

DRILLS

DRdrills 

Drill open-hole like
always...
drill overburden like
never before!



FOREMOST

The original **Dual Rotary**



Foremost (originally “Barber”) Dual Rotary (DR) drills have been working successfully around the world since 1979. Over the years, the DR method has earned an enviable reputation for exceptional drilling performance in unconsolidated overburden. Indeed, DR operators regularly drill and case through hundreds of feet of tough overburden where casing hammers and underreamers have been unsuccessful. The Foremost DR also delivers excellent productivity for a variety of open-hole applications, making it one versatile, powerful, and truly unique machine.

Ten reasons to consider a Foremost Dual Rotary Drill

Since 1979, Foremost's Dual Rotary drills have delivered on the promise of better performance. They continue to make significant contributions to the productivity and profitability of operators worldwide. For a growing number of contractors, there's simply no better way to drill. Consider these compelling arguments for DR ownership:

- 1 Exceptional Overburden Performance:** Foremost DR drills have been proven repeatedly in some of the toughest unconsolidated overburden formations, including sand, gravel, glacial till, and boulders. The Dual Rotary method minimizes the likelihood of loss circulation and aquifer cross-contamination. And, because the DR can drill without fluids, the ability to detect water in low flow formations is improved.
- 2 Open-Hole Versatility:** In addition to its overburden drilling ability, the DR can be configured for a variety of drilling methods including mud, reverse circulation, and flooded reverse circulation.
- 3 Straight Holes:** The rotation of the casing by the lower drive results in a very straight hole. This minimizes stress on casing and casing welds and eases the task of installing screens and pumps in waterwell applications. It also makes the DR ideal for drilling hydraulic elevator shaft holes and foundation piles.
- 4 Casing Extraction:** The lower drive is equally effective at pulling back casing, thereby simplifying the process of exposing a well screen or abandoning a well.
- 5 Conventional Tools:** Foremost DR drills utilize conventional tools. The drill string can be equipped with a downhole hammer, tri-cone, or drag bit.
- 6 Control of Discharge:** Cuttings are diverted through the discharge swivel and can be directed via hose to a safe and convenient dumping or monitoring point. This is a useful feature when drilling at homeowner sites or when cuttings must be contained for environmental or safety reasons.
- 7 Ease of Maintenance:** Foremost DR rigs feature a directly connected hydraulic feed system, meaning no chains, sheaves, or sprockets to maintain. This type of feed system generates zero load on the mast crown, permitting a simple and lightweight mast design that does not sacrifice pullback capability.
- 8 Reduced Operational Risk:** The DR's overburden drilling capability gives you the confidence to go into areas you might once have considered off-limits. Its flexibility allows you to expand into new applications. And knowing that you have the right equipment to get the hole down will help reduce the risk to your company when bidding on projects.
- 9 Resale Value:** There is arguably no drill on the market today that holds its value better than a Foremost DR. DR owners tend to hold onto their rigs, making used examples scarce. Demand for used DR drills remains strong, and consequently, prices favor the seller. Excellent resale potential provides an added level of comfort and financial security for those who might consider investing in a Foremost Dual Rotary drill.
- 10 Foremost Technical Support:** Foremost Dual Rotary rigs are backed by the considerable product and application expertise of its product management team, field technicians, and one of the largest engineering departments in the industry. The Company is committed to providing superior customer support, and enjoys significant repeat sales as proof of customer satisfaction.

For more details, contact our office for a copy of our information circular entitled **"Benefits of Dual Rotary Drilling in Unstable Overburden Formations"**.

Foremost Dual Rotary drill in mine de-watering application:
Note how the casing can be rotated so that the welder is always comfortably situated, never having to climb in behind the casing to complete the weld.



