

CSD ECO200

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DREDGE YARD

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ECO200

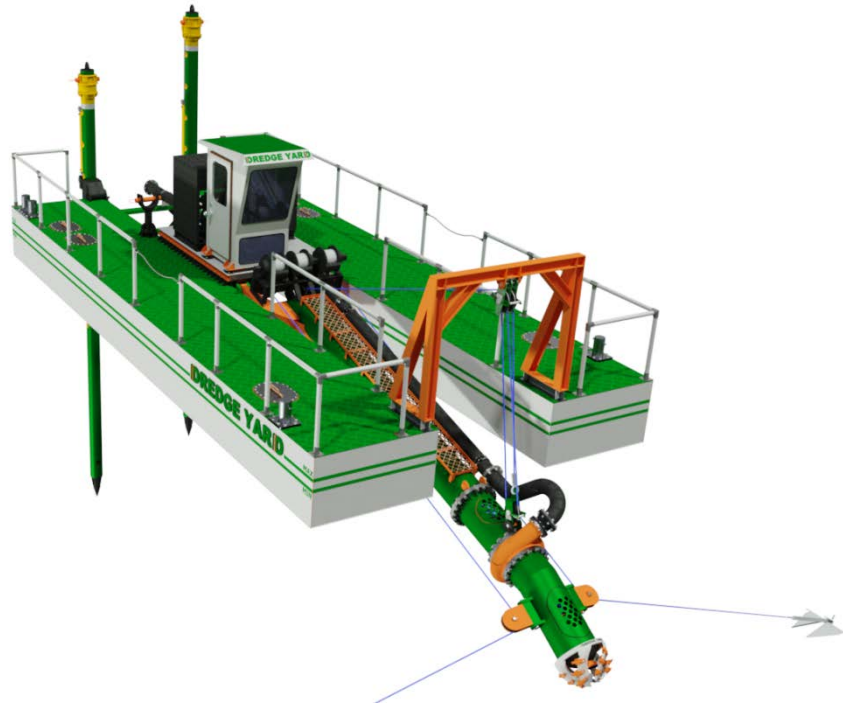


Figure 1. CSD ECO200

ABSTRACT

Dredge Yard introduces new compact and economic cutter suction dredger 'ECO200' which is designed completely by Dredge Yard engineers following the advice of several dredge companies that has a need for such a compact and economic dredger.

"The aim of the design was to make an economic dredger that is low cost at initial acquiring and in daily use".

This dredger will offer many benefits to operators like an underwater dredge pump placed on the front part of the ladder which will allow the dredger to be able to handle higher dredge mixture and high volume of mixture flow, complete ECO200 is transportable by standard 40 feet containers, the complete spud assembly together with its hydraulic cylinders is able to be tilted on its pontoon. This allows the dredger be towed easier and under pass low bridges and other obstacles. For the drive of all components being the dredge pump, cutter head, winches and spud cylinders, one hydraulic power pack is provided on the central platform. Lastly, the ECO200 will be provided with cutter head with replaceable teeth what is unusual for this size of dredgers in the market.

Keywords: Dredging, beneficial uses, slurry transport, compact, economic, dredger

INTRODUCTION

Changing climate conditions, flooding, demand for land reclamation, and development of the infrastructure for the developing countries near the rivers and lakes as well as their periodic cleaning projects has given good opportunities to the small and medium scale dredging industries in the recent times. This demand is increasing as the time passes and companies are looking for cost effective solutions for the dredging machines.

An evaluation was conducted on the inquiries and requirements from the end users and based on their experience a feedback report was formed by Dredge Yard. Some of the major issues of acquiring a new dredger for the small and medium scale dredging companies were:

1. Delivery time (build, transit)
2. Transport & Mobilization
3. Assembly and dismantling
4. Maintenance
5. Budget/Capital cost

To convert the above mentioned problems into benefits and advantages, Dredge Yard has developed a completely new cutter suction dredger especially for the dredging of lakes and rivers and other small scale dredging projects. This dredger is named as 'ECO200' which is combination of two terms 'ECO' and '200' where 'ECO' resembles economical and '200' is the size of the dredger.

