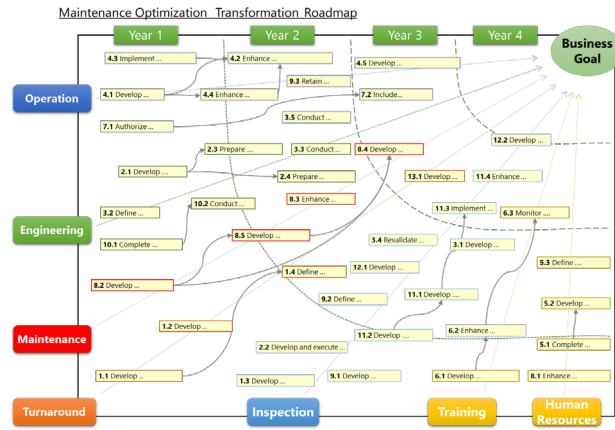
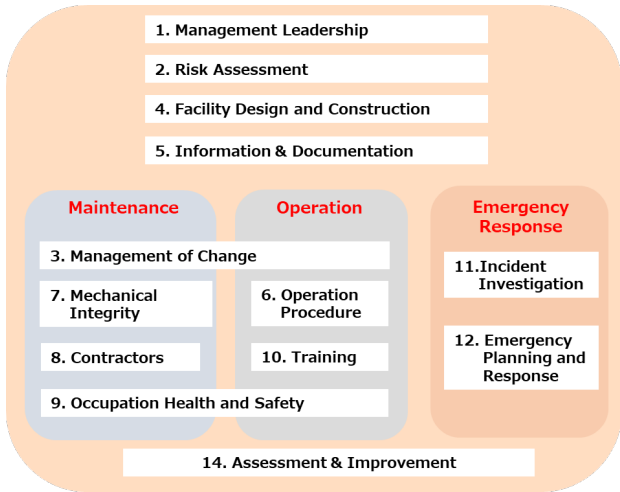


# Technical Assistance & Training

[Return to OE Service menu](#) 

Over the past several decades, JGC Group has conducted various engineer training programs and technical assistance programs at plant site and remote locations. Many of our clients have achieved considerable improvements in their employee skills and plant operations which significantly contribute to the profitability and efficiency of their business.



Maintenance Optimization Road Map

**Service Menu**

- ◆ **Technical Assistance Service**
  - Onsite Assistance (Residential/On-call)**
  - Asset & Operation Due Diligence**
  - OPEX Assessment**
  - Strategic Operational Improvement Assistance**
- ◆ **Training Service**
  - Training and Competency Management Services**

## Asset & Operation Management Framework



Onsite Assistance



Training Class and Technical Seminars





# Operational Excellence Services

## Technical Assistance & Training

Onsite Assistance  
(Residential/On-call)



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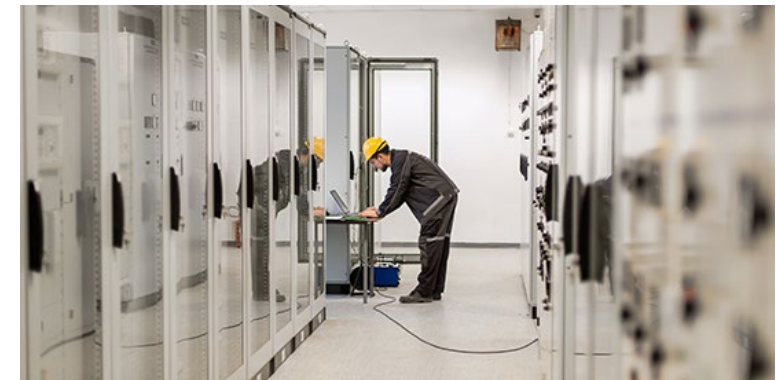
# Onsite Assistance (Residential/On-call)

## Do you have any of these issues?

- ☹️ **Lack of experienced engineers and technicians**
- ☹️ **Need specific expertise**
- ☹️ **Need technical problem-solving teams when in trouble**