Better productivity through better **technology**

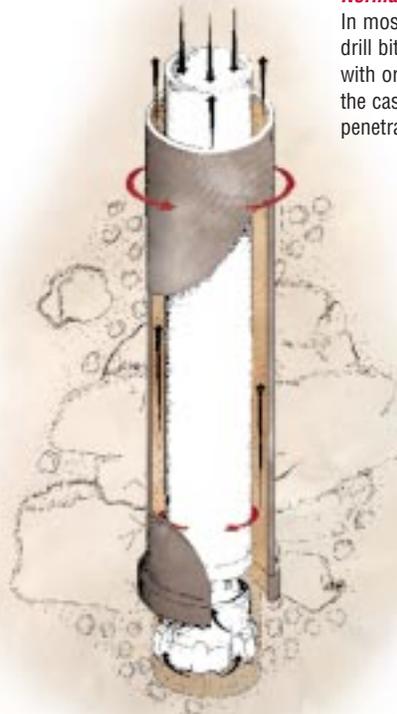
Foremost Dual Rotary (DR) drills feature a unique lower rotary drive that is used to advance steel casing through unconsolidated overburden like sand, gravel, glacial till, and boulders. Pullback, pull-down, and rotational forces are effectively transmitted to the casing via power-operated jaws.

An independent rotary top drive simultaneously handles a drill string equipped with a down-the-hole hammer, drag bit, or rolling cone bit. Cuttings are typically evacuated with air, but Foremost DR drills can also be configured with pumps for mud or flooded reverse circulation drilling.

The top and lower drives feed independently, meaning that the bit position can vary relative to the bottom of the casing. Once the desired casing depth has been achieved, the DR continues drilling open-hole like a conventional top drive drill. With a Foremost DR drill, there is no need to trip out or change tools when transitioning to open-hole drilling.

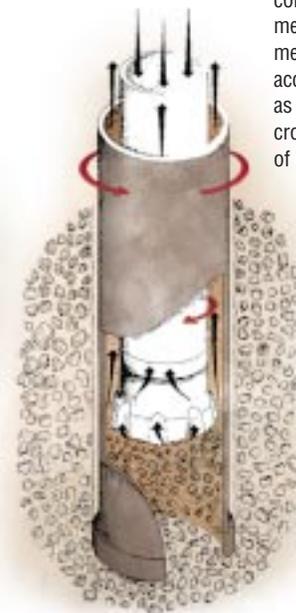
Normal Bit Position:

In most situations, the drill bit is advanced flush with or slightly ahead of the casing bottom for best penetration rates.



Bit Position in Heaving Formation:

In heaving formations, the casing is advanced ahead of the drill bit to create a plug in the casing. This allows drilling to continue in a controlled fashion. This method is also recommended where sample accuracy is important, as it helps to minimize cross-contamination of cuttings.



