It is common knowledge that a global approach is first step toward achieving good results. This means that, if the final goal is to reduce drilling costs, minimize environmental impact and ensure good safety, rig manufacturers should focus on:

• Speeding up movement
• Reducing footprint
• Increasing automation
• Reducing the workforce
• Reducing noise
• Minimizing wastes
• Integrating various services (ex. cementation, data acquisition, tubing)

Hydro Drilling has equipped its fleet with innovative hydraulic rigs; units that have proven their capabilities under a wide range of climatic conditions (from the deserts of North Africa to the ice of Siberia).
The HH220 FA “Leonardo” and “Archimede” are innovative drilling rigs, which meet all advanced technological requirements of the oil field. Thanks to their design and technical features, these rigs are an integrated drilling system that reduce drilling costs, minimize environmental impact and noise level and produce fewer wastes. Moreover, with an elevated degree of automation, these units achieve high standards of safety. The fully automated functions (pipe handling system, power tongs, slips, mud system and drilling parameters), can be easily controlled by a single operator from the dog house. The rig up and down operations are greatly simplified by fully hydraulic controls. All loads are wheeled and self-erecting, ensuring fast moving between locations and preventing accidents during transportation.

The rigs are equipped with an automated pipe handling system: the tripping operations are PLC controlled, thus preventing the possibility of interference from personnel working on the drill floor. The drilling parameters can be controlled by a hydraulic device installed on the rig, thus allowing automatic drilling at a constant WOB or constant rate of penetration. The use of hi-tech automatic hydraulic rigs reduces the risk of accidents and environmental impact. Reductions in the number of loads, dimensions and weight are guaranteed by easy, fast movement. Higher quality and efficiency is achieved by reducing operation costs.

The rigs have been designed to work with a reduced footprint. The mud system has integrated mud control features to prevent leaks and spills.

The advantages of hydraulic hoist rigs over conventional designs have been demonstrated in various fields and applications.

**Hydraulic Hoisting Drilling Rig DRILLMEC model HH220 with AC motors, trailer mounted:**
- Rated capacity: 1000 KW (1340 HP)
- Hook load: 200 tons (440,000 lbs)
- Max tripping speed: 1 m/sec with 100% efficiency

The rig is compliant with API, CE and ATEX standards.

**Main Rig Components:**
- Substructure and rig floor: Connected directly to the trailer. Total height 7.6 m - clear height 7 m.
- Telescopic Mast: Mounted on a trailer and lifted with hydraulic pistons. Hook load capacity 200 tons - pull down capacity 20 tons.
- Top Drive: Driven by four hydraulic motors with variable pistons and piston displacement.
  - Max load 200 tons
  - Max working pressure: 345 bar
  - Torque range: from 0 to 3525 Nm at 80 rpm with 100% efficiency.
- Power tong: Directly activated from the main driller’s console.
  - Max torque: 16300 kgm
  - Diameter size: 3½” - 11”
- Vertical Drill Pipe Bins: 17 vertical bins which can house 272 stands of 5” drill pipe, range 3 - 18 stands of 6½” drill collars and 3 stands of 8” drill collars; the bins are vertically located around the drill floor.
  The handling system software can handle both range 2 and range 3 drill pipes, 5” and 3½”, at the same time.

**Automated Handling System**

The automated handling system is controlled by software that handles drill pipe displacement following the program preloaded by the driller. The handling system picks up the pipe from the mouse hole and returns it to the vertical bins (and vice versa).

**Main Components**
- A central mast driven by an independent hydraulic power unit.
- A clamped arm for handling drill pipes.
- An arm for the vertical positioning of the drill pipes.
- The main crane placed on the top of the handling system mast, with a 12 tons load capacity.

**Mud System**

Two electrical 1600Hp mud pumps, driven by GE 752 ARB3 DC electric motors.
Modular mud system composed of five tanks, total capacity 300 cubic meters.

**Diesel Generator**

Three MTU generators:
- Model: 12V4000G41
- 1355 KW at 1800 rpm
- 1750 kVA, 60Hz, 600 V

**SCR/VFD**

A fully soundproofed container houses the electrical controls for:
- 3 generators
- 2 x 1600HP DC mud pumps
- 2 x 670HP AC electrical motors for the HPU
- mud system
- rig services

**Skidding System**

Both rigs are equipped with a skidding system able to quickly set the rig over the different wells in a cluster, maximum distance between centre of 15 meters.