

# IHC 7025MP Cutter Suction Dredgers for the Chinese dredging market



BEIYA 1 HAO

The market trend in China to go for an increase in scale of dredgers first became apparent in the mid nineties with the new building of cutter suction dredgers for a Chinese Waterway Bureau. These dredgers were designed for a nominal production of 1750m<sup>3</sup>/hr and they were the first dredgers in China to be equipped with spud carriers. The submerged dredge pump application was considered optional and was realised at a later stage. It was the prelude to a change in the market from small-scale dredging to operations at a large to huge scale. The trend can be described as: large dredging depth; great discharge length; high production output and sufficient accommodation for 24 hours operation and a sturdy seaworthy hull allowing for bad weather conditions.

In 1999 IHC developed its first ideas to beat this existing design with a better performing concept, and at that particular time - with respect to the ratio of European currency versus the RMB - a competitive option was possible. It was too early, however, to convince the market at that time.

## BEIYA 1 HAO

Around 2004 Tianjin Dredging purchased a second-hand dredger that came close to the design as mentioned above. The client was also aware of the earlier design of IHC, however, and in the course of 2004 IHC received the inquiry. By giving the design extra technical advantages compared with the existing designs in the market IHC was awarded with the contract by the newly established Chinese contractor "Qingdao North Asia Construction Engineering Co Ltd" of a dredger with a production of about 2,300m<sup>3</sup>/hr and an accommodation for 13 persons.

This dredger, named BEIYA 1 HAO, was delivered in January 2006. Immediately afterwards the BEIYA 1 HAO was put to work in one of the many big dredging projects near the city of Tanghai (in Hebei Province), together with about 35 other dredgers from different dredging contractors.

This dredging project of the BEIYA 1 HAO was part of the "Business development plan" in the Bohai Sea. Around Tianjin, in several ports development works were and are

carried out simultaneously. Dalian, Tianjin and Qingdao were assisted by the ports of Qinghuangdao, Yingkou and Yantai and together formed a mega ports group.

Qinghuangdao is the main port in the province of Hebei. It is surrounded by satellite ports like Huang Hua Port and Jingtang, which handle bulk goods. The port of Cao Fei Dian will become the specialised port with a deep water berth for ore and crude oil. In Cao Fei Dian a new facility is also being developed for the Capital Steel Factory which is scheduled to be moved from Beijing to the coastal area, requiring the reclamation of about 300km<sup>2</sup> land; 150km<sup>2</sup> of this has to be reclaimed at Tianjin Port.

Another development area is Tang Gu Ling Gang, an industrial area where 12km<sup>2</sup> of land will be reclaimed. These are just some examples of the many projects in this area that create an enormous boost in the dredging market, attracting many dredging contractors. These dredging contractors are partly experienced and partly without experience, both trying to benefit from these developments.



GANG HANG YUN 8 HAO

In 12 months' time the BEIYA 1 HAO had a production of over 10 million m<sup>3</sup>. The dredged material was silty sand that had to be pumped over 6km. The average dredging depth was about 20 meters. The client remains very enthusiastic about the performance of the BEIYA 1 HAO.

### IHC 7025 MP orders

Since the contract for the BEIYA 1 HAO was signed, IHC closed several contracts for this type of dredger. The dredger was designated an IHC 7025MP cutter suction dredger, which can be explained as follows: the first two digits refer to the suction diameter in centimetres and the last two digits refer to the dredging depth in meters. The letters "MP" refer to Mono Pontoon Execution.

So far 13 dredgers have been contracted for delivery in 2007 and 2008, 2 of which are already in operation. The clients are based in Guangzhou, Tangu and Beijing. Guangzhou Dredging already invested in a Dredge Wheel application. With the exception of the reputed dredge company Guangzhou Dredging, all other contractors are new players in the market.

Though all dredgers are based on the same concept and dredge systems, IHC has made adjustments based on the individual wishes of clients. With the modular design approach of IHC this option can be fulfilled. Clients pay a licence fee for the use of a package of standard drawings.

### Design of the IHC 7025MP

The design of the IHC 7025MP focuses on typical Chinese requirements, such as large dredging depth, strong side winches to enable dredging in current, large accommodation (to facilitate working in remote areas) and many cost-reducing features such as a basic instrumentation and control package and the application of locally purchased auxiliary equipment.

The IHC 7025MP is a hydraulic dredger, meaning that besides the spud carrier, the cutter drive and all winches used for dredging operations are diesel-hydraulic driven as well.