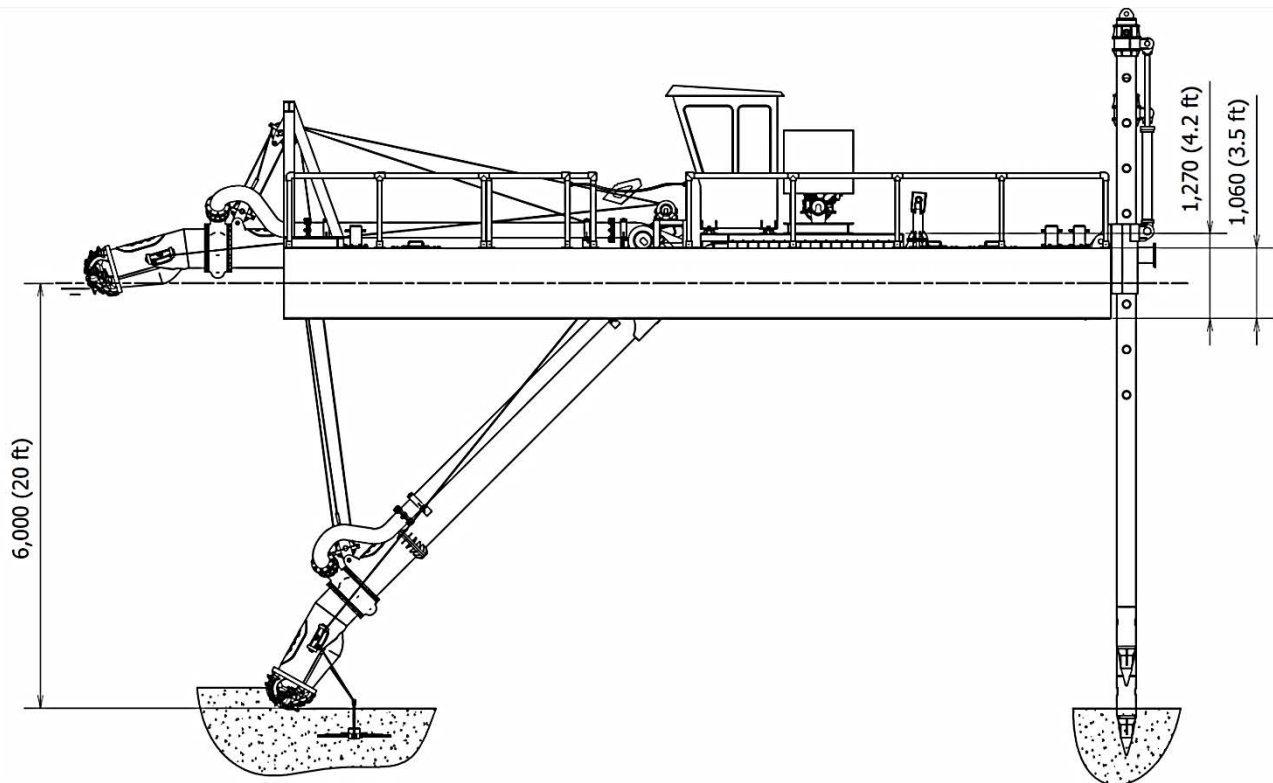


Figure 2. CSD ECO200

The ECO200 is a cutter suction dredger of nominal pipe diameter of 200 mm. It's small size, simple design and efficient components will not just reduce initial cost but also reduce the power consumption on the daily basis and save the production cost up to a large margin. It is designed completely by Dredge Yard engineers using the latest CAD technologies, FEA analysis, CFD analysis and the expertise of the experienced to make an economic dredger that is low cost at initial acquiring and in daily use as well as robust and efficient in design.