## Our Solutions

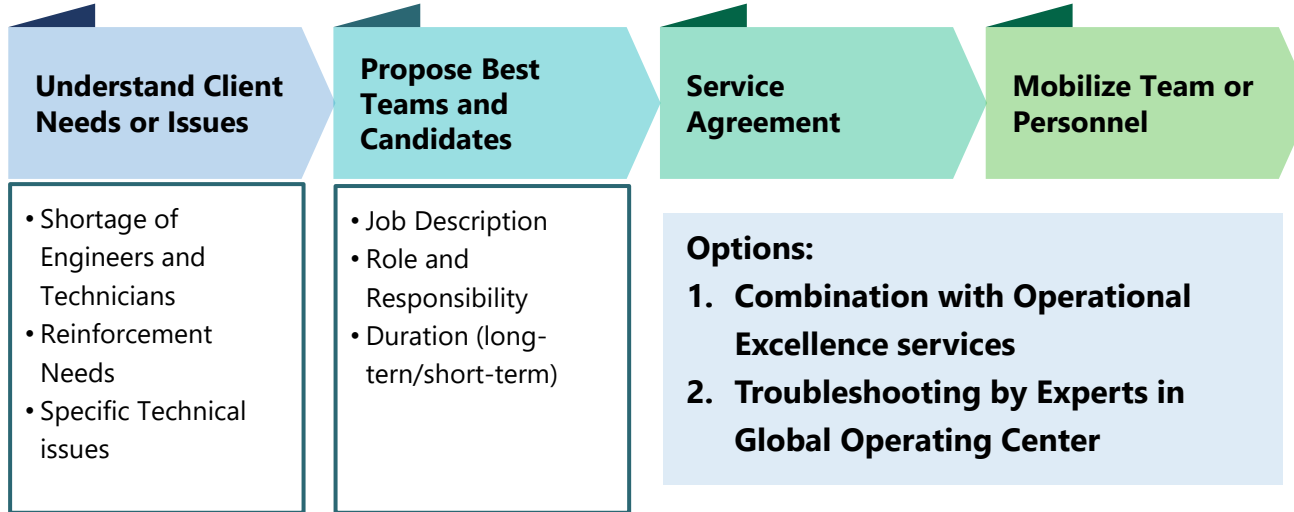
- Dispatch customized teams, experts, and operation and maintenance staff to the operation site to meet the client's needs.
- Select the most suitable resources from JGC network for client's situation over a long period of time or even within a short period of time.
- The dispatched teams and crew will work as an integrated resource with client's operating organization, or work as an independent task force team.



# Onsite Assistance (Residential/On-call)

[Return to Technical Assistance & Training menu](#) 

## Our Approach



## Our Strengths

- A wide variety of global human resources networks allow flexible use of experienced and knowledgeable experts
- Cooperation with specialized teams at headquarters with expertise from various EPC and Operational Excellence services
- Standby by various experts who can solve problems quickly

## Our Experiences

**30+**

**Years in Global Market**

Middle East  
North Africa  
West Africa  
Southeast Asia

**Various Type of Facilities**

Gas Processing  
Oil Producing  
FPSO  
Integrated Water, Steam, Power Plant, etc.





# Operational Excellence Services

## Technical Assistance & Training

### Asset & Operation Due Diligence



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# Asset & Operation Due Diligence

## Do you have any of these issues?

- ☹️ **Considering investment for operating assets**
- ☹️ **Audit for operation and maintenance of operating assets**

## Focus Areas

- **Facility design and construction** in accordance with recognized and generally accepted engineering practices
- Implementation of **Process Hazard Analysis**
- Established **Operation Manual**
  - ✓ Startup and Shutdown
  - ✓ Normal operations
  - ✓ Emergency Operations
- Deployment of **safe work practices**
- **Written procedures** for maintenance, inspections and testing
- Rigorous **quality assurance** systems
- **Training and competency** management system

