

A large offshore oil rig is shown at night, illuminated by its own lights. A large crane is visible at the top, and the rig's complex structure of pipes and scaffolding is clearly visible. The rig is situated in the middle of the ocean, with waves visible in the foreground.


# Process safety training for oil & gas production

Reduce the number of process safety incidents with  
close to reality hands-on and simulator based training



**MAERSK**  
TRAINING





*"Recognisability makes a difference. There will be people who in the classroom can look at the diagram and read the procedure and still be in doubt. When they go through the drawings on the facility, they grasp it immediately".*

*Claus Kofod Jørgensen,  
OIM*

## Process safety training for oil & gas production enhances both process safety and performance

*Reducing the number of process related incidents is not merely a question of spending more money on training; it's really about spending them on the right training.*

Process safety incidents are a part of every oil & gas operators reality. Ask yourself how many process safety related shutdowns or production losses you had last year, and what the impact on your bottom line would have been if just half of them had been avoided? Or imagine what a 1% higher output from your mature fields would do to your bottom line? Maersk Training has developed a process safety training programme for oil & gas production that can help you improve both process safety and performance.

### THE POTENTIAL FOR REDUCING PROCESS SAFETY INCIDENTS INCREASES SUBSTANTIALLY WHEN YOU TRAIN CLOSER TO REALITY

Today the human factor is responsible for a large number of process safety incidents, but with our training programme your personnel will acquire the necessary skills and competencies to be able to handle daily challenges and critical events in a safe and effective way. They will train closer to their everyday reality, using our production facility mockup and advanced Kongsberg K-Spice Learn process simulators.

### OUR TRAINING PROGRAMME WILL REDUCE THE NUMBERS OF PROCESS RELATED INCIDENTS

All personnel will get the same understanding of the process flow and procedures, and why operating discipline is important in handling daily challenges and critical events. The training programme consists of 6 different modules targeted at offshore production and operation and maintenance teams:

- **Introduction to Offshore Oil & Gas Production**
- **Oil & Gas Production – Basic Course**
- **Process Safety – Hands-on Training**
- **Oil & Gas Production – Operator Course**
- **Oil & Gas Production – Advanced Operator Course**
- **Oil & Gas Emergency Response Training.**

Our training programme will:

- Reduce the number of process safety related incidents
- Reduce the risk of a major accident
- Reduce the number of process shutdowns
- Reduce start-up time after planned or unplanned shutdowns.



# The human factor is responsible for a large number of process safety incidents

Everytime a process safety related incident causes a shutdown you lose money, but due to the nature of hydrocarbons, oil & gas incidents are also potentially high risk events. If a seemingly harmless event suddenly spins out of control due to poor operating discipline or poor decision making you could find yourself in the middle of a major accident, similar to *Piper Alpha* or the *Texas City disaster*. Very few operators can withstand such an disastrous event, both in terms of the massive economic impact, but also when it comes to the loss of reputation and trust from investors, employees and authorities.