One of the major challenges was the transportation of dredgers to the site that had to be overcome by the engineers. Other task was to make all equipment very easy to use and maintain.



Figure 3. CSD ECO200

In order to provide solutions for the transportation and operations, engineers had to play with the sizes of the components, with the functions, with the parts to be used, etc. while on the other hand the experienced dredge masters didn't want something with low power and performance and quality. The Dredger had to be well crafted before release including all the basic necessities of a standard cutter suction dredger and be cost effective but also offer many benefits to operators.

Another important factor of the ECO200 is its basic instrument controls that allow easy use during operations, it's easy to maintain and repair components and equipment. Other benefit of this dredger will be its easy assembling and dismantling process. Basically the complete assembly is three parts consisting of two pontoons and one middle assembly which include ladder, drive platform and cabin.

Following sections will discuss the major benefits and design of the CSD ECO200.

MAJOR PARTS

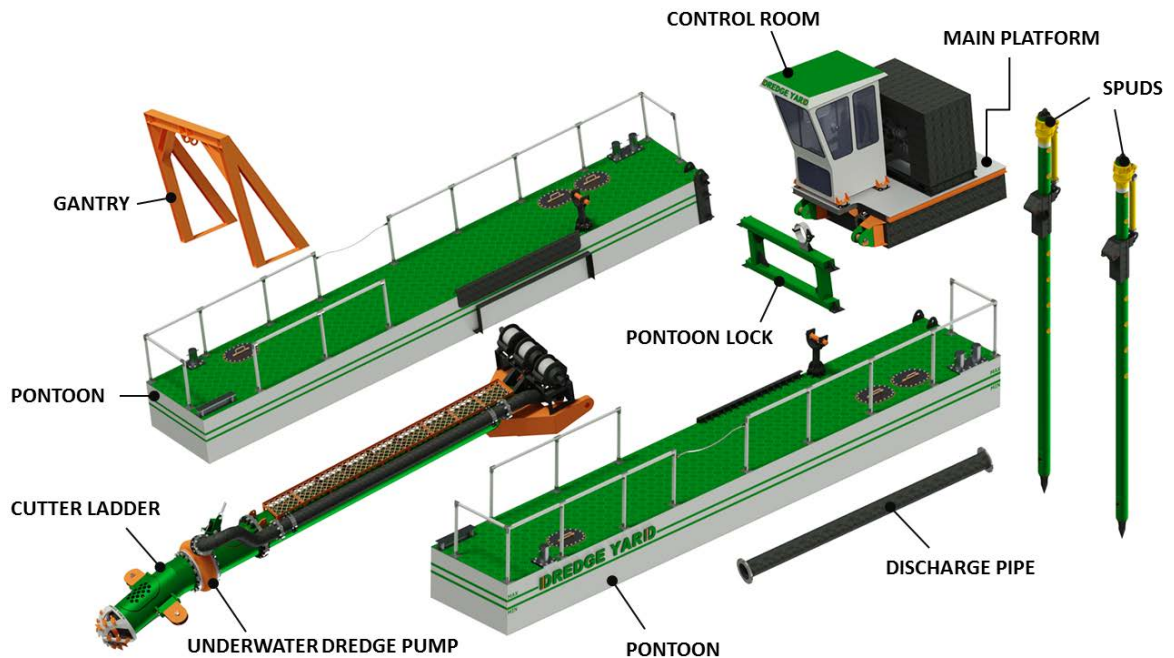


Figure 4. ECO200 Major Parts

Figure 4 illustrates all the major components of the ECO200. The ECO200 dredger will consist of two side pontoons; main platform with control room, engine, and hydraulic power pack unit, fuel tank, and oil tank; cutter ladder including underwater dredge pump, cutter head, suction line, winches; gantry, pontoon lock, spuds and discharge pipe.

Improvements and solutions

1. Delivery time

Delivery time is always a major issue. Some projects have urgent need for dredger. To facilitate this issue, Standard ECO200 will be available on stock. There are many companies who have urgent requirement for small size dredger and this option is taken in regards for such customers. Companies will have to consider only the transit time of the dredger for their planning of the projects.

