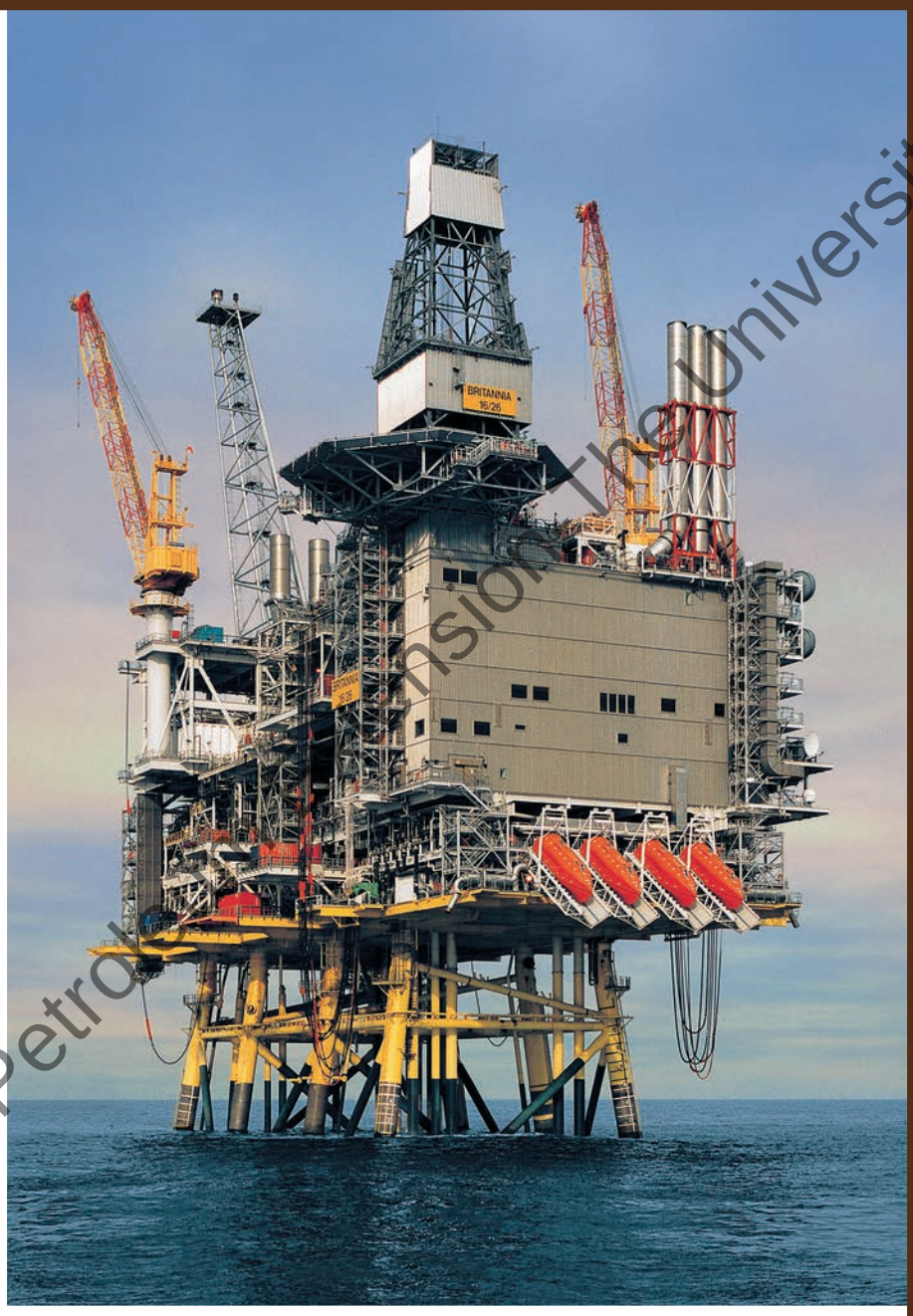
ROTARY DRILLING

LIFE OFFSHORE



Second Edition

UNIT V • LESSON 9

ROTARY DRILLING SERIES

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Units of Measurement

Throughout the world, two systems of measurement dominate: the English system and the metric system. Today, the United States is one of only a few countries that employs the English system.

The English system uses the pound as the unit of weight, the foot as the unit of length, and the gallon as the unit of capacity. In the English system, for example, 1 foot equals 12 inches, 1 yard equals 36 inches, and 1 mile equals 5,280 feet or 1,760 yards.

The metric system uses the gram as the unit of weight, the metre as the unit of length, and the litre as the unit of capacity. In the metric system, 1 metre equals 10 decimetres, 100 centimetres, or 1,000 millimetres. A kilometre equals 1,000 metres. The metric system, unlike the English system, uses a base of 10; thus, it is easy to convert from one unit to another. To convert from one unit to another in the English system, you must memorize or look up the values.