## OFTEN THE HUMAN FACTOR IS THE REASON FOR PROCESS SAFETY INCIDENTS

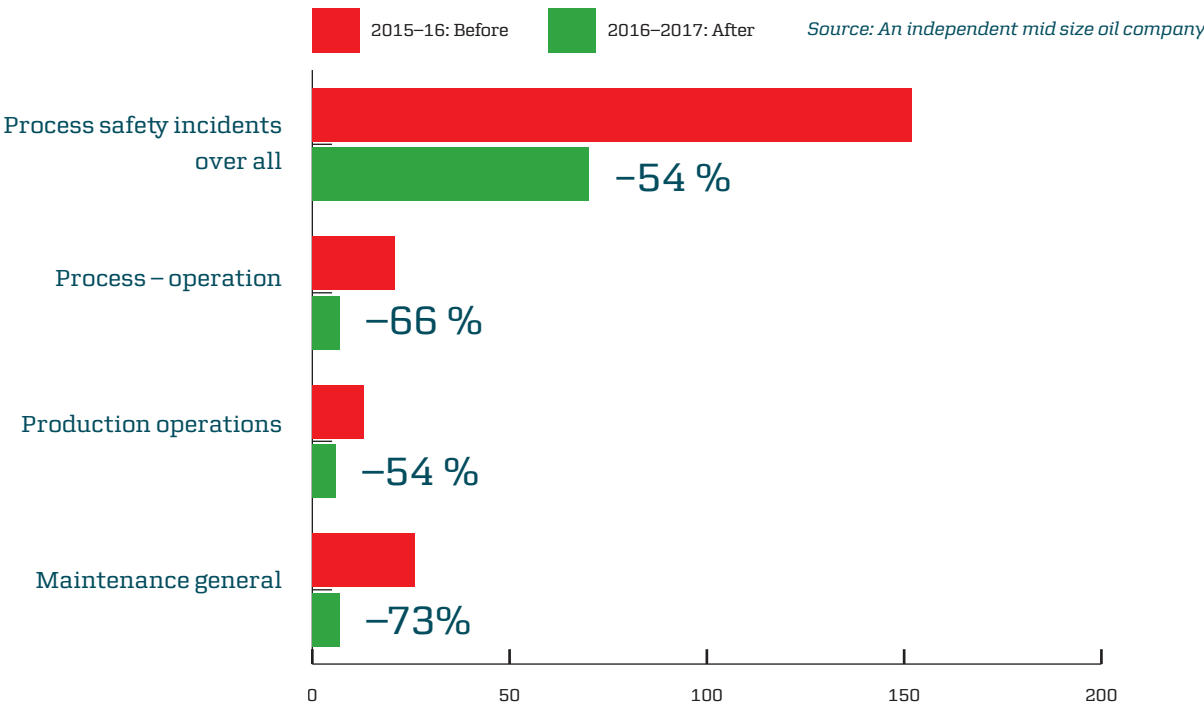
A lot of money has been invested in technology and in improving hardware barriers. Some of these solutions are complex, and they only work in combination with strong competencies and procedural discipline. Maybe that's one of the reasons why human barriers fails more often. Poor decision making, lack of situational awareness and complex procedures, combined with poor procedural training and lack of awareness among senior management will increase the risk of major incidents significantly.

## SIMPLE THINGS LEAD TO SHUTDOWN AND PROCESS SAFETY INCIDENTS

A great number of process safety related incidents are due to simple, easy to fix issues, like i.e.:

- Procedures are not always followed. Frontline personnel do not know them, do not understand them or do not see the value in their daily work
- On the job training reproduces bad habits existing in the organisation
- Process plant operational procedures are not optimised
- Often process safety training is theoretical – this kind of training is a poor investment. Since competencies are not implemented in a working environment behavior doesn't change
- Cutting cost on training.

## Process safety incidents before and after implementing Process safety training for oil & gas production



*The key to prevent process safety incidents is to enhance the right behaviour among operating staff, by getting them to understand and recognise the importance of maintaining hardware barriers and always working within operational barriers. Hereby you will achieve safe and reliable operations, ensuring you reach your targets on production, uptime and safety.*

*"It underlines a feeling of vulnerability when you see how differently we understand the same procedure".*

*Leif Munk Christensen,  
Production technician*





*"It is extremely difficult to sit on a chair and learn a procedure. It is much easier to learn with the hands".*

*Claus Kofod Jørgensen, OIM*



## The secret behind stronger human barriers is training closer to reality

The training programme consists of 6 different modules targeted at new employees, technicians and central control room/Field Operators (see courses page 8–13). It's a combination of classroom, simulator and hands-on training, for individuals and teams. The training programme is designed to:

- Reduce the number of process safety related incidents
- Reduce the risk of a major accident
- Reduce the number of process shutdowns
- Reduce start-up time after planned or unplanned shutdowns.

### TRAINING CLOSE TO REALITY ON OUR "PRODUCTION FACILITY" AND SIMULATORS

The element of reality is an important part of the training programme. The introduction and hands-on modules are focused around our generic production facility mockup. It's a fully functional copy of an offshore facility, running on water and vegetable oil instead of crude oil, and pressurised air replaces gas in the piping.

To accurately reflect the behavior of real process equipment we use the Kongsberg K-Spice Learn process simulator on the more advanced course modules.