2. Easy transportation

Transportation of the dredgers is one of the major concerns and usually comprises about 10% -15% of the total dredger cost. In addition to the cost, the delivery time of the dredger is also affected and later assembling and installation time costs further more requiring special arrangement for loading and off-loading.

To resolve the issue with transportation for such small sized dredger, immense amount of focus was given to the design of the pontoons and the platform and the mode of transport. Basically the complete assembly is made of three parts consisting of two pontoons and one middle assembly included with ladder, drive platform and cabin.

It will be a surprise to know that the complete ECO200 dredger can be transported by two standard 40 feet containers. What could be better option than using containers for transportation? It's safe, secured, always available, easy to handle and can be transported anywhere like near the lakes and rivers and to any country at low cost.



Figure 5. Transportation arrangement

Figure 5 explains the arrangement for the transportation. Let's find out how it's possible to transport ECO200 using two 40 feet containers.

The two side Pontoons fit in one 40 feet container placed one on top of another.

Other 40 feet container will contain all other remaining components like the main platform with cutter ladder, pump, spuds, gantry, railings, discharge pipe and cutter head.

It may seem very tedious job to assemble the parts together requiring special technicians and tools but it would be interesting to know that the parts of the ECO200 are arranged in such a manner that all parts are ready to use and just need to be assembled together using fasteners and welding.

The main platform that carries engine, hydraulic power pack unit and control room will be supplied ready assembled with the cutter ladder with all components such as pump, pump drive, cutter drive, hydraulic winch and suction line. This assembly is designed in a way that the total length, width and height remain within the standard 40 feet container dimensions. Moreover, all hydraulic connections will be ready connected.



Figure 6. Main platform arrangement

During installation, it just needs to be bolted with the pontoons and once priming of the pump. Your dredger will be ready to use saving major time of installation. Other components are very easy to install.

3. Easy Assembly and dismantling

As discussed in earlier section, all the major hydraulic connections, drive connections will be done before delivery by Dredge Yard. In the field site, all the parts just need to be fastened together with the standard tools, without any special facilities or tools requirement. However, Dredge Yard will provide all the tools with the delivery of the dredger.

In the same manner, dismantling can be performed and all parts can be transported to other site in standard containers saving time, cost and energy.

Other than easy assembly and dismantling options, basic instruments controls are provided that allows easy to operate option and maintenance and repair by the end user.

User manual will be supplied for installation of the components.

4. Foldable Spud system

In the rivers and canals, during towing of the dredger, it needs to pass through low height bridges, shallow river areas and other obstacles. To overcome this problem, the two spuds provided at the end of each pontoon for the penetration of the soil and the swings of the dredger have the option for folding. Each spud is lifted by one hydraulic cylinder. The complete spud assembly together with its hydraulic cylinders is able to be tilted on its pontoon. Figure 7 illustrates the tilting of the spuds.

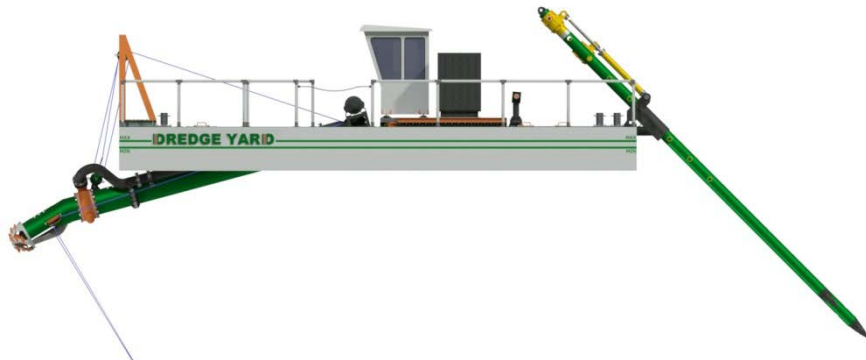
During Operations,

Spuds angle: 90°,

Cutter Ladder lowered.



