LEMAC EXCAVATOR Customizing

Amphibious Excavator

What is an Amphibious Excavator?

- An amphibious excavator, also known as a marsh buggy, is an excavator specifically designed to manoeuvre in marshes, swampy areas and soft terrain, as well as to float on water.
- The physics behind the amphibious excavator lies in the hermetically sealed pontoons, designed based on Archimedes' principle. Coupled with its large foot print, this creates an extremely low ground pressure.
- The machine is capable of tracking in both dry, soft and swampy areas with little or no risk of being stuck in the mud.

Why Amphibious Excavator?

- Standard crawler excavators have much higher ground pressure and are not designed to track in soft terrain.

Typical Applications

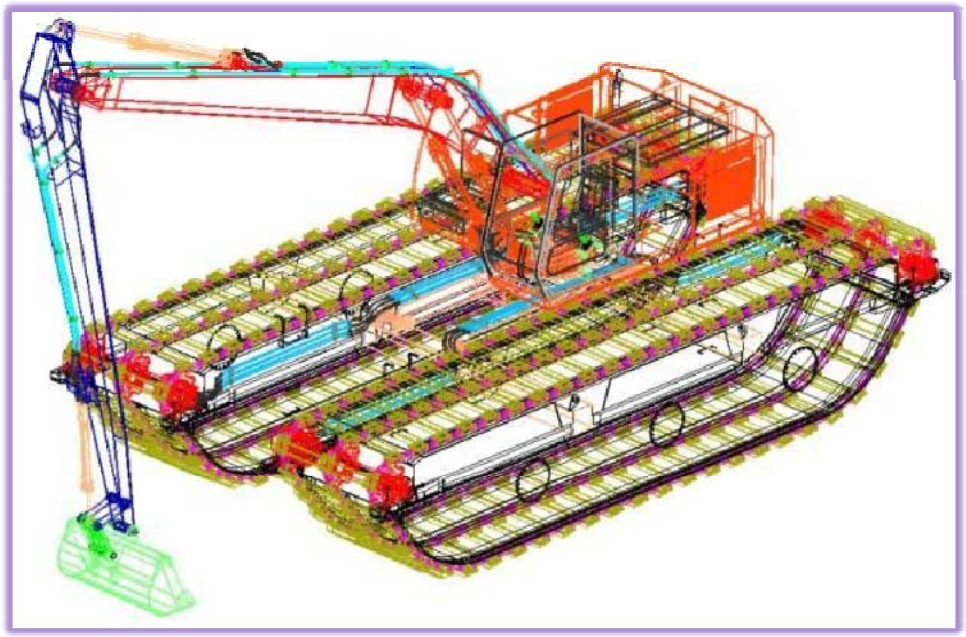
- Our amphibious excavators has proven itself and performed exceedingly well in the followings applications :

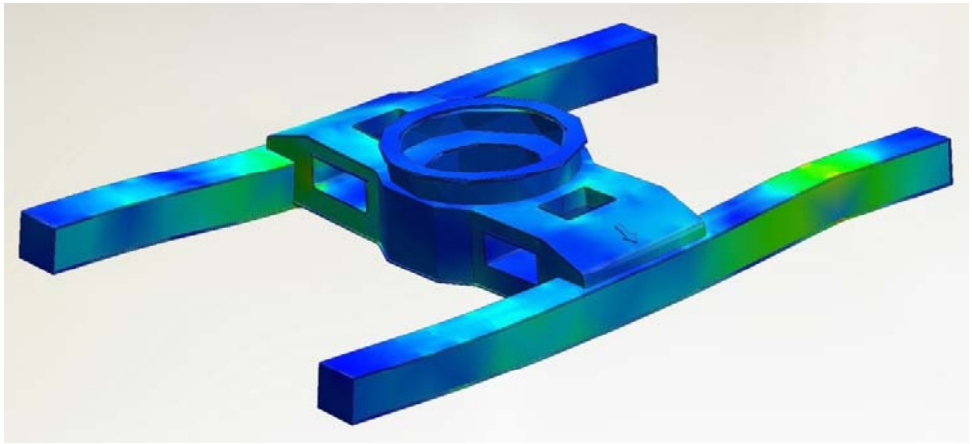
  - *Dredging*
  - *Landscaping*
  - *Erosion control & prevention*
  - *Deepening of waterways & river deltas*
  - *Maintenance & cleaning of rivers, lakes, shorelines, etc*

Product Design Philosophy

- All products must meet D. E. P. criteria prior to launching.
  - **D**esigned for Functionality
  - **E**ngineered for Reliability
  - **P**riced for High ROI (Return On Investment) for customer
- We believe in yielding higher quality products through the investment of technology and human capital.
- We continuously upgrade our equipment and provide human resource training.