## Asset & Operation Management Framework

1. Management Leadership

2. Risk Assessment

4. Facility Design and Construction

5. Information & Documentation

### Maintenance

3. Management of Change

7. Mechanical Integrity

8. Contractors

9. Occupation Health and Safety

### Operation

6. Operation Procedure

10. Training

### Emergency Response

11. Incident Investigation

12. Emergency Planning and Response

14. Assessment & Improvement

# Asset & Operation Due Diligence

Return to Technical Assistance & Training menu 

## Example of JGC's PSM Assessment Checklist

No.	Requirement	Guideline for Compliance	Observation	Opportunities / Comments
5.0	In accordance with the schedule set forth in paragraph 3.1) of this section, the employer shall complete a compilation of written process safety information before conducting any process hazard analysis required by the standard. The compilation of written process safety information is to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. This process safety information shall include information pertaining to the hazards of the highly hazardous chemicals used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process.	1. A procedure to manage PSI defined in the paragraph 2.1 through 2.3 should be developed. - Information applicable as PSI should be clearly defined in the procedure. - Management process of PSI, including roles & responsibilities of owners should be developed. - PSI should be periodically updated according to Management of Change processes. (Refer to Element-10)	Observations found during the interview will be described in this column.	
5.1	Information pertaining to the hazards of the highly hazardous chemicals used or produced by the process, including: i. Toxicity data; ii. Flammability data; iii. Reactivity data; iv. Corrosivity data; v. Thermal and chemical stability data; and vi. Hazardous effects of inadvertent mixing of different materials that could foreseeably occur. Note: Safety data sheets meeting the requirements of 29 CFR 1910.1200(g) may be used to comply with this requirement to the extent they contain the information required by this subparagraph.	1. F... and ...genists TLV: Threshold Limit Value TWA: Time Weighted Average STEL: Short Term Exposure Limit TLV-C: Threshold Limit Value Ceiling IDLH: Immediately Dangerous to Life or Health 2. Material Safety Data Sheet (MSDS) should be used to include the information. - All MSDS should be supplied from manufacturers and compiled. 3. When a contractor brings highly hazardous chemicals to the plant then the contractor shall show MSDS to the employer and obtain approval.	Improvement opportunities identified during the interview will be described in this column.	
5.2	Information pertaining to the technology of the process.	1. Most of technology information should be developed during the EPC phase and delivered from the EPC contractor.		

### Element 5: Information & Documentation

## Our Strengths

- Extensive, worldwide EPC project and maintenance experiences
- Experience in investment for operating assets
- Professional Operation & Maintenance Engineer Teams
- Asset & Operation Management (AOM) system based on OSHA PSM
- Experience in Due Diligence (DD) and audits for operating plants.

## Our Experiences

O&M Due Diligence

3+ Cases

Audit for O&M

5+ Cases



# Operational Excellence Services

## Technical Assistance & Training OPEX Assessment



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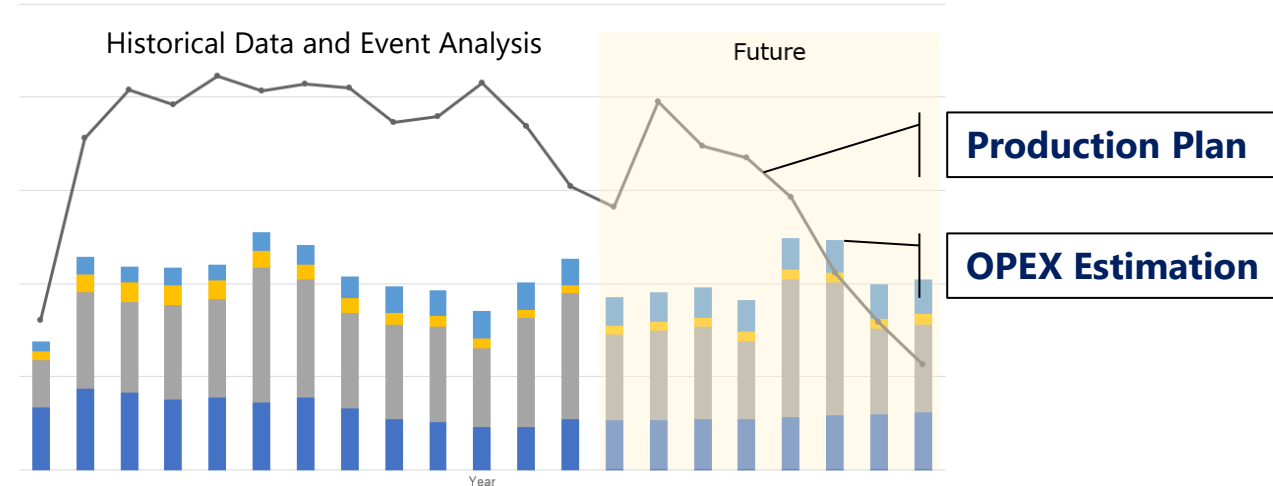
# OPEX Assessment

