



AmphiMaster: The Amphibious Excavator

The AmphiMaster is specifically designed to maneuver in marshy and swampy areas, soft terrains, and is also able to float on water. EQUIPMENT INDIA scoops out more details from **Rajiv Mehta, Managing Director, ACE Infrastructure**, who has conceptualised the amphibious excavator for Indian site conditions.

Water is essential for humans. Civilisation normally develops around water bodies; hence, to evolve, we develop areas near water sources. India has a very long coastline and is blessed with a large number of rivers and lakes. Development of these areas needs earthmovers. Excavators work on land, dredgers can work in water but there is the dearth of a machine suitable for use in marshland, poor soil, and slush and water. Hence the need for a solution to have a machine which will work on land, marsh and water as well, became imperative. Enter the AmphiMaster. Rajiv Mehta says, "The concept was to have a machine which will be self-propelled in water and on land and in marsh conditions, use an existing standard hydraulic excavator or a

new one to reduce capital cost, be easily serviceable and have a long reach to be really effective. This concept of an amphibious excavator led us on a search for equipment to fill this gap, for a solid and robust designed, engineered and easily serviceable machine for India."

He follows that up with, "We have already sold the first AmphiMaster AM 350 unit in India. We plan to have a small fleet available for long-term and short-term lease as well," says a beaming Rajiv.

He further says, "We are associated with EIK Engineering, Singapore, who have been designing and providing long-reach attachments for numerous and unique dredging applications over the years. It is inevitable for us to continue providing more comprehensive products

to satisfy our customers' never-ending quest for enhanced efficiency, safety and leading edge solutions. Our customers can rely on us to provide a complete package to carry out tasks in challenging terrains with incredible efficiency and high ROI (Return On Investment). A long-reach front AmphiMaster has always been part of our product design roadmap. Our exposure during the many years of working with our customers in overcoming various challenging terrains has provided us with a wealth of experience and knowledge, and that is behind the design. Completely self-propelled, it can virtually access all terrains and yet requires minimum supporting transportation or hoisting equipment. Greater versatility can be easily achieved when used in conjunction with the wide



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range of attachments we produce. We have in-house expertise in designing customised attachments in tackling unique challenges where traditional off-the-shelf solutions fail to deliver."

Application areas

Simply put, it will work where no other excavator or dredger will go. This opens up a huge area of application. It is possible to achieve what earlier was not possible, bringing immense advantage, competitiveness and cost reduction. There is nothing like this that we know of in the Indian market, the segments where this product is ideally suited: reservoir capacity augmentation (increasing the water retention capacity by desilting and fresh excavation); inland dredging of lakes, canals and waterways; flood control (deepen water

way to reduce impact of flooding); and deepening of the river delta.

The technology

The design is based on extensive R&D and field trials after which the final design has been arrived at. The design incorporates technologies which will help make the customer experience of owning and operating a pleasure. The design is validated on a modern design software for stress and balance. Some design elements which are instrumental in making the Amphimaster a potent tool are:

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because it can float, hence it does not fear to work in very poor soil or water; it

uses a standard basic hydraulic excavator as the building block; it has very low ground pressure and a heavy-duty track chain that is designed to ensure that it can extricate itself without breaking a track. Also, it has the synchronous quad drives system (patent pending) which gives unparalleled traction power with speed.

Pontoon: Structural grade tensile plate is used for the fabrication of the pontoons. The goal is to construct a high strength and durable base structure without being overly heavy, as it would hamper its efficiency. The pontoon is designed to be able to float on water as an added safety feature. It has three watertight compartments with easy access from outside for inspection and preventive maintenance. An optional hydraulic system is available in extending the pontoons outward or



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retracting inward, reducing the overall footprint for transportation.

Track chain: Each pontoon comes with three strands of heavy-duty track chains, constructed with high tensile steel with a yield strength of 700 mpa (100,000 psi). Track shoes/cleats supported by three strands of track chain provide the advantage of a uniform pulling force and superior weight distribution across each track shoe/cleat.

The hard-working sprockets, rollers and bushings (embedded within the rollers) are made from hardened steel, reducing the frequency of replacement and costly downtime. Rollers are traveling on a strip of wear-resistance steel plate, preventing any form of premature wearing of the pontoons.

Motor: High quality hydraulic motor with proven technology and reliability from a reputable manufacturer is fitted at

UNIQUE FEATURES

- Uses any standard excavator of 10, 20 or 35 tonne class depending on the model of the AmphiMaster
- Uses 6 separate isolated flotation cells
- Made from corrosion resistant marine grade of steel and then specially treated by multi coats of marine paint to reduce the marine corrosion effects
- Synchronous quad drive system to enable the machine to extricate itself from most situations
- Can be easily split up for road transport and each split component is designed to fit inside and be shipped in shipping containers
- Can fully float and propel in water
- Very low ground pressure
- Special heavy-duty track tread to work in slush and mud
- Can work on ground and semi float conditions as well
- Special design long reach attachment for greater working radius
- Can be fitted with a huge array of more than 25 options—some frequently requested options like extra flotation tanks, fuel tanks, tool boxes, and walk around railings
- Long reach boom and arm
- Self-erecting and collapsible hydraulic spuds which are fully collapsed while not in use to enable unrestricted operation
- Hydraulic winches for spud or anchor handling
- Hydraulic marine propulsion
- Vibro hammer for piling
- Dredge pumps
- Cathode protection



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both ends of each pontoon. Two active drive motors propelling each pontoon provide twice the tracking power, and it is virtually undeterred in any terrain. A similar concept applies to a full time 4x4 gear system of a land vehicle.

Safety angle

How do you ensure the safety of the operator of the AmphiMaster when it is working either in water or in marshy land? And what is the possibility of a failure? Rajiv points out, "The world over there has not been a single major accident due to equipment failure." He further explains, "We have incorporated many safety features on the unit; individual isolated chambers which enhance structural stability even if a flotation cell is partially damaged.

Buoyancy is calculated to lend full flotation as a safety feature; the structure is balanced to minimise tipping possibility. A specially designed long reach to provide least tipping; there is a synchronous quad drive system to provide balance to the system. The machine is welded using robotic welding for weld integrity. Provision of hydraulic spuds ensures stability, and there is the provision of life jackets in the event of an operator having to bail out. Optional walk-around railings with guard rails can be provided, and last but not the

least, we provide operator training in the proper use of the AmphiMaster."

Cost factor

High cost of sophisticated equipment always acts as a deterrent in adopting latest technology and advancements. However, Rajiv says, "The cost of the AmphiMaster is approximately 50 per cent cheaper than a similar-sized dedicated dredger on the capital side and on the operation side, the productivity cost is very low as compared to standard operating practice where the AmphiMaster outshines itself by especially carrying out jobs in swampy areas unlike the standard excavator. For the latter to work in a swamp, you need to either lay steel plates or logs on the soft ground. It is both expensive and time-consuming and incurs plenty of extra resources. The AmphiMaster simply walks in, does the job and walks out."

"The AmphiMaster is custom-made for Indian customer requirements, but imported. We are exclusive dealers to EIK Engineering for the AmphiMaster range and other products in India. We work with the customer and customise the features required, help the customer in the selection of base excavator and finally, our engineers integrate the AmphiMaster with the customer's excavator; and we train the customer's operators as well," Rajiv sums up. **EI**