Advance 3-D Design





- All product development is achieved by advanced designing software.
- Designs are simulated through a state-of-the-art FEA program, ensuring design integrity and increased field reliability.

Industry Leading Features

- ✓Multi-Synchronous Drive System
- ✓Hydraulic Extendable & Retractable Pontoons
- ✓Non-Hydraulic Extendable Option
- ✓Exclusive Pontoon Design & Specialized Construction
- ✓Superior Heavy-Duty Track Chain & Steel Shoes
- ✓Easily Replaceable Sprockets
- ✓Extremely Modular Design

Multi-Synchronous Drive System

- Proprietary multi-synchronous drive motor design.
- Motors are mounted on front and rear of each pontoon.
- It offers superior tracking power as compared to a single motor design. A similar concept that is applied to a full time 4x4 gear system of a land vehicle.
- Swampy areas are not necessary flat, and one will realize the full potential when tracking on uneven and high viscosity muddy terrains.

Multi-Synchronous Drive System *(cont.)*

- Most single motor powered pontoons require a reduction system to reduce travelling speed. Our multi-synchronous drive system is designed to retain as much of the original travelling speed as possible.
- We have conducted field tests and have proven a higher travelling speed and momentum, coupled with front and back synchronized motors can drastically reduce the risk of being stuck when tracking in thick muddy ground.
- No modification to the main pump or hydraulic system of your existing excavator is required to accommodate the multi-synchronous drive system.

What If...?

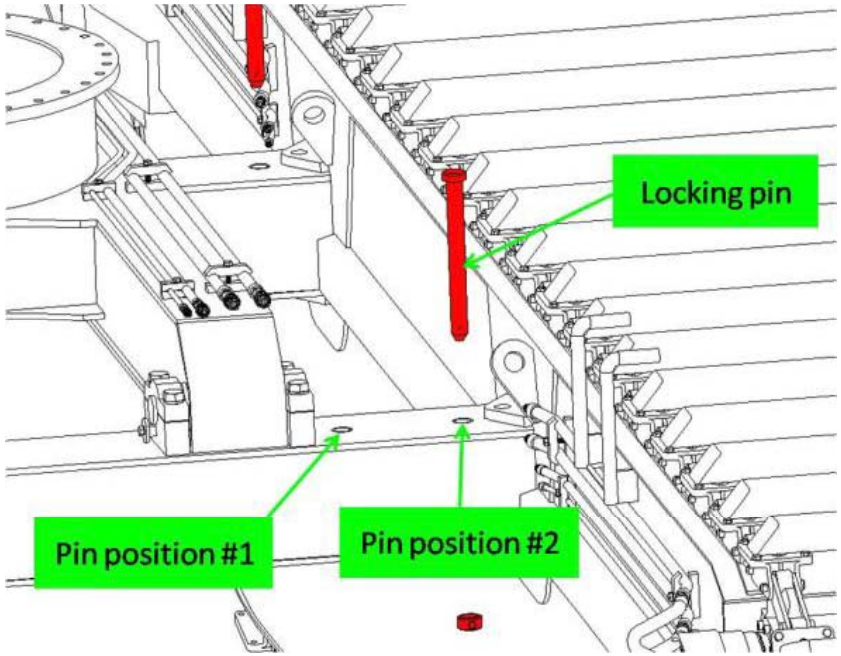
- What if the drive motor of a single motor powered pontoon breaks down in the middle of a swamp?

- Our multi-motor system would still enable the entire machine to track back to dry ground for service, although speed and power may be compromised.