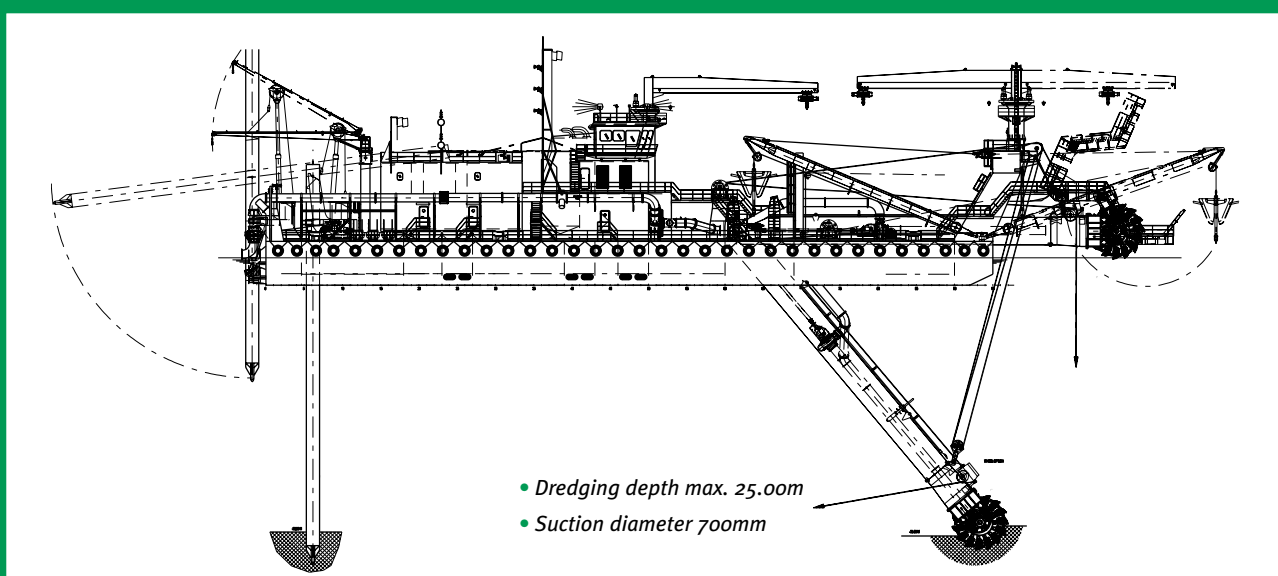
The idea behind the design is to work with modules which in itself represent proven technology and can be combined in various different ways to meet the specific demands of customers.

By using the same basic design short delivery times for design drawings can be achieved.

A General Arrangement with the main dimensions of an IHC 7025MP with a dredging wheel is shown below.

There are two different types of accommodation for the IHC 7025MP, one for 12 persons and one for 21 persons. Both accommodation units are placed on vibration dampers for increased comfort onboard.

Because the IHC 7025 MP is designed



General arrangement IHC 7025MP



Cutter ladder of the BEIYA 1 HAO

for dredging in river estuaries where strong currents can be encountered, the IHC 7025MP is equipped with strong swing winches.

The pumping hearts of the IHC 7025MP cutter suction dredger are two high-efficiency dredge pumps, one single



IHC swivel unit of the BEIYA 1 HAO

walled submerged dredge pump and one double walled inboard dredge pump. Both the inboard and submerged dredge pump are of this same type, allowing for the interchanging of impellers and some other wear parts, limiting the number of spares to be kept on board of the dredger. All wear parts of the pumps are made of wear-resistant materials such as Maxidur 5, resulting in a long life. For an increased discharge length (up to 12km) IHC has also

designed a land based-booster station. The submerged dredge pump is electrical driven; the electric engine is positioned on the upper part of the cutter ladder. The inboard dredge pump is driven through a special integrated gearbox-bearing assembly which reduces the length of the drive train.

The dredgers are designed and built in compliance with the rules of the China Classification Society (CCS) and meet all current international rules and regulations as far as relevant to this type of vessel. Even though the IHC 7025MP has become a standard dredger, for every IHC 7025MP contract specific client requirements were incorporated.

To keep investment costs as low as possible, the IHC 7025MP cutter dredger is equipped with a basic instrumentation and control package, consisting of an Automatic Pump Controller (APC), Production Calculator (PRC) and a Swing and Depth Indication System (SDI). But if required, a more sophisticated level of automation, for example an Automatic Swing Control is available. A further option is the installation of a management tool, consisting of a shore-based monitoring system of the production rate, fuel consumption, downtime etc.