## Do you have any of these issues?

- ☹️ **Estimating OPEX to assess the feasibility at business planning phase**
- ☹️ **Verifying future OPEX in operation phase**
- ☹️ **Identifying improvement opportunities on operation and maintenance costs**

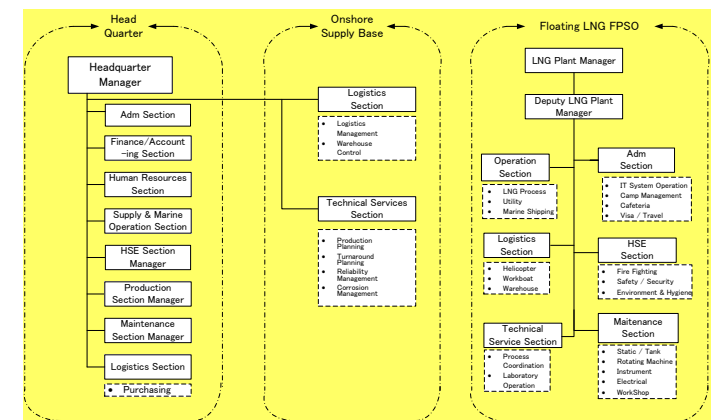
## Our Solution

- Estimate or Assess OPEX by experts who understand the processes and regions at business planning phase
- Analyze historical OPEX data from the operation phase
- Conduct a case study to identify the optimized OPEX in either of the above cases



OPEX Estimation based on Production Plan

O&M Strategy Development as the basis of OPEX (e.g., Organization Chart)