Hydraulic Extendable & Retractable Pontoons

- Extension and retraction of pontoons “on the fly”.
- When fully extended, it offers the extra stability needed when situation calls for.
- Provide the flexibility of narrow track width when fully retracted when needs arises.
- Designed for ease of land transportation of complete machine by trailer when pontoons are fully retracted.
- Higher ROI through long term saving of manpower, crane hiring and other logistical cost.
- Hydraulic extendable pontoons is a standard feature for 12 ton class and below amphibious machine.
- Optional features for 20 ton class and above.

Non-Hydraulic Extendable



- For non hydraulic extendable design, there are 2 separate locking pin positions for each pontoon on the horizontal mounting beams.
- Users can choose their desired overall track width during the installation process.

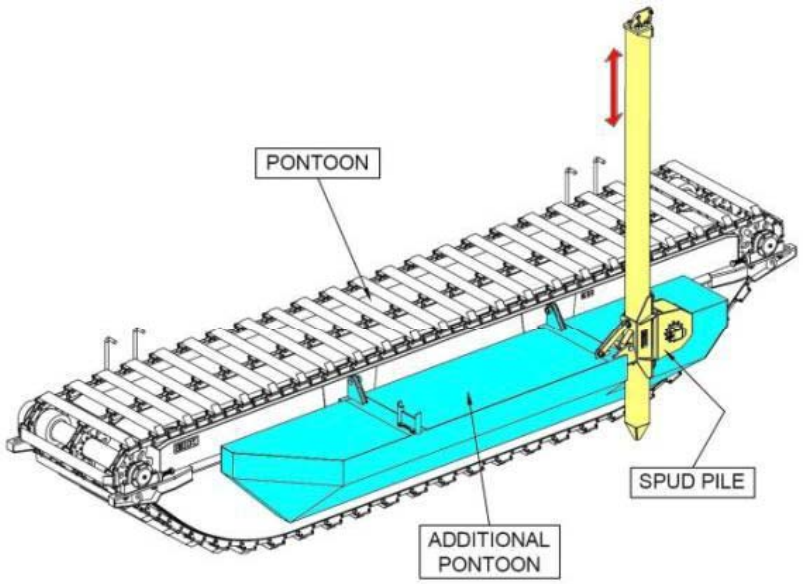
Pontoon Design & Construction

- Each pontoon has 2 bulk heads with 3 water tight compartments which are hermetically sealed.
- The pontoon is designed with sufficient displacement applying Archimedes' Principle to ensure the entire amphibious excavator is able to float on water as a safety feature

- Each pontoon comes with manholes for easy access to its interior for servicing & maintenance.

Supplementary Pontoons & Spuds

- Supplementary pontoons can be added on each side to boost stability in deeper water operation.
- Spud piles attach to supplementary pontoons help to overcome buoyancy effect, it offers added stability and enhanced operability.

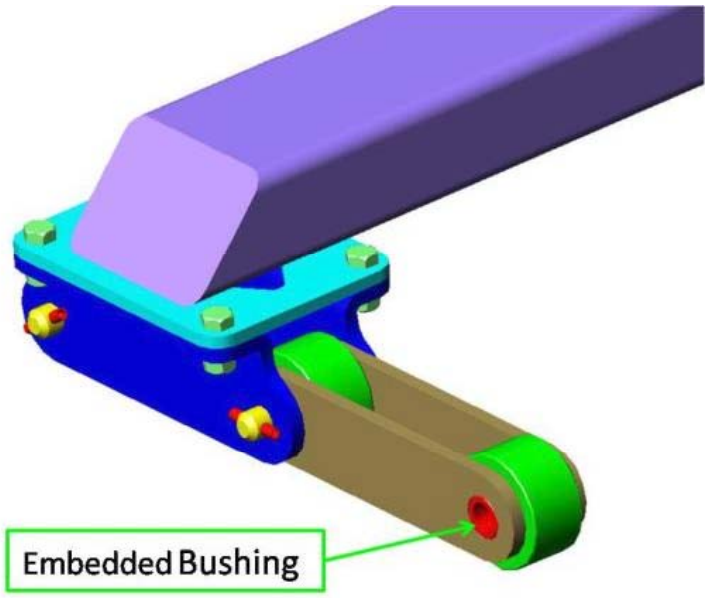


- Pontoons are designed and built with provision for later addition of supplementary pontoon and spud system.
- Future proof in design.

