ TLE types & design considerations for different feedstock
- ✓ Coil & TLE Metallurgies
- ✓ Coil Supports & Transfer line valves

## Coking & Mitigation

- ✓ Coke Formation Mechanism
- ✓ Key Coking Variables
- ✓ Coking & Run-length
- ✓ Coking Inhibitors, products, economics
- ✓ De-coking Options & Techniques

## Firebox/Convection Systems

- ✓ Coil Arrangements
- ✓ Burners & Firing Arrangements
- ✓ COT Considerations
- ✓ Convection Coil Configurations

## Burners & Combustion Controls

- ✓ Burner design considerations
- ✓ Burner arrangements (Floor & Wall)
- ✓ Burner performance for NOx
- ✓ Burner controls requirements

## Refractory/Insulation

- ✓ Design & Selection Criteria
- ✓ Heat loss Estimate

## Furnace Operations & Maintenance

- ✓ Key controls for safe operation
- ✓ Burner management
- ✓ Safe Start-up & Shut down considerations
- ✓ Emergency shut down considerations

## NOx Mitigation

- ✓ Factors affecting NOx formation
- ✓ Ultra-Low NOx Burners
- ✓ Post NOx mitigation options (SNCR & SCR)

## Simulation Model Demo

- ✓ Yield estimates model to demonstrate sensitivity of different variables
- ✓ Firebox modeling demo
- ✓ Coke laydown estimate to demonstrate TMT,  $\Delta P$  & Run length

## Economic Model

- ✓ Maximize profit for market conditions
- ✓ Economics of cracking coil upgrade

## Retrofit Options

- ✓ For Capacity & Efficiency Improvements
- ✓ Economic determination of retrofits

## New Developments

- ✓ Alternate routes for olefins production
- ✓ Trend towards Mega Ethylene plants
- ✓ Improvements in Coil arrangements
- ✓ Improved Inspection/ Maintenance

# IMPORTANT INFORMATION

## COURSE VENUE\*

**Omni Houston Hotel at Westside**  
13210 Katy Fwy, Houston, TX 77079  
Phone: (281) 558-8338

## REGISTER TO CONFIRM

E-mail Registration form to: [process@kpieng.com](mailto:process@kpieng.com)

## COURSE SCHEDULE

**Training dates: May 2, 3 & 4, 2018**

**Course Timing:** 8 am until 4 pm on days# 1 & 2; Day# 3: 8 am until 1:30 pm

## CANCELLATION & REFUND POLICY\*

Cancellation by Feb 28, 2018	-	100% refund
Cancellation until March 30, 2018	-	90% refund (10% Processing Fee)
Cancellation after March 30, 2018	-	(No refund)- Enroll a substitute

*\*KPI reserves the right to change venue or cancel the workshop with insufficient registration. Registrants will be notified in this unlikely scenario with full refund*



**KPI Inc.**, 16000 Park Ten Place, Suite 903, Houston, TX 77084  
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## COURSE INSTRUCTORS

**VK Arora**, a registered professional Chemical Engineer in Texas with degree from IIT and 35 years of diversified hands-on practical experience in Olefins and Syngas technologies including strategic planning and execution of major Petrochemicals projects.

He holds two patents- one for NO<sub>x</sub> reactor system in furnaces and other for Ammonia process improvement. He led the design, start-up and performance test of the first world scale CATOFIN PDH plant for Saudi location.

He worked in operating Ethylene & Dehydro plants of Shell JV-NOCIL and SABIC. He also worked with various Licensors including KTI, KBR, CB&I/Lummus. He has been deeply involved in design, engineering, start-up & troubleshooting of Refinery and Petrochemicals Furnaces including Reformers and Cracking Heaters with experience in gas & liquid cracking.

Since 2006, he has been with KPI where he spearheaded the development and execution of a world-scale Propylene derivatives complex to produce Acrylic Acid, Oxo-Alcohols and Acrylic Esters for Saudi location. As part of KPI, he has led more than two dozen project feasibilities and revamps for major Petrochemicals and Chemicals projects globally.

Published & presented more than a dozen Technical Papers including a Chapter on 'Propane Dehydrogenation to produce Propylene' in McGraw-Hill "Handbook of Petrochemicals Production Processes".

**Dr. Sam Narayanan**, a Chemical Engineer, with more than forty years of hands-on experience and an industry specialist in Olefin Pyrolysis Furnaces including modeling yields, Process design, Troubleshooting and Operations management in Europe, North America and South-East Asia.

He is a Ph.D. in Chemical Engineering from IIT followed by Post-Doctoral work at Technical University of Delft. He made significant contributions in the development of coil designs with improved olefins yields using the Pilot plant work for Industrial applications at Gent University. He holds five patents related to process improvements in Cracking Furnaces and several publications including Co-cracking.

He worked as specialist in Ethylene Furnace design groups at KTI, Stone & Webster, KBR and Westlake Ethylene Plants. He has been conducting many training courses in Cracking furnaces.

### REFERENCES

**The Companies who attended our Training workshops and several of them attended multiple times:**

- |            |          |
|------------|----------|
| • SABIC    | RELIANCE |
| • PETRONAS | WESTLAKE |
| • IEPL     | ENIP     |
| • ELEME    | METHANEX |
| • MHTL     | CFI      |
| • PCS      | CNC      |
| • AUM      | PLNL     |
| • AMPCO    |          |

*\*We have conducted many 'on-site' custom training*

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# Registration Form

## Cracking Furnace Workshop May 2-4, 2018 | Omni Hotel, Houston

*Welcome at a special rate*

WORKSHOP FEE

EARLY BIRD- \$1499 (before Feb 28)

\*Fee: is per attendee and includes Lunch, Coffee breaks and training notes

**BEFORE FEB 28**

**REGULAR**

\$1499

\$1699

### ATTENDEE DETAILS

Last Name\* \_\_\_\_\_ First Name\* \_\_\_\_\_ Mi \_\_\_\_\_  
 Title \_\_\_\_\_ Company\* \_\_\_\_\_  
 Address \_\_\_\_\_  
 Town/City \_\_\_\_\_ State \_\_\_\_\_ Zip code \_\_\_\_\_  
 Phone\* \_\_\_\_\_ Fax \_\_\_\_\_ E-mail\* \_\_\_\_\_  
 Your Job Function:  Engineering  Operations  Maintenance  Environmental  Other (specify)  
 Your Interest:  Process  Troubleshooting  Operation  Furnace selection  Other (specify)

### MY CRACKING FURNACE

Type & Configuration \_\_\_\_\_  
 Feed Mix \_\_\_\_\_  
 Feed rate \_\_\_\_\_  
 Any plant issues- you may want to discuss \_\_\_\_\_

### PAYMENT METHODS

Please check appropriate box:  Check  Money Order  PO  Bill Company (Pay to "Kinetics Process Improvements")

Credit Card  VISA  MasterCard  AMEX Expiration Date: \_\_\_\_\_ CVV: \_\_\_\_\_

Card #: \_\_\_\_\_ Cardholder Name: \_\_\_\_\_ Amount: \_\_\_\_\_

Billing Address: \_\_\_\_\_

Signature\* \_\_\_\_\_

Date\* \_\_\_\_\_

**Please send the completed form via e-mail ([process@kpieng.com](mailto:process@kpieng.com)), or Fax (+1-832.565.9360), or check payment by mail (KPI Inc., 16000 Park Ten Pl, Suite# 903, Houston, Texas 77084, USA)**

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