In the late 1970s, the Eleventh General Conference on Weights and Measures described and adopted the Système International (SI) d'Unités. Conference participants based the SI system on the metric system and designed it as an international standard of measurement.

The *Rotary Drilling Series* gives both English and SI units. And because the SI system employs the British spelling of many of the terms, the book follows those spelling rules as well. The unit of length, for example, is *metre*, not *meter*. (Note, however, that the unit of weight is *gram*, not *gramme*.)

To aid U.S. readers in making and understanding conversion to the SI system, we include the following table.

English-Units-to-SI-Units Conversion Factors

Quantity or Property	English Units	Multiply English Units By	To Obtain These SI Units
Length, depth, or height	inches (in.)	25.4	millimetres (mm)
		2.54	centimetres (cm)
	feet (ft)	0.3048	metres (m)
	yards (yd)	0.9144	metres (m)
	miles (mi)	1609.344	metres (m)
		1.61	kilometres (km)
Hole and pipe diameters, bit size	inches (in.)	25.4	millimetres (mm)
Drilling rate	feet per hour (ft/h)	0.3048	metres per hour (m/h)
Weight on bit	pounds (lb)	0.445	decanewtons (dN)
Nozzle size	32nds of an inch	0.8	millimetres (mm)
Volume	barrels (bbl)	0.159	cubic metres (m^3)
		159	litres (L)
	gallons per stroke (gal/stroke)	0.00379	cubic metres per stroke (m^3/stroke)
	ounces (oz)	29.57	millilitres (mL)
	cubic inches ($in.^3$)	16.387	cubic centimetres (cm^3)
	cubic feet (ft^3)	28.3169	litres (L)
		0.0283	cubic metres (m^3)
	quarts (qt)	0.9464	litres (L)
	gallons (gal)	3.7854	litres (L)
	gallons (gal)	0.00379	cubic metres (m^3)
	pounds per barrel (lb/bbl)	2.895	kilograms per cubic metre (kg/m^3)
	barrels per ton (bbl/tn)	0.175	cubic metres per tonne (m^3/t)
Pump output and flow rate	gallons per minute (gpm)	0.00379	cubic metres per minute (m^3/min)
	gallons per hour (gph)	0.00379	cubic metres per hour (m^3/h)
	barrels per stroke (bbl/stroke)	0.159	cubic metres per stroke (m^3/stroke)
	barrels per minute (bbl/min)	0.159	cubic metres per minute (m^3/min)
Pressure	pounds per square inch (psi)	6.895	kilopascals (kPa)
		0.006895	megapascals (MPa)
Temperature	degrees Fahrenheit (°F)	$\frac{°F - 32}{1.8}$	degrees Celsius (°C)
Thermal gradient	1°F per 60 feet	—	1°C per 33 metres
Mass (weight)	ounces (oz)	28.35	grams (g)
	pounds (lb)	453.59	grams (g)
		0.4536	kilograms (kg)
	tons (tn)	0.9072	tonnes (t)
	pounds per foot (lb/ft)	1.488	kilograms per metre (kg/m)
Mud weight	pounds per gallon (ppg)	119.82	kilograms per cubic metre (kg/m^3)
	pounds per cubic foot (lb/ft^3)	16.0	kilograms per cubic metre (kg/m^3)
Pressure gradient	pounds per square inch per foot (psi/ft)	22.621	kilopascals per metre (kPa/m)
Funnel viscosity	seconds per quart (s/qt)	1.057	seconds per litre (s/L)
Yield point	pounds per 100 square feet ($lb/100\ ft^2$)	0.48	pascals (Pa)
Gel strength	pounds per 100 square feet ($lb/100\ ft^2$)	0.48	pascals (Pa)
Filter cake thickness	32nds of an inch	0.8	millimetres (mm)
Power	horsepower (hp)	0.75	kilowatts (kW)
Area	square inches ($in.^2$)	6.45	square centimetres (cm^2)
	square feet (ft^2)	0.0929	square metres (m^2)
	square yards (yd^2)	0.8361	square metres (m^2)
	square miles (mi^2)	2.59	square kilometres (km^2)
	acre (ac)	0.40	hectare (ha)
Drilling line wear	ton-miles (tn•mi)	14.317	megajoules (MJ)
		1.459	tonne-kilometres (t•km)
Torque	foot-pounds (ft•lb)	1.3558	newton metres (N•m)

The Life

New hires on an offshore drilling rig, platform, or other offshore facility enter an interesting and unique world. These jobs are not for everyone. They demand hard work in some very challenging situations.

Understanding the Offshore Job

Although workers familiar with onshore drilling and production may think they are well-informed about the industry, the offshore oil and gas environment is unique. The major difference is the living conditions. Offshore work requires being away from home and family for long periods of time. Most offshore facilities are not even in sight of land (fig. 1). Offshore facilities are self-contained communities where employees live, work, and often spend their off time.