Track Chain

- The track chain is constructed with premium grade steel imported from Europe.
- The track chain, being one of the most critical component require high level of precision and consistency in the manufacturing process.
- Each track link plate is CNC laser cut to utmost precision of the highest standard.
- The track shoe is supported by 2 or 3 strands of track chain offers the advantage of uniform pulling force and superior weight distribution across each track shoe.

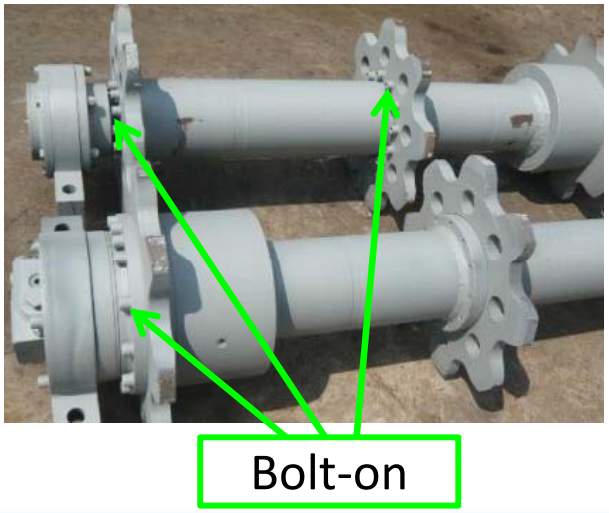
Track Chain *(cont.)*



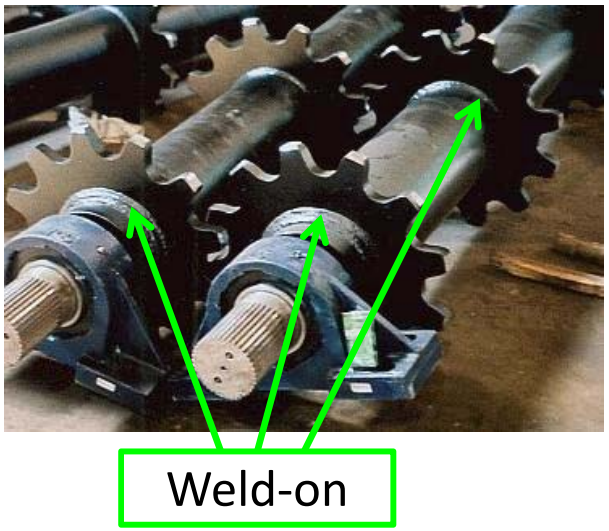
- The hard working sprockets, rollers and pins are made from hardened steel, reducing the frequency of replacement and costly down time.
- Rollers are travelling on a strip of wear resistant steel plate (Hardox), prevent premature wearing to the pontoons.
- Every roller has an embedded bushing (in red). The bushing protects and extends the useful working life of the track chain.