Spuds tilt able.



During Towing,

Spuds folded,

Cutter ladder lifted.

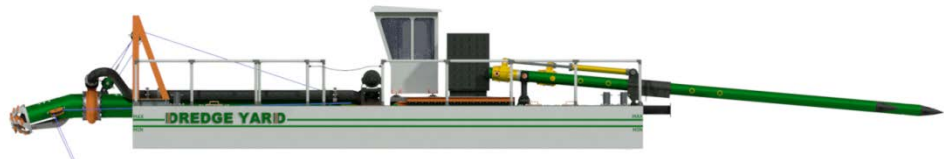


Figure 7. ECO200 Spud Tilting

This allows the dredger to be towed easier and under pass low bridges and other obstacles.

5. Replaceable cutter teeth

Another benefit of the ECO200 is that it will be provided with cutter head with replaceable teeth what is unusual for this size of dredgers in the market. The replaceable cutter teeth will allow the dredger to change to different type of teeth according to the soil properties. This will increase productivity of the dredger and prevent wear on the cutter.

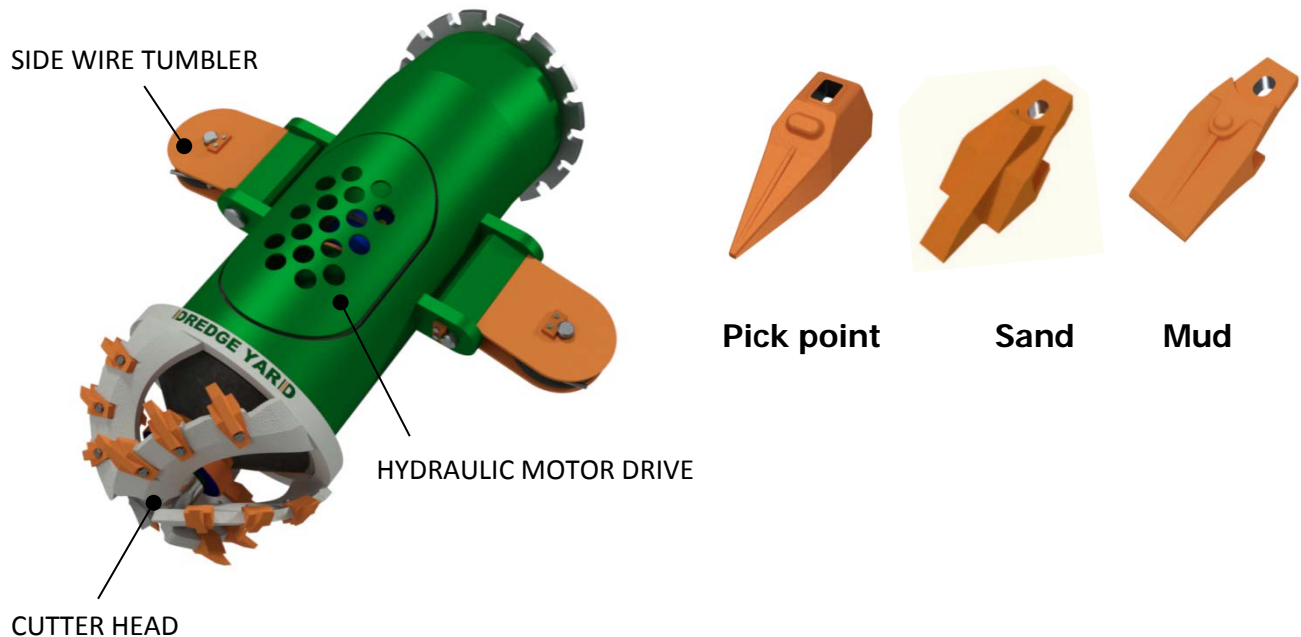


Figure 8. Replaceable teeth cutter head

6. Underwater dredge pump

The ECO200 dredger will include an underwater dredge pump placed behind the front part of the ladder. This will allow the dredger to be able to handle higher dredge mixture and high volume of mixture flow. The dredge pump is designed and simulated by Dredge Yard using one of the leading CFD simulation software in the market for providing the best efficiency in its class and maximum output. Figure 9 explains the design of the underwater dredge pump. For more information on the pump, please contact Dredge Yard.