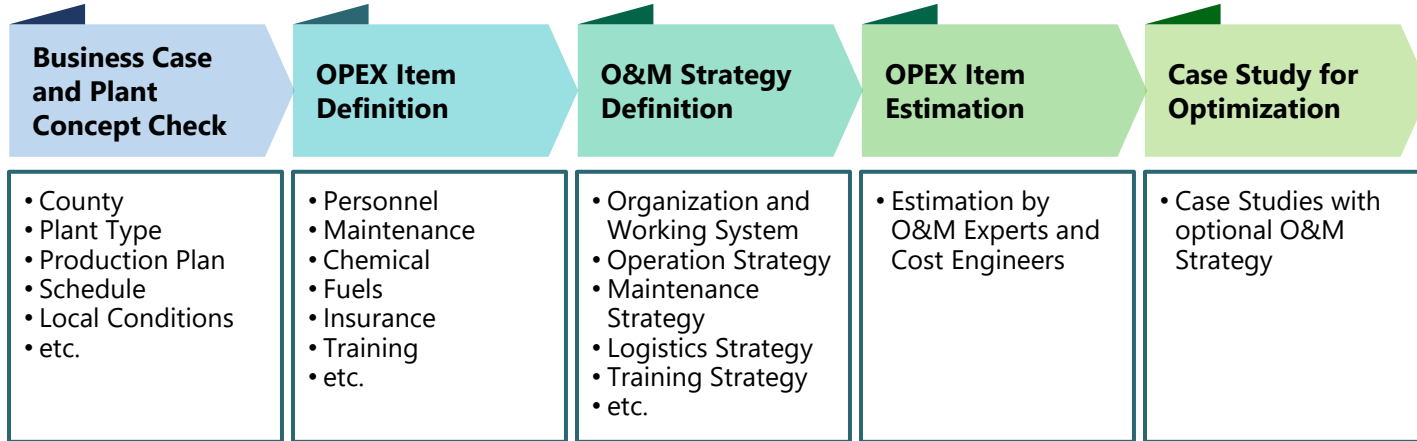


# OPEX Assessment

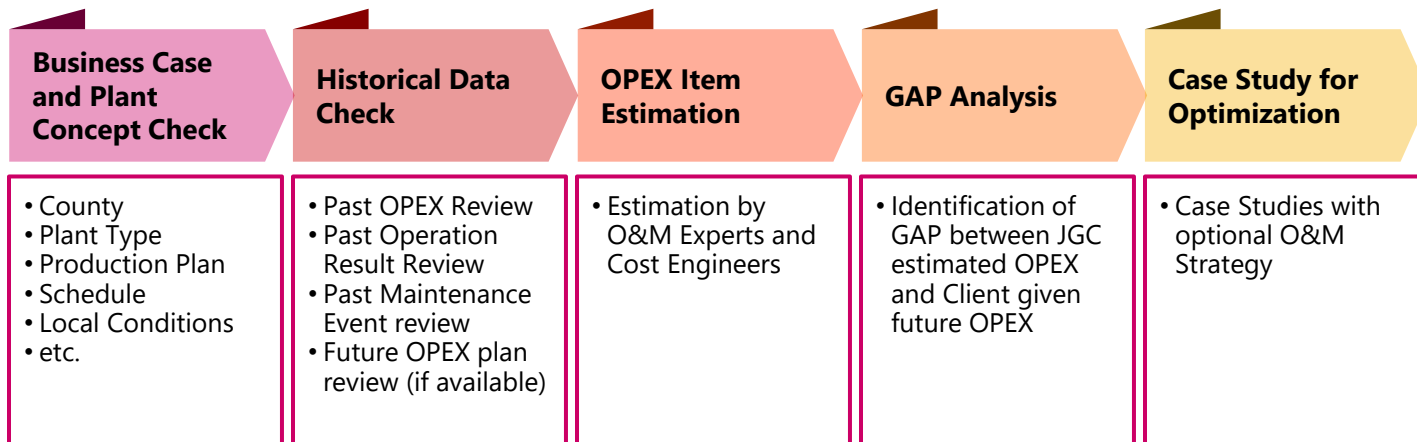
[Return to Technical Assistance & Training menu](#) 

## Workflow & Results

### Business Planning Phase



### Operation Phase



## Our Strengths

- Assess using the latest cost information accumulated through plant EPC projects worldwide
- Estimate by experts with plant process, operation and maintenance knowledge
- Provide output tailored to client needs and business phases
- Advise improvement opportunities by experts

## Our Experiences

**10+**  
**Projects in 10 years**

**Various Type of Facilities**

Gas Processing  
LNG Terminal  
Onshore LNG  
FLNG  
FPSO, etc.