Replaceable Sprockets

OUR DESIGN



THEIR DESIGN



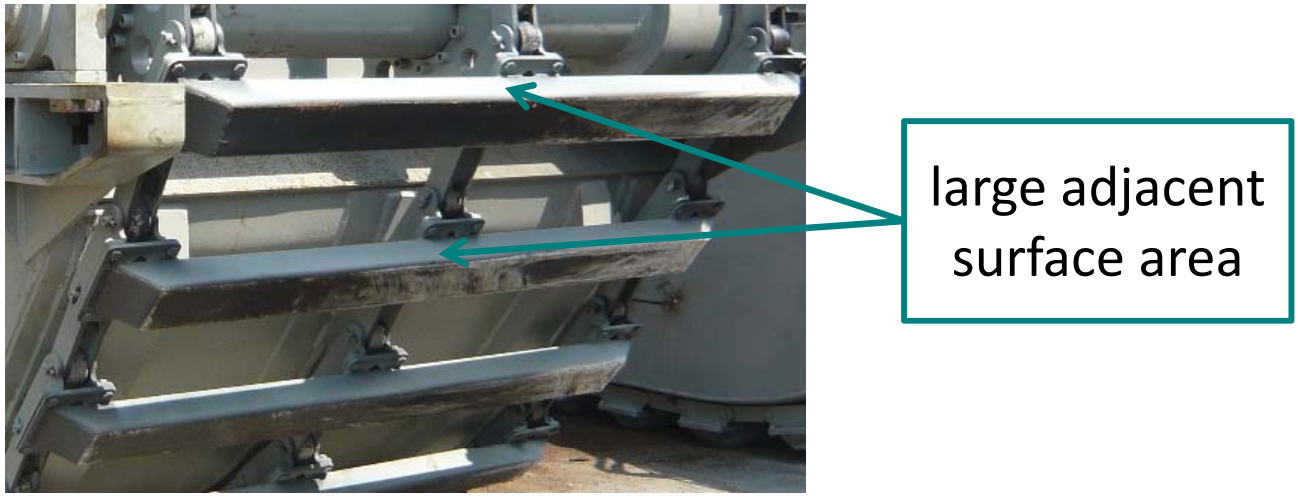
- Sprockets are machined to high precision.
- Induction hardened for durability.
- Each sprocket is bolted onto the axel which can be easily replaced individually.
- Replacement process is simple and perfect alignment is guaranteed.
- For competitors' weld-on sprocket design, replacement is much more tedious, complicated & costly.

Track Shoe

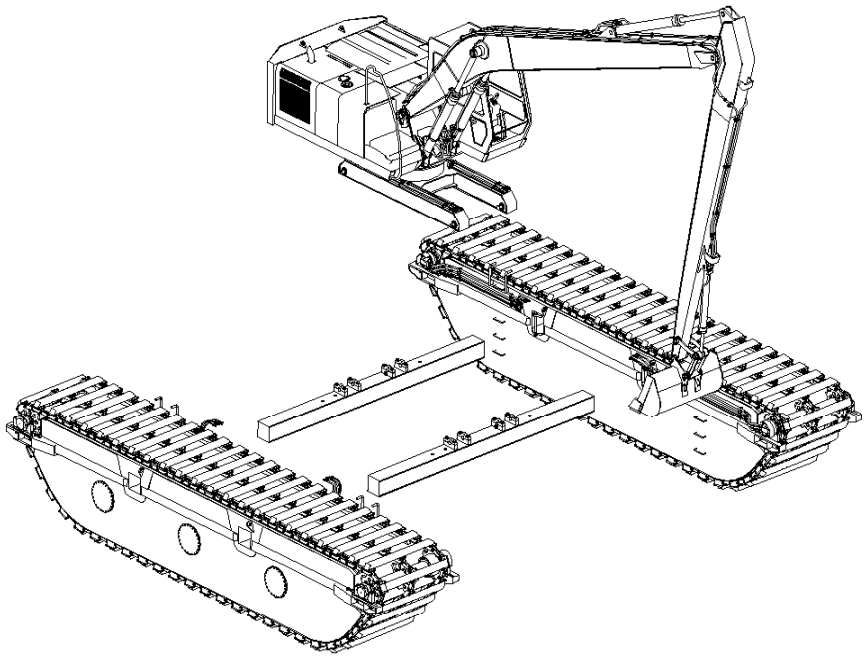
- Track shoes are steel fabricated.
- Steel is much more malleable than aluminium, and it has a wider spread between yield strength and ultimate tensile strength.
- The key distinct advantage of steel over aluminium is, it is less prone to cracking.
- The steel track shoes used have a typical tensile strength of 69,600 psi (480 MPa) and yield strength of 40,600 psi (280 MPa).
- Competitors who used 6061-T6 aluminium track shoe have a typical tensile strength of about 42,000 psi (290 MPa) and yield strength of about 35,000 psi (241 MPa).

Track Shoe *(cont.)*

- The track shoe is reinforced box design, enhancing the floating capability.
- A large adjacent surface area translates to enhance traction on soft terrain, & higher efficiency when “paddling” in water.



Modular Design



- Both the assembly and disassembly processes can be achieved in under 3 hours if equipped with proper tools and crane.

- No special tooling is required for the assembly and disassembly process.

Modular Design

- Designed to be easily transported by low bed trailer.
- Undercarriage modules and attachments are designed to be able to fit into 40ft container.