Figure 1. Statoil's Gullfaks A platform in the North Sea. Note the helideck on the platform. (Courtesy of Statoil ASA, photo by Oyvind Hagen)

Traveling to the Offshore Facility

Offshore crews get a free ride to and from the offshore facility. Today, travel to offshore facilities is mainly by helicopter because it is much faster (fig. 8). However, travel to the offshore site may be by boat depending on the distance to the location, weather conditions, and time factors. The gathering point for departure from land to the offshore facility is usually the company's operation base or a local airport.

Prior to traveling to or from the offshore facility by boat or helicopter, the crewmembers must have in their possession all required personal identification including a passport and/or visa, if necessary. Crew members should have been briefed about appropriate clothing and safety gear for transport whether by helicopter or boat. All carry-on items and baggage must conform to the transport company and the crewmember's employer regulations.

Figure 8. Helicopter transporting offshore crews (Courtesy of Bell Helicopter Textron, Inc.)

The Work Place

Types of Offshore Facilities[1]

The main categories of offshore facilities are offshore drilling rigs and offshore production platforms. A small number of offshore facilities are able to combine both drilling and production operations.

The offshore drilling rig is used to drill for oil and natural gas. Usually, the drilling rig is not designed for the production or extraction of oil or gas. It is only meant to create the hole for the future production of oil and/or gas.

The *offshore production platform* is a much larger structure housing workers and the equipment needed to produce oil and natural gas. The platform may be moored to the seafloor or floating. Platforms may have several wellheads and be connected to many subsea wells that are often miles away from the platform itself.

The type of offshore facility used depends on the distance from shore and the depth of the water. Another factor in deciding the type of offshore facility to build is the size of the field that will be drilled. Some facilities are mobile and can be floated or moved to various locations on the field area, whereas others are more permanently anchored to the sea. Most offshore facilities including drillships have a helideck used by helicopters for crew transfer, equipment loading, and delivery of supplies. Drilling rigs and production platforms perform different functions offshore. Some facilities are used for oil or gas and others may be used for both. The thing they all have in common is that people live and work on these facilities offshore.

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[1]*Source information from the National Ocean Industries Association (NOIA) Fact Sheet on Hurricanes and the Offshore Energy Industries, 2006.*

The Offshore Crew

The Jobs

Most jobs on an onshore rig are also found offshore. Because of the marine environment and the fact that personnel live and work on the offshore facility, additional support people of varying skill levels are needed. Some jobs are very technical and require a degree or extensive training. Others require physical and organizational skills. Some jobs are not directly involved with drilling but essential to life offshore. Every job on the rig is important to the operation and safety of the offshore facility (fig. 30).

DRILLING
Offshore Installation Manager
Drilling Superintendent
Toolpusher
Driller
Assistant Driller
Derrickman
Pipehandling Technician
Mudman
Mud Engineer
Pumpman
Pump Mechanic
Welder
Crane Operator
Assistant Crane Operator
Roughneck
Roustabout
Safety and Training Officer

MARINE DEPARTMENT
Barge Engineer
Barge Supervisor
Control Room Operator (CRO)
Assistant CRO
Ballast Control Operator
Captain
Chief Engineer
Mates—senior, 1st, 2nd, 3rd
Dynamic Positioning Operator
Stability Technician
Able-Bodied Seaman
Ordinary Seaman
Cleaner/Painter
Deckhand
Wiper

MECHANICAL DEPARTMENT
Chief Mechanic
Mechanic
Assistant Mechanic
Motorman
Engine Room Assistant
Maintenance Supervisor
Maintenance Foreman

ELECTRICAL DEPARTMENT
Chief Electrician
Electrician
Maintenance Supervisor
Electronic Technician
Electrical/Electronic Supervisor
Subsea
Subsea Engineer
Assistant Subsea Engineer
Catering
Catering Manager
Chief Steward
Steward
Cook
Galley hands (Kitchen Utility)

OTHER
Scaffolder
Radio Operator
Medic
Storeman
Oiler
Bedroom Hand
Company Man
Administrative Staff
Boiler
Chemical Crew
Communication Crew
Metallurgical Engineer
Computer Crew
Geologist
Geophysical Engineer
Geotechnical Engineer
Sandblasting Crew
Seismic Crew
Warehouseman

Figure 30. Offshore jobs (Source: Offshore Oil Rig Jobs http://offshoreoilrigjobs.tripod.com/index.htm)

Personal Time on the Rig

Half of the 24-hour day of an offshore worker is spent on duty status, either actually performing physical work or on standby, ready to respond to a need for service (fig. 43).

Figure 43. Offshore workers Garve Scott-Lodge (left) and Brian James at work (Courtesy of Oilrig-photos.com, photo by Ian Jack)

To obtain additional training materials, contact:

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