The underwater dredge pump and the replaceable cutter head will give the ECO200 superior performances compared to other dredgers in the same size range. High performance will allow the dredger to have a short return of investment.

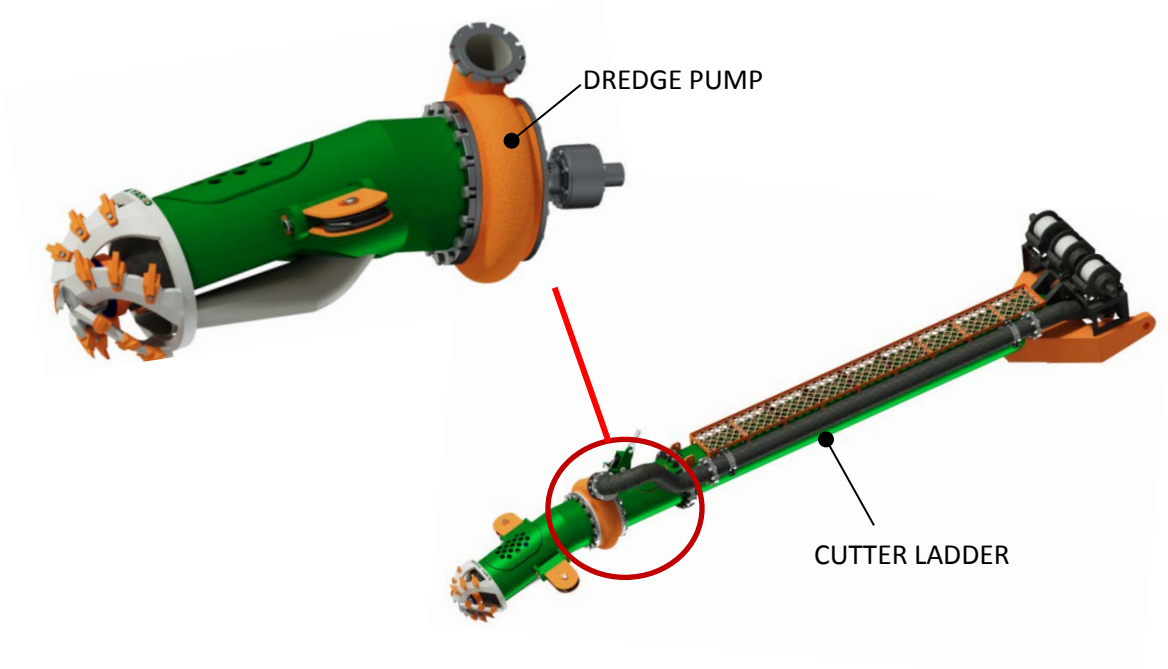


Figure 9. Underwater dredge pump

Other benefit of using underwater dredge pump is that it will also be easier to extend the ladder what is standard suitable for dredger at six metre depth.

