Unrivalled experience creates new dredger: the IHC Beaver® 65 DDSP unveiled

Introduction

In 2013, IHC Beaver Dredgers in Sliedrecht, The Netherlands, celebrated the 50th anniversary of the IHC Beaver® product range. Throughout this half-century, the company has focused on the design and delivery of standard cutter and wheel suction dredgers in the IHC Beaver® series. Now a registered trademark, the range has become regarded in the dredging industry as the epitome of highly qualified, extremely reliable and cost-effective standardised cutter suction dredgers (CSDs) – mainly in the power range up to approximately 4,000kW.

Taking advantage of 50 years of uninterrupted enhancement of knowledge, design and production methods, services and feedback from service personnel, customers and the market in general, the company has become a regular innovator in this area and an excellent performer in the field. All these years, it has been at the forefront of developments. Yes, there are more CSDs in the world in general, but IHC Beaver® dredgers set the standards by which others follow.

Innovative vessels

The new dredger includes the latest innovations and technologies, making it reliable, efficient, easy to maintain and productive.
The IHC Beaver® 65 DDSP is a dismountable non-propelled CSD. The catamaran-shaped hull is composed from two long pontoons, interconnected by coupling pontoons. Special attention has been paid to simple and quick assembly and dismantling of the pontoons.

The engine room unit is mounted on the coupling pontoons. The trunnions for the cutterladder are integrated in its construction, as are the hydraulically operated swing winches and ladder winch. The single-walled wear-resistant and high-efficiency (HR) submersible dredge pump, mounted on the cutterladder, is directly driven by the main diesel engine via IHC’s patented pivoting gearbox in the ladder turning point (figure 3). This greatly reduces efficiency losses between the engine and pump, such as is the case in other submersible dredge pump drives. At the lower end of the ladder, the cutter is driven by a low-speed, high-torque hydraulic motor.

Dredging is performed from the operating cabin, which is mounted on top of the engine room unit (figure 4). It features an adjustable operating chair, fitted with two speed control levers integrated within the arm rests. Following a programme, these integrated controllers can be used to intuitively operate the dredge winches and spuds in every operation. The chair is supported by a dredging instrument panel and control console for auxiliary instrumentation and controls (figure 5).

The composition of the engine room unit, cutterladder and operating cabin integrates all vital dredging-related subsystems into one single, yet easily dismountable unit. Consequently, as few parts as possible must be dismantled for preparing the dredger for transportation. This feature is supported by the configuration of the hydraulic installation and its control electronics, which allow it to keep fully intact when dismantling the dredger. This philosophy on dismounting and commissioning makes life easier for the dredging contractor throughout the lifetime of the vessel.

As standard, the dredger is provided with an integrated hydraulically operated spud carriage installation and two spuds, operated by hydraulic cylinders. The carrier is integrated in the ship’s hull firmly between the two side pontoons. An electric deck crane completes the standard version, offering assistance to daily operations, maintenance and repair.

CFD and IHC Curve® impeller

The application of a submersible dredge pump, driven by the pivoting gearbox, provides a compact and easy maintainable construction. It allows the dredger to operate at all imaginable dredging depths with high mixture densities, and provides highly efficient mixture transport and high dredger production figures against a modest amount of installed power (figure 6).

The submersible IHC high-efficiency (HR) medium pressure pump is made from wear-resistant steel and equipped with a 3-bladed impeller. The pump shaft seal is the renowned IHC Liquidyne® from IHC Sealing Solutions, which prevents leakage and shaft wear with several flushed pressure stages [5].

Speaking of the impeller, a true innovation has been installed on the IHC Beaver® 65 DDSP. It is named the IHC Curve®, referring to its curvature in multiple directions. This is common with impellers used within high-efficiency water pumps, but the true art for dredge pumps is to find out how it should be curved in order to achieve the desired performance improvement.

Specialists at MTI Holland, IHC’s research institute, have a vast knowledge of fluid mechanics, pump design and manufacturing at their disposal, as well as various design tools and people with good ideas. Over the years, suggestions have been made to improve the suction and wear-resistance properties of impellers (figure 8), but these could not be conventionally achieved at reasonable costs, as they require the repeated production of moulds and steel castings, followed by costly testing in real pumping circuits.
Like all IHC Beaver® dredgers, the new IHC Beaver® 65 DDSP is fully prepared to work in rough waters. The IHC Spud Guard® enables dredging under severe wave conditions, with an integrated spud carrier, BV coastal carriage (figure 10). With an integrated spud carrier, BV coastal carriage, it is able to slightly rotate the spud carriage in the longitudinal direction of the dredger, reducing excessive forces if forces threaten to exceed a specific value, the system intervenes automatically.

**Life-cycle support packages**

IHC supports owners of IHC Beaver® dredgers with several life-cycle support packages, which can be selected according to customer requirements, the experience of operators, and the need for managing more or less complicated dredgers. These packages can include auxiliary equipment, a hydraulic buffering system, and integrated software. This provides the operator with additional operations-related information and resources for optimising the dredging process. They play a key role in achieving the specified dredge profile and preventing under- and over-dredging, ensuring safety and efficiency. They play a key role in achieving the specified dredge profile and preventing under- and over-dredging, ensuring safety and efficiency.

**Working in rough waters**

Some of these features have been well proven in the industry for years. The IHC Spud Guard® has been developed for both conventional and semi- vessel operators. It is often impossible to achieve by experiments. In this way, CFD serves as a solid basis, which provides the guidelines for product optimisation.

**Options package**

Like all IHC Beaver® dredgers, the new IHC Beaver® 65 DDSP is available with an arrangement of options, such as an anchor boom installation, swivel bend, or the Lancelot cutter, for example. Even highly efficient dredgers, such as the IHC Beavers, can be pushed to perform even better by adding IHC Systems’ instrumentation and automation equipment. This provides the operator with additional operations-related information and resources for optimising the dredging process. They play a key role in achieving the specified dredge profile and preventing under- and over-dredging, ensuring safety and efficiency. They play a key role in achieving the specified dredge profile and preventing under- and over-dredging, ensuring safety and efficiency.

**References**