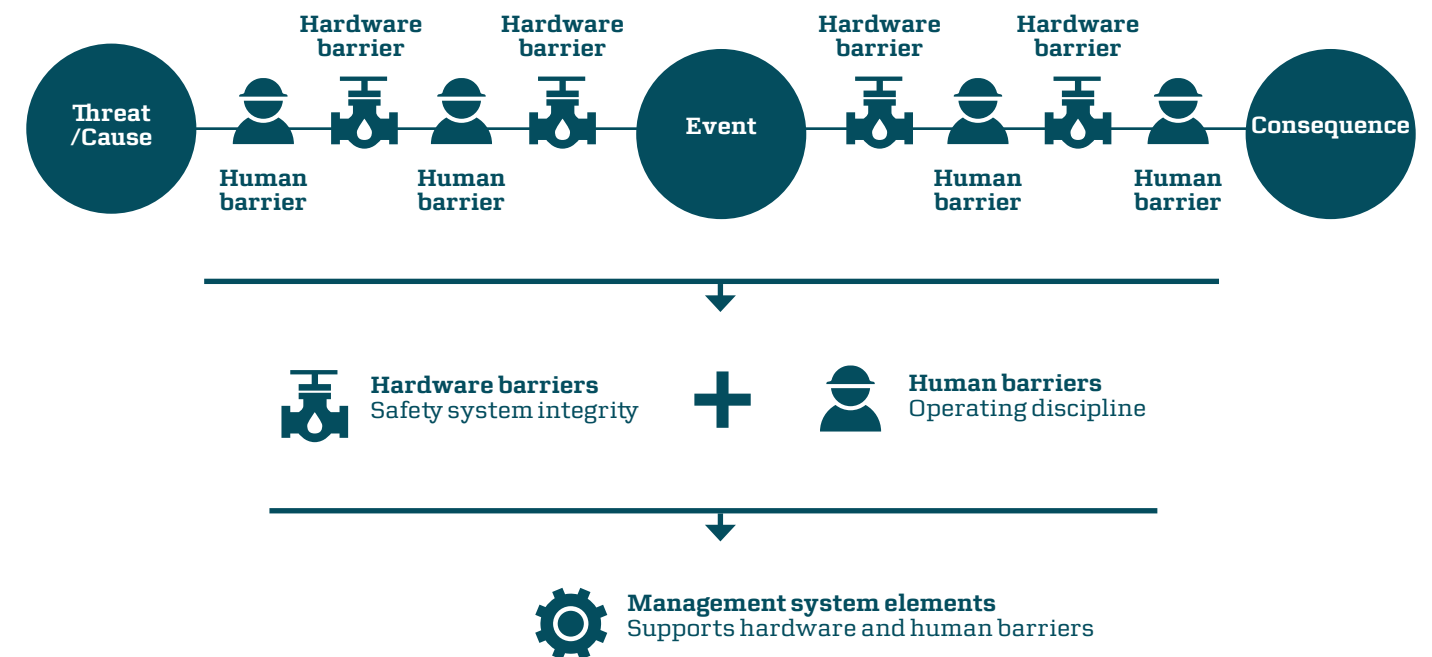
### COMMON UNDERSTANDING OF PROCEDURES AND OPERATING DISCIPLINE WILL IMPROVE SIGNIFICANTLY

Teams training at the same facility will reduce the chance of misinterpretation of a specific procedure. All personnel will get the same understanding of the process flow and procedures, and why operating discipline is important in handling daily challenges and critical events. Your personnel will act in the same way, aligning your procedures and reducing process safety related incidents.

### OUR TRAINING PROGRAMME IS BASED ON IOGP's CONCEPT OF HUMAN AND HARDWARE BARRIERS

We have build our training programme on IOGP's concept of human and hardware barriers, and the relevant management system elements critical to delivering high performance in process safety (see next page). The primary focus of our training programme is to strengthen the human barrier and understand how to manage the overall risk level when hardware barriers are weakened due to maintenance or technical failure.

### IOGP's concept of human and hardware barriers



*Hardware and human barriers are put in place to prevent a specific threat or cause of a hazard release event, or to reduce the potential consequences if barriers have failed and an event has occurred. Both hardware and human barriers are supported by the processes and procedures (Management System Elements). Source: IOGP*



# The courses

## Introduction to Offshore Oil & Gas Production

### TARGET GROUP

- All new employees offshore
- Relevant positions onshore.