# Operational Excellence Services

## Technical Assistance & Training

Strategic Operational Improvement Assistance



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# Strategic Operational Improvement Assistance

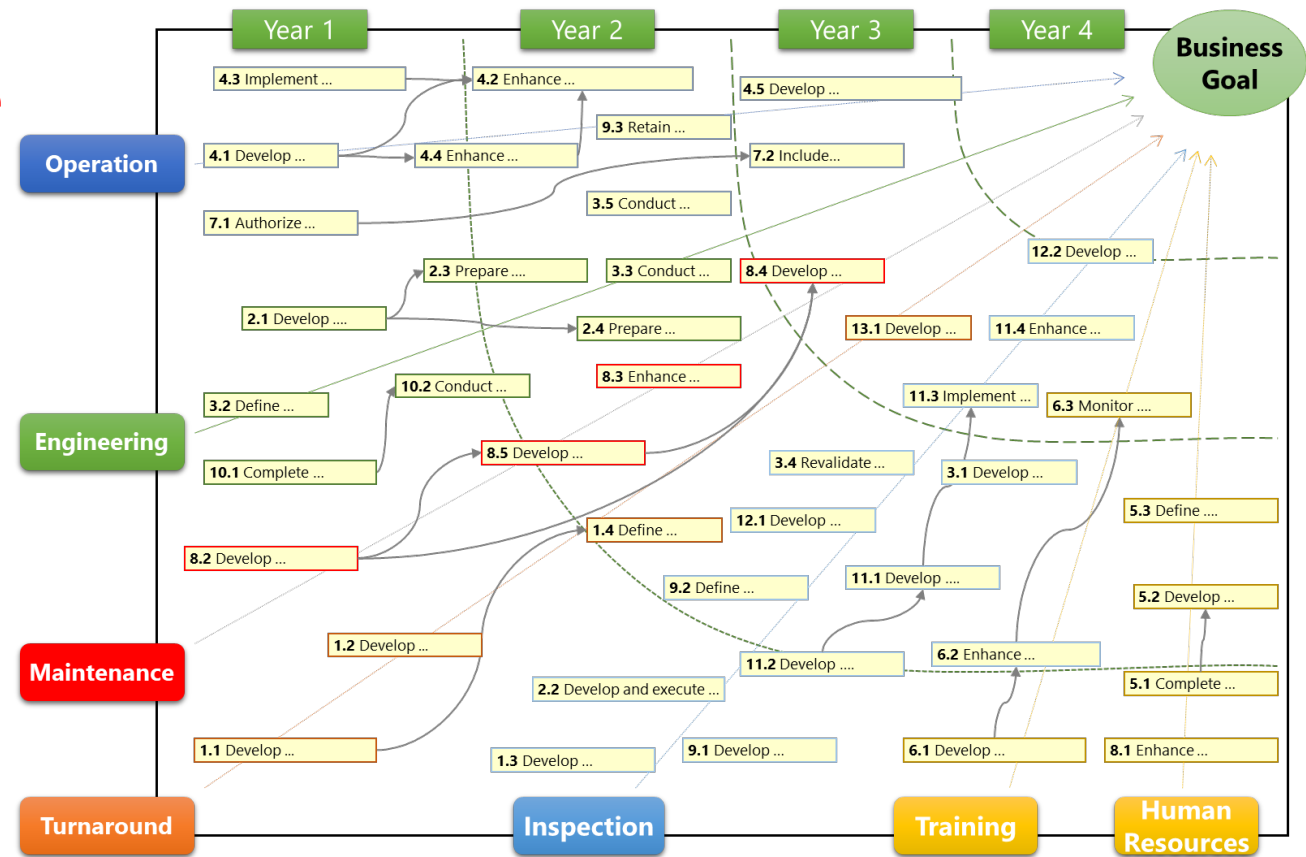
## Do you have any of these issues?

- ☹️ Increasing Unplanned Plant Outages
- ☹️ Increasing Maintenance Costs along with Age
- ☹️ Lack of Experienced Maintenance Staff
- ☹️ Representing Improvements Visually

## Solution

- SWOT Analysis of operation and maintenance organization
- Middle and long-term operation and maintenance plan including turnaround plan
- Setting Key Performance Indicators (KPI)
- Root Cause Analysis (RCA) for equipment failure and countermeasure development
- Training focusing on younger staff and skill/knowledge transfer from experienced staff