Manufacturing and Commissioning Test

Raw Material Preparation

CNC Laser Cutting Machine

- All steel material are processed by CNC machines to ensure a high level of precision and consistency.
- We invest heavily in the latest cutting-edge technologies, demonstrating our commitment to ongoing quality improvement.
  - CNC laser cutting machine
  - CNC plasma cutting machine
  - CNC milling machine.
  - Etc,….

Material & Component Quality

- We only use steel plate with mill certificate.
- Steel of varying grades are used in combination for a single piece of product depending on the application and level of severity of field work.

Material & Component Quality

(cont.)

Seamless Hydraulic Pipe

- We only use genuine seamless hydraulic lines.
- Hydraulic lines are subjected to pressure testing prior to installation.
- We **do not** substitute our hydraulic lines with low cost API piping.
- API piping has rust debris within the inner tube, which may clog the excavator's main pump and could lead to costly repair.

Material & Component Quality

➢ **Premium Grade Flexible Hoses**

- We use premium hydraulic hoses from established European & Japanese suppliers.
- All pins on booms and arms/sticks are of grade 4340 high tensile material.
- Pins are induction hardened for prolonged durability.

➢ **Grade 4340 High Tensile Pins**

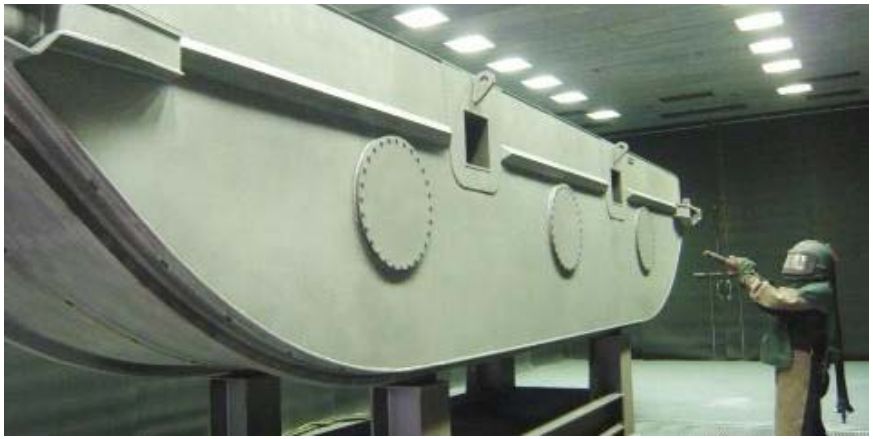
Robotic Welding

Robotic Welding Machine

- The use of robotic welding machines is extremely rare within the industry.
- We take pride in being the pioneers of implementing robotic welding process.
- Ongoing investments in leading edge technologies has been our critical success factor.

Sand Blasting

- Uncompromising workmanship even to details beneath the paint work.
- Steel surface is thoroughly clean and free from contaminants and rust.
- Sand blast process create a unique steel surface texture that provide excellent cohesion for paint coating.



Sand Blasting Process

Undercoat & Final Coat

Industrial Grade Paint Room

- We apply premium epoxy paint for both undercoat and final coat.
- Epoxy paint offers superior adhesion and protection on steel against harsh environment.
- Painting process is carried out in an industrial grade paint room with powerful filtration system.
- Minimising trapped foreign particles to ensure a high level of coating finishing.

Leak Monitoring Test

- Each pontoon's internal compartment is filled with 6 psi of air pressure.
- Pressure is monitored over 24 hours to ensure no sign of leaking.

Commissioning Test

- Each module is tested individually to isolate any potential issue.
- Final complete assembly for full commissioning test prior to shipment.

Service and Support

Vertically Integrated

Components manufacturing

- We fully understood that service and support is critically importance to your business.
- Our vertically integrated organization give us the edge over competitions for quick delivery of spares.
- Most components are manufactured in-house and not overly relying on external subcontractors.