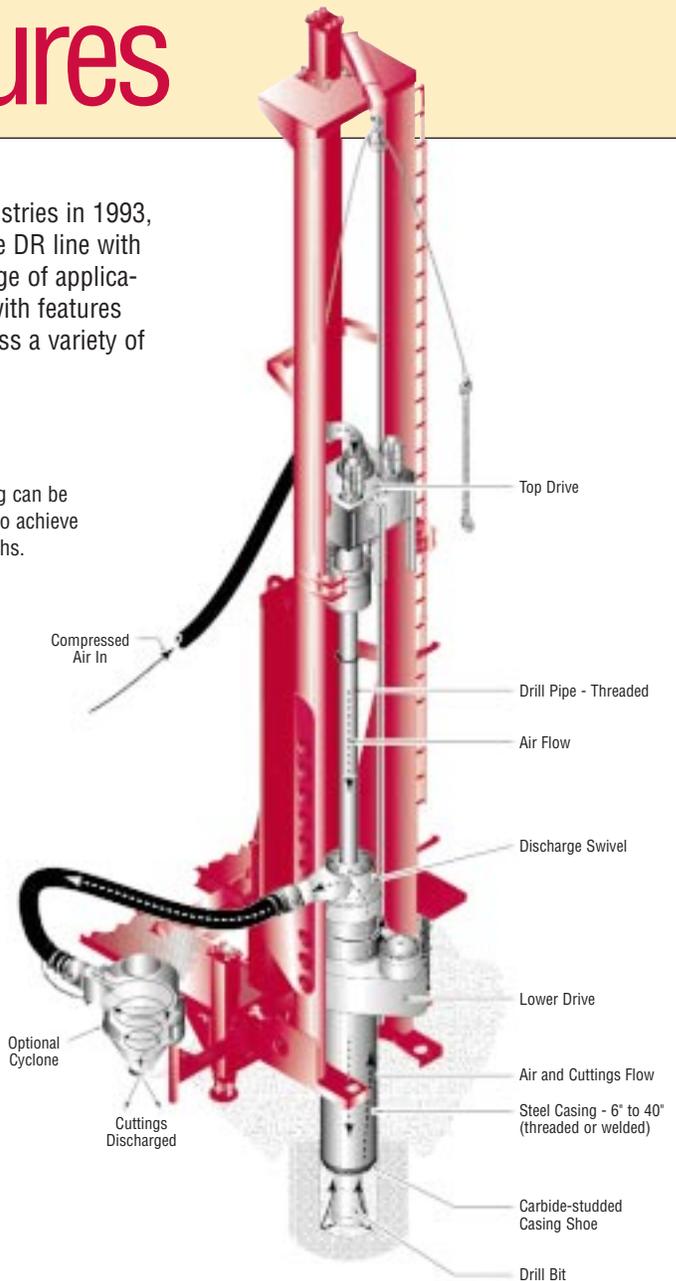
Overview of DR features

Since acquiring the Dual Rotary technology from Barber Industries in 1993, Foremost has continually updated, refined and expanded the DR line with the goal of enhancing its functionality and extending its range of applications. Today, Foremost offers several DR models, each packed with features that deliver heightened safety, productivity, and profitability across a variety of drilling activities.

Depth Ranges as Reported by DR Operators:

Casing Diameter		Depth Range	
6" - 8"	152 - 203 mm	500 - 1300 ft	152 - 400 m
10" - 14"	254 - 356 mm	300 - 800 ft	91 - 244 m
16" - 24"	406 - 610 mm	100 - 500 ft	30 - 152 m
26" - 40"	660 - 1016 mm	100 - 350 ft	30 - 106 m
> 40"	> 1016 mm	For surface casing only	

Note: Casing can be telescoped to achieve greater depths.



Tilting Top Drive	Discharge Swivel
<p>The independent hydraulic top drive tilts for convenient loading of drill pipe and casing with the operator standing safely at ground level.</p> 	<p>All drill cuttings rise to the surface between the drill pipe and casing and exit through the discharge swivel attached to the top of the casing. The discharge swivel directs cuttings to a safe dumping point or to an optional cyclone collection system.</p> 

<p>Lower Drive (with breakout)</p> <p>The lower rotary drive is also used as a powerful breakout and spinner for drill pipe, hammers, and bits.</p> 	<p>Casing Jaws</p> <p>Rotation and feed forces are effectively transmitted from the lower drive to the casing via a set of 3 power-operated casing jaws. Casing jaws are available for all common casing sizes and can be changed out quickly in the field.</p> 
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Casing Shoe

A carbide-studded casing shoe is welded to the casing bottom. The shoe I.D. is flush with the casing I.D. so that there is no reduction in bore-hole diameter when switching to open-hole drilling.



Cyclone Collector

DR-12 shown with optional cyclone collection system. The cyclone slows discharge velocity to allow accurate, continuous sampling of the formation.



Available DR models

DR-12

First introduced by Foremost in 1999, the DR-12 is a light, yet powerful PTO rig popular among domestic waterwell contractors drilling in moderate to severe overburden. It will handle casing up to 12" (305 mm) in diameter, and has been field tested to depths beyond 550 ft (168 m) for a typical 6" (152 mm) cased well.



DR-12 with Pipe Loader Arm

The DR-12 is available with an optional pipe tub and single pipe loader arm. The on-board pipe tub carries up to 420 ft. (128 m) of 4-1/2" (115 mm) drill pipe. This configuration improves productivity on open-hole applications and appeals to contractors who experience a mix of drilling conditions or whose territory includes pockets of difficult formations.



DR-24

The DR-24 will set casing up to 24" (610 mm) in diameter. This model is commonly used for domestic and municipal wells, construction foundation piling projects, and holes for hydraulic elevator jacks. The DR-24 is available in PTO or deck engine configurations and can be mounted on a truck, trailer, or self-propelled tracked carrier.