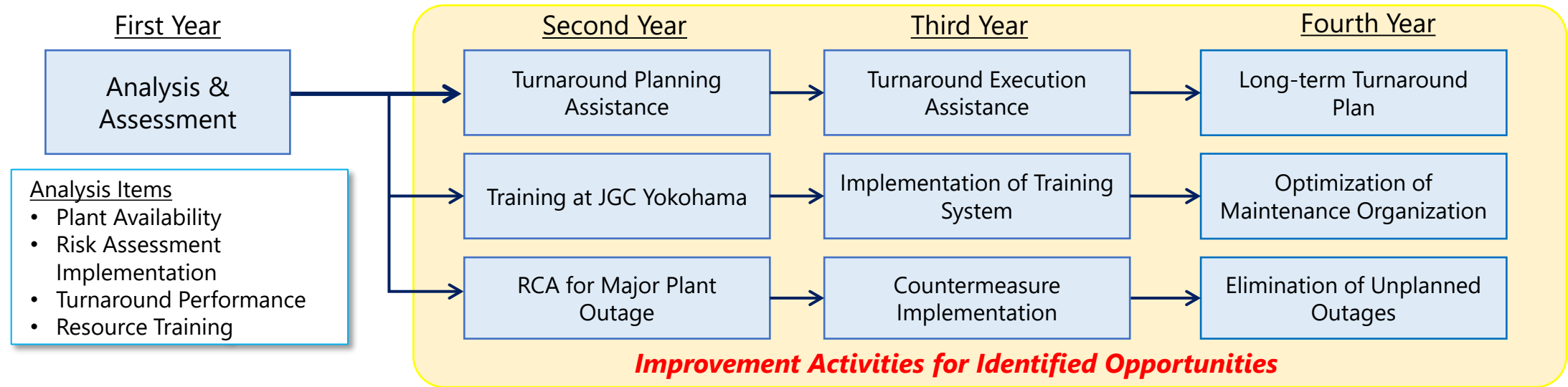
## Strategic Operational Improvement – Transformation Roadmap



# Strategic Operational Improvement Assistance

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Technical Assistance  
& Training menu 

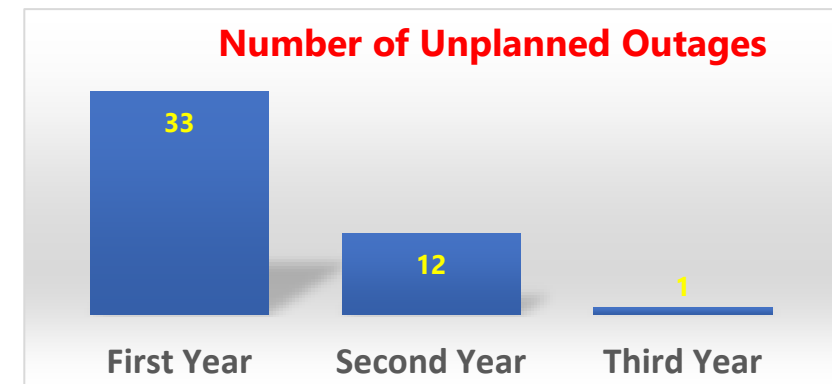
## Long-Term Strategic Operational Improvement Assistance Program



## Our Strengths

- Professional Operation and Maintenance Engineer Teams
- Global resources
- Practical application of Risk Based Work Selection process such as RCM and RBI
- Rigorous turnaround readiness review methodology
- Many experiences in turnaround planning
- Engineering tools and experienced analytical staff for RCA

## Our Experiences Chemical Plant Case in Indonesia







# Operational Excellence Services

## Technical Assistance & Training

Training and Competency Management Services



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# Training and Competency Management Services

## Do you have any of these issues?

- ☹️ **Catch up to the latest technical trends**
- ☹️ **Refresh knowledge on essential technical matters**
- ☹️ **Specific training linked to technical issues**  
(e.g., troubleshooting, performance improvement)
- ☹️ **Struggling to fill gap between actual and required skill set**