### RECOMMENDED ADMISSION LEVEL

None; however, the course should preferably be completed within the first 6 months of employment, and ideally after one or two assignments offshore.

### PURPOSE

To give new employees a general knowledge about the safety culture and offshore installations and provide technical understanding to prepare the participant for further job specific training.

### OBJECTIVE

After completing the course the participant should have:

- General knowledge about offshore installations
- Knowledge of offshore organisations
- Awareness of oil & gas production, including process safety
- Knowledge of safety behaviour
- Knowledge about utility systems and tools used offshore to maintain a high level of safety.

### CONTENT

- Introduction to the offshore oil & gas industry
- Offshore organisation
- General safety behaviour
- Permit to Work – why, where and how?

- Isolations – why, where and how?
- Other safety and control of work procedures
- Introduction to offshore process – from well to delivery
- Process safety and integrity
- Utility systems
- Maintenance.

### DURATION

4 days.

### PARTICIPANTS

Min. 4 – max. 15.

## Oil & Gas Production – Basic Course

### TARGET GROUP

Offshore technicians and future CCR operators.

### RECOMMENDED ADMISSION LEVEL

Passed *Introduction to Offshore Oil & Gas Production*. Ideally the participants have min. 3 months of offshore experience.

### PURPOSE

To give new employees an introduction to common process equipment and operations related to typical oil & gas production process. The introduction shall make them understand why and how produced fluids and gasses are processed, and enable them to demonstrate the knowledge by applying it in a series of simulator exercises, case studies and class room discussions.

### OBJECTIVE

After completing the course the participant should have basic knowledge about:

- Reservoir structure and geology
- Different “production” systems via manifolds and flowlines
- Gas compression including separating liquids from incoming gas
- Produced gas conditioning and treating
- Systems for lowering oil in water content
- Drain and Vent system
- The separator process and hydrocarbon behaviour
- Specifications for oil and gas export
- Water filtration, de-aeration and water injection
- Sea water and closed cooling water systems
- Fuel gas system
- Utility air system
- Hydraulic system
- Electrical power supply

*“You will not be good at football by reading about it. You will be good at football if the game is explained and shown to you, and if you practice. Why should it be any different with procedures?”*

*Kim Hagen Thomsen,  
Production Engineer*

- Fire & gas detection system
- ESD system
- Fire water system build up including lift and fire pump
- Utility chemical injection systems
- Nitrogen generating and supply system
- SCADA system
- Common documentation.

### CONTENT

- Reservoir/geology
- Operating wells and managing well integrity
- Gas process
- Oil & gas process and export
- Water injection
- Utilities
- Documentation.

### DURATION

5 days.

### PARTICIPANTS

Min. 4 – max. 8.



# Process Safety – Hands-on Training

## TARGET GROUP

Offshore technicians, assistant supervisors and CCR operators.

## RECOMMENDED ADMISSION LEVEL

Passed *Introduction to Offshore Oil & Gas Production* and min. 3 months of offshore experience.

## PURPOSE

To help new offshore employees to become familiar with relevant procedures in relation to operation and maintenance work, ensuring all activities are carried out in accordance with the procedures and thus safe, efficient and environmentally responsible. Challenge experienced employees on their routines, share best practice and enhance a culture of compliance and safety through barrier thinking.

## OBJECTIVE

After completing the course the participant should be able to:

- Have knowledge of everyday functions in safety management systems and be able to find relevant procedures

- Be able to contribute in risk assessment and planning of maintenance jobs, in order to reduce risks in accordance to the ALARP principle
- Contribute in ensuring process safety before, during and after relevant activities
- Have knowledge of operating safety procedures (OSP) regarding SJA, PTW, Inhibiting, Isolation, Hotwork, Work in confined space, Noise and vibration
- Be able to conduct various tasks in accordance with above mentioned procedures
- Have an understanding of Human Factors (IOGP basic six) which may influence a safe and efficient operation
- Be able to use and understand SJA, Tool Box Talk (TBT) and Time out during practical exercises.

## CONTENT

- Introduction to safety management systems
- Introduction to relevant procedures:

- Safe Job Analysis (SJA)
- Inhibition of safety systems
- Permit to Work (PTW)
- Hotwork
- Isolation
- Work in confined space
- Noise and vibration
- Planning of jobs according to above procedures
- Practical execution of planned jobs on process simulator
- Human Factors (IOGP basic six)
- Risk assessment and preventive barriers
- Communication and training in effective tool box.