7. Ladder Extendable

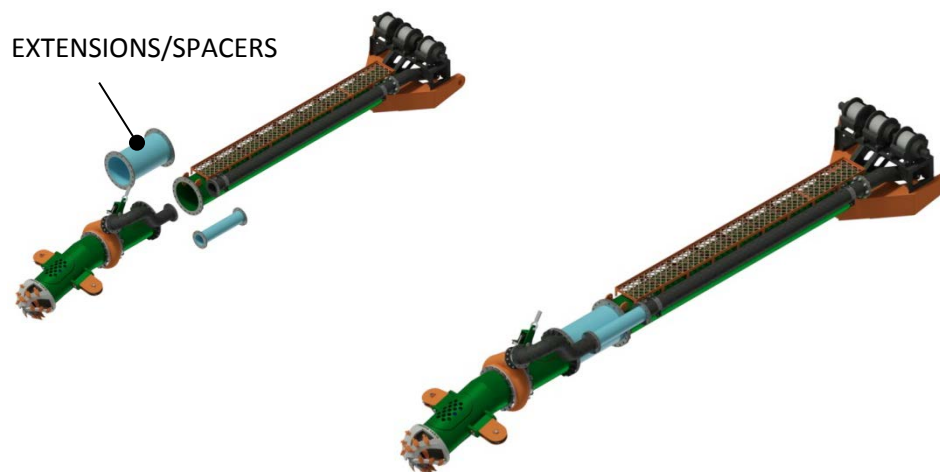


Figure 10. Extendable ladder

This is another option from ECO200 that it is capable for increasing its cutter ladder depth. Standard ECO200 can dredge up to 6 m depth while it can be extended up to 9 m easily.

8. Simple Design

For the drive of all components being the dredge pump, cutter head, winches and spud cylinders, one hydraulic power pack is provided on the central platform. All components are hydraulically driven allowing the power to be distributed in a better way to give more power to the highest user. Also the ECO200 can be provided with hydraulic power unit driven by diesel engine or electric motor.

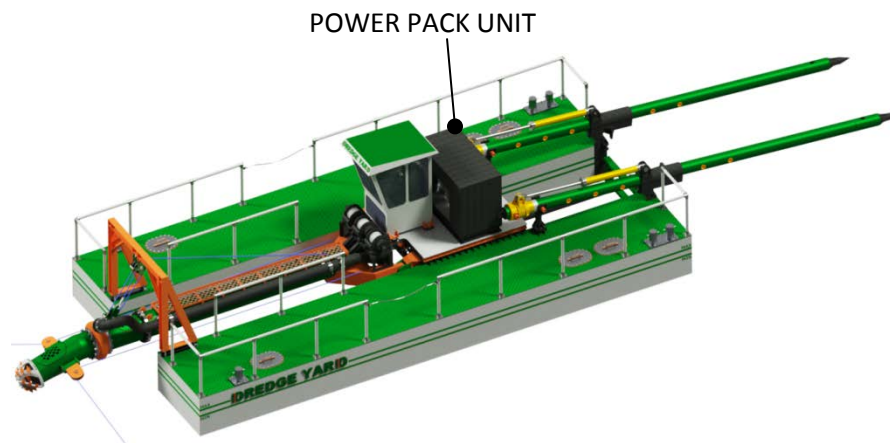


Figure 11. Simple design- hydraulics

The hydraulic power pack is placed outside on the main platform. In this way, it will be easy to access for maintenance or in case if the end user wants to upgrade, it can be easily replaced.

AFTER SALES SERVICE

Dredge Yard will offer:

1. Testing and commissioning
2. A strong support onsite assisting end users with their projects.
3. Basic training will be provided onsite for one or two days by Dredge Yard's experts.
4. All spare parts will be available on stock ready for shipment at any time to prevent downtime the dredger and delays in the project.



Figure 12. Testing/Commissioning

CONCLUSIONS

Robust design, multi options, highly efficient components, easy and versatile usability and maintenance concludes Dredger ECO200 to be best in its class and besides that Dredger ECO200 will be available in stock. It will be built in the UAE under the supervision of Dredge Yard engineers. Availability of shipping ports and shipping lines to any place in the world from UAE allows easy, cost effective and fast transport of the dredger. All parts fit in standard closed containers.

All these features will not just provide best quality and reliability but also ensure high savings on initial acquiring cost for the dredging companies.

FOR MORE INFORMATION REGARDING TECHNICAL SPECIFICATIONS AND PERFORMANCE CURVES, IT IS ADVISED TO CONTACT DREDGE YARD.

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