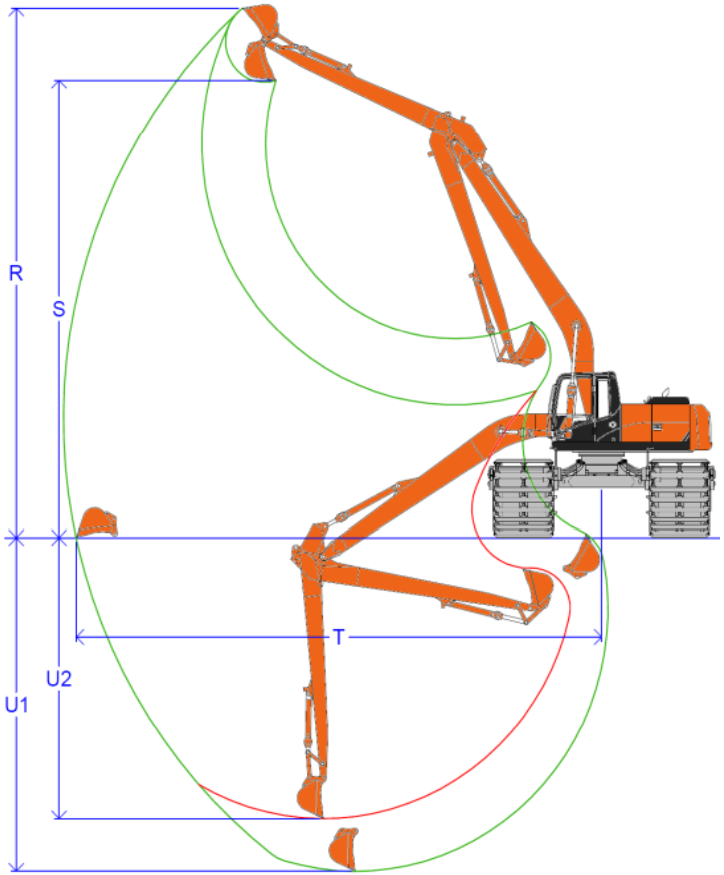
Quick Respond Time

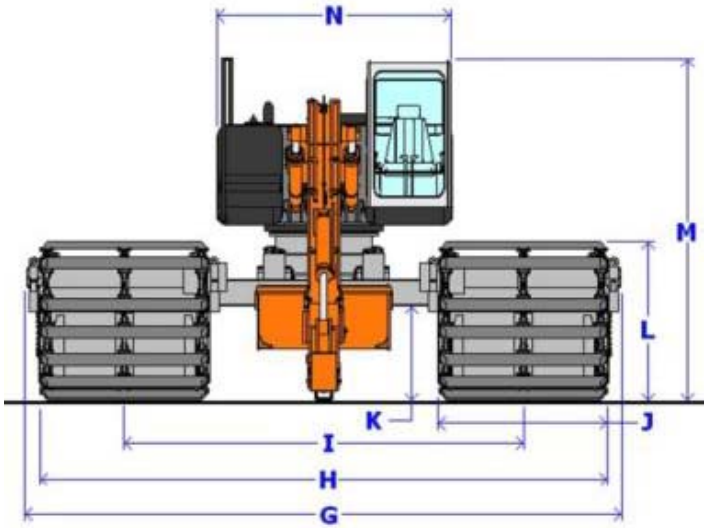
- Replacement parts are well stocked and can be shipped on a short notice.
- The availability of spare parts is guaranteed for 10 years.