The course is a combination of theoretical class room training, discussions, workshops and practical exercises on the simulator.

## DURATION

3 days .

## PARTICIPANTS

Min. 4 – max. 8.

# Oil & Gas Production – Operator Course

## TARGET GROUP

Offshore technicians, supervisors and CCR operators.

## RECOMMENDED ADMISSION LEVEL

Passed *Oil & Gas Production – Basic Course* and min. 1–2 years of offshore experience, or background as marine engineer or similar.

## PURPOSE

To give the participants an understanding of process principles and physical properties of hydrocarbons. Enable them to gain a better overview of the full process, by applying the knowledge and understandings to operate and optimise the process plants, including start-up of process plant and various equipment, achieve equilibrium and optimum throughput according to specification etc. and handling minor deviations in the plant.

## OBJECTIVE

After completing the course the participant should be able to:

- Understand process principles
- Understand basic physical properties of hydrocarbons
- Describe main components in a Oil & gas process plant and their relationship
- Operate the process plant during start-up
- Operate the process plant during shutdown
- Demonstrate the ability to monitor the process plant during operation and take correct actions under various conditions
- Apply the knowledge of hydrocarbons and system components to optimise the process plant operation.
- Execute standard operations on a generic process simulator.

## CONTENT

- Physical properties of hydrocarbons
- Cold start-up of utility systems
- Cold start-up of the oil system with well commissioning
- Oil system troubleshooting
- Gas compression system
- Gas dehydration and gas export

- Re-compression
- Gas system troubleshooting
- Emergency shutdown system (ESD)
- Problem solving techniques.

The training will be conducted as instructor led classroom training, utilising a generic oil & gas process simulator to demonstrate and enhance the knowledge and skills. The ratio between simulation and other activities is approximately 50/50.

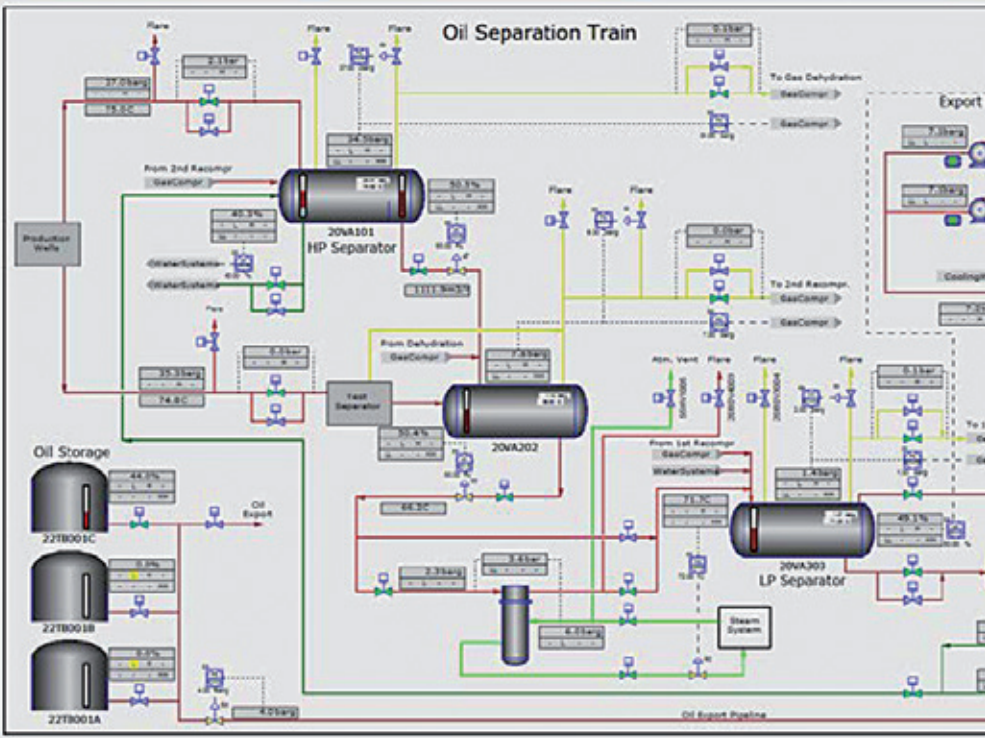
## DURATION

5 days.