DR-24HD

Introduced in 2000, the DR-24HD ('Heavy-Duty') features a heavy-duty lower drive, which generates twice the torque of the standard DR-24. The DR-24HD is also configured with a heavy-duty mast to withstand the additional torque and larger hoist cylinders for bigger pullback. The DR-24HD is most commonly used in deep, big-diameter applications, such as municipal/industrial wells and mine de-watering.



DR-40

The DR-40 handles casing up to 40" (1000 mm) in diameter. The DR-40 excels in large diameter construction and industrial waterwell applications. Standard configurations include tracked undercarriage or crane carrier with deck engine and on-board air compressor.



DR specifications & performance

	DR-12	DR-24	DR-24HD	DR-40
Top Drive		Standard	Heavy Duty	
Stroke	25 ft (7.62 m)	26 ft (7.92 m)	26 ft (7.92 m)	29 ft (8.84 m)
Hoist Speed	Up 130 ft/min (39.62 m/min)	77 ft/min (23.47 m/min)	54 ft/min (16.46 m/min)	57 ft/min (17.37 m/min)
Hoist Capacity	Pullback 37,600 lbs (17000 kg)	58,000 lbs (26300 kg)	84,000 lbs (38000 kg)	84,000 lbs (38000 kg)
	Pulldown 16,400 lbs (7400 kg)	20,000 lbs (9000 kg)	25,900 lbs (11800 kg)	25,900 lbs (11800 kg)
Torque (stall)	116,000 in-lbs (13100 Nm)	116,000 in-lbs (13100 Nm)		264,000 in-lbs (30000 Nm)
Rotation Speed	0 - 116 rpm	0 - 116 rpm		0 - 47 rpm
Lower Drive				
Stroke	7 ft (2.13 m)	12 ft (3.66 m)	12 ft (3.66 m)	12 ft (3.66 m)
Hoist Capacity	Pullback 42,400 lbs (19200 kg)	72,000 lbs (33000 kg)	117,000 lbs (53000 kg)	75,000 lbs (34000 kg)
	Pulldown 18,800 lbs (8500 kg)	33,000 lbs (15000 kg)	42,000 lbs (19000 kg)	32,900 lbs (14900 kg)
Torque	500,000 in-lbs (56500 Nm)	1,000,000 in-lbs (112000 Nm)	2,500,000 in-lbs (282000 Nm)	3,000,000 in-lbs (339000 Nm)
Rotation Speed	0 - 13 rpm	0 - 6 rpm	0 - 6 rpm	0 - 7 rpm
Maximum Casing Diameter	12" (305 mm)	24" (609.6 mm)	24" (609.6 mm)	40" (1016 mm)
Compressor				
Air Flow	900 cfm (25.5 m ³ /min)	900 - 1150 cfm (25.5 - 32.6 m ³ /min)		1150 cfm (32.6 m ³ /min)
Pressure	350 psi (24.1 bar)	350 psi (24.1 bar)		350 psi (24.1 bar)
Engine Power	475 hp (354 kw)	475 - 600 hp (354 - 447 kw)		600 hp (447 kw)
Dimensions				
Length	37 ft (11.28 m)	38 ft 9 in (11.81 m)		41 ft 11 in (12.77 m)
Height	13 ft (3.96 m)	13 ft 6 in (4.11 m)		13 ft 6 in (4.11 m)
Width	8 ft (2.44 m)	8 ft (2.44 m)		9 ft 6 in (2.90 m)
Weight	51,600 lbs (23500 kg)	56,000 - 72,000 lbs (25400 - 32650 kg)		105,000 lbs (47600 kg)
Jib Boom Winch				
Wire Rope Length	140 ft (42.67 m)	140 ft (42.67 m)		120 ft (36.58 m)
Wire Rope Diameter	1/2" (12.70 mm)	1/2" (12.70 mm)		5/8" (15.88 mm)
Line Pull on Bare Drum	6,000 lbs (2720 kg)	6,000 lbs (2720 kg)		12,000 lbs (5400 kg)
Line Speed on Full Drum	100 ft/min (30 m/min)	100 ft/min (30 m/min)		175 ft/min (53 m/min)
Water & Foam Injection				
Capacity	12 gpm (45 l/min)	12 - 20 gpm (45 - 75 l/min)	20 gpm (75 l/min)	20 gpm (75 l/min)
Pressure	600 psi (41.4 bar)	600 psi (41.4 bar)		600 psi (41.4 bar)

Performance specifications are theoretical maximums. Actual performance may vary.

