

# CENTRIFUGAL COMPRESSOR OPERATION AND MAINTENANCE

## April 20 - 23 at Aston Tropicana Hotel, Bandung

---

### OBJECTIVE

- Give general description of air compression theory to optimize compression process efficiently
- Give fundamental knowledge of compressor principle and air state of condition in compression process
- Give fundamental structure of compressor to ensure safe operating installation in all condition can be achieved.
- Give the knowledge to condition compressor operation and its maintenance to avoid the same failure. Be able to modify operating condition.
- Give the knowledge to determine disturbance source, be able to think systematically to analyse root cause of compressor failure

### COURSE OUTLINE

#### 1. Fundamental of thermodynamic

- Compression process and work
  - Isothermal
  - Adiabatic
  - Polytrophic

#### 2. Fundamental theory of compressor

- Compressor development history
- Compressor classification
- Compressor work cycle
  - Theoretic cycle
  - Semi theoretic cycle
  - Actual cycle
- Centrifugal compressor
- Head, losses and efficiency
- Characteristic at each speed
- Compressor installation

#### 3. Dynamic compressor

- Performance and condition definition
- Type of centrifugal compressor
  - High casing
  - Horizontal split casing
  - Vertical split casing
- Package assembly
- Multi casing unit
- Centrifugal compressor application
- Characteristic of centrifugal compressor
- General detail of centrifugal compressor
  - Impeller
  - Diaphragm
  - Inter stage packing
  - Rotor assembly
  - Casing
  - Journal and thrust bearing
  - Shaft seals
  - Seal and lubrication system
  - Gas cooling

- Pressure ratio and centrifugal characteristic curve
- Control of capacity
  - Load curve
  - Control method
  - Surge control
  - Parallel operation
  - Unloading start

- Inner gear air centrifugal compressor
  - Modulation pressure control
  - Dual step capacity control
  - Auto dual control

- Axial flow compressor

#### 4. Gas turbine compressor

- Centrifugal compressor
- Axial compressor
- Compressor performance

#### 4. Pressure loss at gas pipe installation

- Definition and accuracy
- Factors to estimate friction loss
- Pressure gradient in pipe
  - General equation of various gas
  - Natural gas piping equation
  - Vacuum piping equation
- Fitting pressure loss
- Flexible pipe pressure loss

#### 5. Fundamentals of piston compressor

- Gas compression usage
- Compression method
- Type of compressor
- Compressor principles
- Standard, symbol, and definition
- Measurement unit
- Basic thermodynamic theory
  - Compressibility
  - Multi stage compressor
  - Power consumption
  - Positive displacement compressor
  - Isothermal basis
  - X-factor
  - Compressibility correction
  - Discharge temperature
- Application of theory
  - Reciprocating compressor
  - Clearance control
  - Clearance control and variable compression ratio
  - Effect of heat specific ratio to horse power
  - Peak horse power and break horse power
  - Effect of compressibility
  - Effect of altitude
- Reciprocating compressor
  - Definition

# CENTRIFUGAL COMPRESSOR OPERATION AND MAINTENANCE

## April 20 - 23 at Aston Tropicana Hotel, Bandung

- Characteristic
- Classification
- Cylinder
- Valve
- Cylinder cooling
- Non-cooled cylinder
- Air cooling cylinder
- Capacity control
- Manual control
- Main automatic control
- Load depletion to start
- Types of control
- Constant speed control
- Suction side throttling
- Variable speed control

### 6. Installation, operation and maintenance

- Installation
  - Placement
  - Suction condition
  - Foundation
  - Piping
  - Electric cabling
- Field testing
  - Commissioning
  - Running test
- Operation
  - Responsibility
  - Recording
  - Cleaning
  - Lubrication
  - Safety
  - Initial start
  - Capacity control
  - Spare parts
  - Trouble shooting
- Inspection and maintenance
  - Preventive maintenance
  - Predictive maintenance
- **Operation**
  - Procedure to run and to stop compressor
  - Capacity control device
  - Hazard prevention
  - Automatic operation
- **Maintenance**
  - Preliminary inspection
  - Operating condition inspection
  - Preventive maintenance
  - Predictive maintenance
  - Troubleshooting

### WHO SHOULD ATTEND

1. Mechanical & Rotating Engineer/Supervisor/Foreman
2. Plant Maintenance Engineer/Supervisor/Foreman
3. Production Operation Engineer/Supervisor/Foreman
4. Process Engineer/Supervisor
6. Everybody or professional who wants to broaden knowledge or gain benefit from this course

### Notes:

1. Venue may change with notification
2. The course will be in Bahasa Indonesia
3. Text & Handouts English & Bahasa Indonesia

### REGISTRATION



#### **PT. Fiqry Jaya Manunggal**

Jl. Kalibata Tengah No. 35C

Jakarta Selatan 12740

Tel.: (62)21 - 7919 8450, 8454

Fax: (62)-21-7997 907

E-mail: [fjm@centrin.net.id](mailto:fjm@centrin.net.id) and [divisittraining@fiqry.com](mailto:divisittraining@fiqry.com)

Website: <http://www.fiqry.com>

Contact: Deden, Abdul Rohim, Eka Rehni and Data Gumilar

#### Terms & Conditions:

1. A confirmation letter will be sent to you upon receiving your registration
2. Any cancellation must be in writing and received by 7(seven) working days prior to the course date, otherwise full fee will be chargeable to your account