## Training Services

- Organize a tailor-made training program  
(e.g., Asset Management, Process Safety Management, TA Management, Plant Life Extension, etc.)
- Deliver training courses and seminars (at site or on-line)
- Implement competency management program
- Dispatch experts to site;
  - for hands-on training
  - for troubleshooting and performance evaluation with follow-up technical sessions



# Training and Competency Management Services

## Key Categories / Themes for Technical Training

### Engineering & Project

P&ID  
Hydraulic Design  
Process Engineering  
Dynamic Simulation Technology  
Plant Safety Design and Risk Management  
HAZOP  
Material Selection  
Piping Engineering  
Pressure Vessel, Exchangers and Tanks  
Energy Efficiency Improvement  
Pump and Compressor  
Instrument Engineering  
Safety Instrumented Systems  
Electrical Engineering  
Civil Engineering  
Welding Technology  
Paint Technology  
Corrosion under Insulation  
Latest Non-Destructive Testing Technology  
Vibration Control  
Mechanical Handling  
Commissioning  
Operations Readiness & Assurance

### Operation & Maintenance

Process Safety Management  
Reliability, Availability, Maintainability (RAM)  
Reliability-Centered Maintenance  
Risk-Based Inspection  
Plant Life Extension Program  
Fitness for Service  
Simulation Technology for Plant Troubleshooting (CFD)  
Turnaround Management  
Computerized Maintenance Management System  
Computerized Inspection Management System

## Our Strengths

- Professional Engineering Experts run our Training Services.
- Training programs are updated in line with latest technical trends and are applicable to actual implementation.
- In association with and funded by Japanese governmental support, such as JCCP (Japan Cooperation Center, Petroleum).
- Continuous follow-up and support are provided by our overseas affiliates and local partners.

## Our Experiences

**Technical seminars**

**20+ in past 5 years**

**Trainees**

**500+ in past 5 years**

# Case Study : Customized Training for FCC Unit Reliability Improvement

Return to  
Technical Assistance  
& Training menu



## Background:

*A refinery in Southeast Asia was struggling with stable operation of RFCC unit from the start after EPC project*

## Attendees:

*Maintenance and inspection departments and technical service departments at the plant site and headquarters*

## Objective:

*To share information on various problems that occur in RFCC, analysis methods to solve them, and technical advice from refractory vendors.*

*Workshops are also held to share examples of problems encountered in their RFCC and to discuss how to plan the next turnaround maintenance.*

## Reference Services

Process Safety Management Seminar - JGC Headquarter 2016 for E&P Company in Japan

Plant Life Cycle Management Seminar - JGC Headquarter 2017 for E&P Company in Japan

Process Safety Management Seminar - Online 2021 for E&P Company in Japan

FCC Unit Integrity & Reliability Improvement Seminar– Online 2022 for Refinery in Middle East

FCC Unit Integrity & Reliability Improvement Seminar– Online 2023 for a Refinery in Southeast Asia

O&M Engineering Training – JGC Headquarter 2023 for a Petrochemical Plant in Middle East

## Examples of customized training programs

### Material Degradation and Remaining Life Assessment (Day 1)

1. FCC Unit Process Overview
2. Material Selection and Degradation
3. Remaining Life Assessment Methodologies
4. Experience of Material Degradation and Current Issue (by Client)

### Corrosion Management and Inspection Data Management (Day 2)

1. Corrosion Management Program
2. Corrosion Under Insulation
3. Inspection Data Management System
4. Corrosion Management Program and Improvement Plan (by Client)
5. Workshop - Corrosion Management Program (All members)

### Fitness for Service and Major Replacement Work (Day 3)

1. Fitness for Service Technology
2. Major Replacement Work
3. Advanced Repair Technology
4. Past Experiences and Future Plans (by Client)
5. Workshop – Major Replacement and Repair Planning and Execution (All members)

### Reliability of Critical Mechanical Components (Day 4)

1. Refractory (Vendor)
2. Expansion Joint (Vendor)
3. GRP Piping
4. Future Actions and Wrap Up (All members)