Hydraulic Breakout	Lower rotary casing drive is used as a breakout and spinner wrench for drill pipe joints, drill bits, and down-the-hole hammers.
Hydraulic System	A closed loop hydrostatic system is used for the lower drive (DR-24, DR-24HD and DR-40). Fixed displacement pumps are used for all other hydraulic systems.
Hoist System	The hoist feed is by hydraulic cylinder; No cables, sheaves, chains, or sprockets are used.
Carrier	Truck, trailer or self-propelled track carrier
Popular Options	RC top drives, sandline winch, hydraulic split spoon sampler, and cyclone separator

Note: Specifications listed are for standard drill configurations. Contact Foremost for information on optional configurations.

Drilling Penetration Rates *(based on independent third-party observations)*

	Barber (Foremost) Dual Rotary	Conventional Air Rotary	Auger	Cable Tool
Drilling Speed (1)				
Sand and Gravel	20 - 40 min	45 - 90 min	30 - 60 min	1 - 4 hrs
Till	30 - 60 min	45 - 90 min	30 - 120 min	2 - 8 hrs
Rock	30 - 90 min	30 - 90 min	N/A	N/A
Casing Integrity	Excellent	Moderate - Poor	N/A	Moderate
Split Spoon Sampling Ability	Moderate - Poor	Poor - None (3)	Excellent	Good
Cross-Contamination Prevention	Good - Excellent	Moderate - Poor	Moderate - Poor	Moderate - Poor
Versatility	Excellent	Good (3)	Moderate - Excellent	Poor
Air	Yes	Yes	(3)	No
Mud	Yes	Yes	(3)	(3)
Water	Yes	(3)	(3)	Yes
Other Advantages/Disadvantages	- Casing removal simplified - Powerful - Controlled discharge sampling - Good casing seat in bedrock	- Poor casing seat by juttering and drive shoe removal	- Mobile rig for tough access	- Rig simplicity

(1) Drilling speed shown represents average time required to drill and install 20 feet over a 100 foot well depth. (2) N/A denotes Not Applicable (3) Rig type dependent
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Product & application expertise

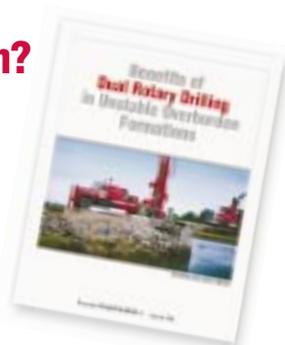
Foremost personnel are experts in the Dual Rotary drilling method. Their product and application knowledge has been honed through years of experience on challenging projects at home and abroad. Whether designing a tooling string for a unique application, providing operational guidance on a high-risk project, or simply prescribing routine maintenance, your Foremost team is uniquely qualified and proud to offer exceptional after-sales support.



An optional angle package permits drilling and casing at angles up to 45 degrees. Some operators report drilling on angles as shallow as 21° off-horizontal.

Need more information?

Call today for a copy of our DR video and detailed information circular entitled **“Benefits of Dual Rotary Drilling in Unstable Overburden Formations”**.



DR-24 mast kit mounted on crane leads to set foundation pilings for a retaining wall.



DR-24 shown in typical domestic waterwell application. Note the discharge swivel atop the casing which diverts the cuttings.

Foremost Industries, LP, established in 1965, is a public company that designs, manufactures and sells specialized drills, vehicles, parts, and tooling on an international basis. Foremost's diverse product portfolio includes drills for water well, construction, oil & gas, mineral exploration, seismic, and geo-enviro applications. Foremost's high-mobility tracked and wheeled vehicles offer payloads ranging from 10 to 40 tons and are used in the oil & gas, utility, and tourism industries. Foremost products operate in over 40 countries worldwide. Based in Calgary, Alberta, Canada, Foremost is listed on the Toronto Stock Exchange under the symbol FMO.UN.



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