## PARTICIPANTS

Min. 4 – max. 8.





# Oil & Gas Production – Advanced Operator Course

### TARGET GROUP

Production assistants and CCR operators.

### ADMISSION LEVEL

Passed *Oil & Gas Production – Operator Course*.

### PURPOSE

To improve the participants process knowledge and competence in managing an oil and gas production plant during normal and abnormal situations. How to handle minor and larger deviation in the plant and equipment and emergency situations related to the process.

### OBJECTIVE

After completing the course the participant should be able to:

- Understand process principles
- Understand basic physical properties of hydrocarbons

- Sketch the main components in a oil & gas process plant and their relationship
- Handle emergency situations
- Restart the production after an ESD 2 or 3
- Demonstrate the ability to monitor the process plant during operation and take correct actions under various conditions
- Apply the knowledge of hydrocarbons and system components to optimise the process plant operation and handle various abnormal operating conditions
- Execute standard operations on a generic process simulator and follow operational procedures / checklists.

### CONTENT

- Physical properties of hydrocarbons

- Optimisation during different operating conditions
- Steady state operations
- ESD and restart of process from ESD 2 and 3
- Plant troubleshooting
- Emergency situations
- Problem solving techniques.

The training will be conducted as instructor led classroom training, utilising a generic oil & gas process simulator to demonstrate and enhance the knowledge and skills. The ratio between simulation and other activities is approximately 60/40.

### DURATION

5 days.

### PARTICIPANTS

Min. 4 – max. 8.

# Oil & Gas Emergency Response Training

### TARGET GROUP

Members of the emergency response team.

### RECOMMENDED ADMISSION LEVEL

None.

### PURPOSE

- To pass knowledge and insight into the factors that affect people working in complex and high-risk environments as a platform, and especially in crisis situations
- Train the individual to act appropriately in an acute crisis situation aboard a platform with a special focus on individual behaviour and interaction with the rest of the team
- Train the crisis team in crisis management, best practises aligned with legislation
- Give the participants knowledge, insight and understanding of corporate crisis standards, and how this influences the responsibilities and actions on the individual, the team and the organisational level

- Learn the craftsmanship of crisis management, utilising crisis management tools and procedures e.g. the PEAR model, identifying what are the challenges, how to problem solve in a structured and systematic manner, keep high situation awareness at all times, and how to take fast and effective decisions in a stressful crisis situation.

### OBJECTIVE

After completing the course the participant should be able to:

- Individual considerations on own appropriate behaviour in relation to the handling of an emergency aboard.
- Individual self-reflection on appropriate behaviors in relation to the cooperation of the team in a crisis situation aboard.
- Training of the communication and cooperation between the platform and the shore base crisis management teams in a crisis situation.

### CONTENT

- Crisis Leadership
  - Personal preferences vs job demands to crisis leadership.
- Teamwork
  - Identifying possible challenges within the crisis team considering the various personality profiles.
  - Tools to cope with individual strengths and weaknesses within the team.
- Time Out and other crisis management tools
- Human Factors
  - Situation awareness
  - Decision making
  - Communication
  - Performance shaping factors.

### DURATION

2 days.

### PARTICIPANTS

Min. 6 – max. 10.



## Contact us for questions or a presentation

### GET AN ESTIMATE OF THE POTENTIAL VALUE FOR YOUR COMPANY

If you share information about your safety statistics and production loss figures we can give you a visualisation and an estimate of the potential value and return on investment of process safety training for oil & gas production for your company.

### CONTACT MAERSK TRAINING

[commercial@maersktraining.com](mailto:commercial@maersktraining.com)

Phone +45 70 26 32 83

*"Maersk Training has set the benchmark for other training establishments to aspire to".*

*Det Norske Veritas (DNV).*







Maersk Training  
Dyrekredsen 4  
5700 Svendborg  
Denmark

Telephone +45 70 26 32 83  
[commercial@maersktraining.com](mailto:commercial@maersktraining.com)  
[www.maersktraining.com](http://www.maersktraining.com)