Feedback during the construction, commissioning, operational experience and suggestions of our clients have been used to improve the basic design. An example of this comprised the

increase of the spud carrier stroke from 4,8m to 6,2m without changing the main dimensions of the dredger. A larger spud carrier stroke contributes to a higher efficiency of the dredger as the stepping procedure requires less time. Other improvements include a local control near the cutter head for inching the cutter motor for mounting and dismounting of the cutter head.

### Dredging wheel option

The IHC 7025MP can be delivered with two different types of cutter heads for different soil conditions. For soft soil an IHC cutter head is delivered with flared teeth, for compact sand and soft rock a cutter head with narrow teeth is provided. A special advantage of this dredger is that it can also be equipped with an IHC dredging wheel. This dredging wheel is interchangeable with the cutter ladder lower piece and enables dredging of sticky clay with a minimal investment. All existing IHC 7025MP dredgers can be equipped with a dredging wheel, making it a versatile piece of equipment suitable for various soil conditions.



Spud carriage GANG HANG YUN 8 HAO

### IHC Scope of supply

China charges high import taxes and in order to meet the market demand for a good quality dredger at a feasible price, the scope of supply is based on a practical demarcation of system liabilities. For the contracts concluded all yards respect the intellectual property rights of IHC Holland and signed nondisclosure agreements. As a lot of know-how is contained in some dredge components which are not under the normal quality survey of CCS, IHC produces these items as ready-to-fit modules in China at their premises.

The IHC scope of supply for the IHC 7025MP cutter suction dredger consists of a design (software) and a hardware package. The design package comprises an extensive drawing package including drawings and calculations required by the Classification Bureau (CCS). The hardware scope of supply includes all the dredge components and key systems that are of importance with respect to the performance of the dredger, including the commissioning of this equipment. All special dredge components such as the cutter ladder upper and lower part (with cutter drive), the complete spud-handling installation, the swivel unit, anchor booms and dredging valves are delivered by IHC. The IHC delivery also includes the major drive systems for the submerged and inboard dredge pump, the hydraulic power generation with the hydraulic distribution panels as well as all hydraulic winches. Besides the optional instrumentation package, dredging wheel and other options above, the scope of supply can also be extended with a complete hydraulic piping package.

### Commissioning

A crucial part of the scope of supply of IHC is the commissioning of the dredging equipment of the IHC 7025MP. This is carried out by a qualified team including mechanical, hydraulic, electrical and electronic engineers, a dredge master and a general supervisor. Commissioning starts by witnessing the inclining test, checking the proper mechanical installation of the main components, flushing of the hydraulic systems, checking the electrical connections etc. and usually ends after successful dredging trials and is followed by handing over the dredger to the client. The commissioning team consists of IHC engineers from both Holland and China.

### Customer and Product Support in China

As explained above there are many newly established dredge contractors with a varying degree of dredging experience. The actual experience available is rooted in a limited group of technical crew and staff, educated in the state-owned dredge companies.



Commissioning team

This source however is quickly drying up. The scarce availability of experienced staff is one of the biggest concerns in the dredging industry in China.

The increased demand combined with short delivery time requirements demands a stronger focus on logistics. The increased value of the goods as a result of the larger scale limits the capability of the newly started companies to make significant investments. The high cost of fuel also takes up a large proportion of the cash. In addition to the cost element there is the increased pressure of investors to complete the costly infrastructure within the planned periods of time and preferably earlier. At other places, trends are similar and therefore IHC has made it a priority in its market approach to pay close attention to the lowest cost of dredger operation. This can be achieved by hiring high qualified crews, training the crews and by improving the logistics of the delivery of spare parts.

In China, IHC has invested in a logistic center in Tianjin where spare parts and consumables are kept in stock. 24/7 maintenance assistance can be provided by service engineers from the service center in Tianjin, supported and trained by experts from the Netherlands.

A Life Cycle Support programme has been implemented to provide customers with targeted support when maintaining their ships and equipment. However, still new in the dredging world this

concept already has greatly matured in other capital-intensive industries (for instance the aviation industry). The service provided by IHC Holland covers more than just building ships and systems. It includes the supply of spare parts, training, service and advice for renovation. The range of service is extensive. To provide support for this on a global level, IHC has an ever-growing network of service centers throughout the world. In 2007 IHC starts with a training center for CSD dredge masters in China.

### Conclusions

With the introduction of the IHC 7025MP cutter suction dredger a new standard is set for a medium-sized cutter suction dredger that meets the requirements of the Chinese dredging market. Considering the recent developments, which require a higher standard of professionalism, IHC is investing in training in China and in providing 24/7 service with local engineers and supplying spare parts from our stock in China.