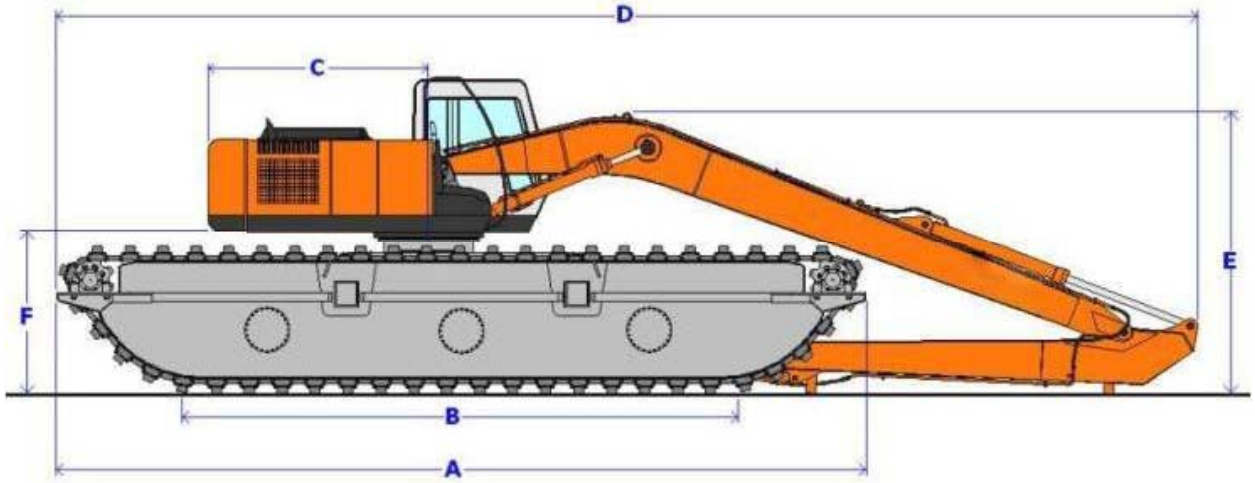




General Specifications







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General Specifications

Dimensions (m)	Description	Amphibious Undercarriage Models					
		AM80	AM140	AM200	AM250	AM300	AM350
		For 6 – 8 ton class excavator	For 12 – 14 ton class excavator	For 20 – 22 ton class excavator	For 24 – 27 ton class excavator	For 28 – 30 ton class excavator	For 33 – 36 ton class excavator
A	Max. Track Length	6.72	9.40	9.65	9.65	11.10	11.90
B	Track Length On Ground	3.90	5.25	4.30	4.30	5.70	6.48
C	Rear Upper Structure Length	1.75	2.18	2.68	3.00	3.12	3.50
D	Overall Length	7.10	12.32	13.12	14.40	15.60	16.06
E	Height of Boom	2.78	2.90	3.23	3.70	4.10	4.00
F	Counterweight Clearance	1.59	1.75	2.21	2.21	2.35	2.32
G	Overall Width, min/max (outwardly extendable)	3.50/4.30	4.22/5.32	5.29/ 6.09	5.87/6.67	6.20/7.00	6.27/7.07
H	Undercarriage Width, min/max	3.38/4.18	3.95/5.05	5.00 / 5.80	5.58/6.38	5.90/6.70	5.97/6.77
I	Track Gauge, min/max	2.11/2.91	2.50/3.60	3.38 / 4.18	3.66/4.46	3.98/4.78	4.02/4.82
J	Track Cleat Width	30	1.45	1.62	1.92	1.92	1.95
K	Min. Ground Clearance	0.94	1.07	1.29	1.29	1.15	1.13
L	Track Height	1.42	1.61	2.05	2.05	2.05	2.05
M	Overall Cab Height	3.56	3.45	4.14	4.20	4.23	4.25
N	Upper Structure Overall Width	1.17	2.50	2.71	2.85	2.98	3.00
R	Max. Cutting Height	9.50	12.50	14.50	16.00	17.10	18.20
S	Max. Loading Height	8.90	8.50	13.00	14.80	15.80	16.50
T	Recommended Outreach	9.00	12.00	14.00	15.00	16.00	17.00
U1	Max. Digging Depth from Front	5.00	7.50	9.50	10.5	11.50	12.50
U2	Max. Digging Depth from Side	2.95	5.90	7.00	8.00	9.00	10.10
	Bucket Capacity (m3)	0.25	0.40	0.60	0.80	0.90	1.00

*Dimensions are for reference only, it may vary from excavator brands and models.

**For the benefit of continuous product improvement, specifications are subject to change without prior notice.

Certification

- ISO 9001:2008
- Our undercarriages are CE Mark, approved for sales in European market.
- Certification done by UK consultant.
- Design of undercarriages met stringent European's criteria.

CE

CERTIFICATION INTERNATIONAL
ISO 9001:2008
Cert No: CI/13921

UKAS MANAGEMENT SYSTEMS
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LEMAC EXCAVATOR Customizing

Product Testament

Entrust Your Needs to Us

- Products and services are backed by our dedicated and professional team comprised of 160 members.