WELL INTERVENTION

LWI Systems

TIS 40ft AHC Wireline Mast

TIS 40ft AHC Wireline Mast

The **40ft AHC Wireline Masts** was designed for lightweight (riserless) well intervention operations provided from a vessel of opportunity.

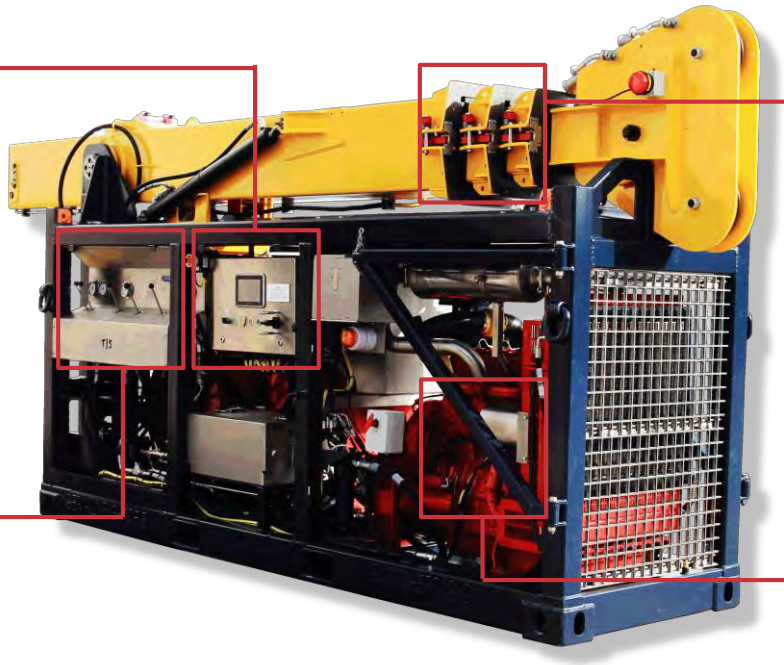
Features:

- DNV 2.7-3 (Mast Frame), DNV 2.7-1 (Slings), DNV 2.22 (Mast Boom)
- Safe Area (available as Zone 2 or Rigsafe)
- Active Heave Compensation System
- Stainless Steel Hydraulic Control Console
- Integral Powerpack
- Telescopic Boom c/w Automatic Latching System
- Colour-coded Guy Rope Set
- Mast Head Marker Beacon

TIS 40ft AHC Wireline Mast | Overview/Location – Major Features

The **Active Heave Compensation (AHC)** system increases the working weather window for offshore lifting operations while also providing safer deepwater seabed interfacing.

TIS Manufacturing's AHC systems use the latest computing hardware and software to ensure optimum processing speeds when calculating for heave compensation.



The four-section telescopic **Mast Boom** lies horizontal in transportation position and is erected to a vertical position by a double-acting hydraulic cylinder, before extending to full operational length by a three-stage integral telescopic hydraulic cylinder.

The **Mast Control Console** is fully colour-coded engraved stainless steel to simplify operator use. A Selector Valve diverts the hydraulic power supply between the mast and winch.

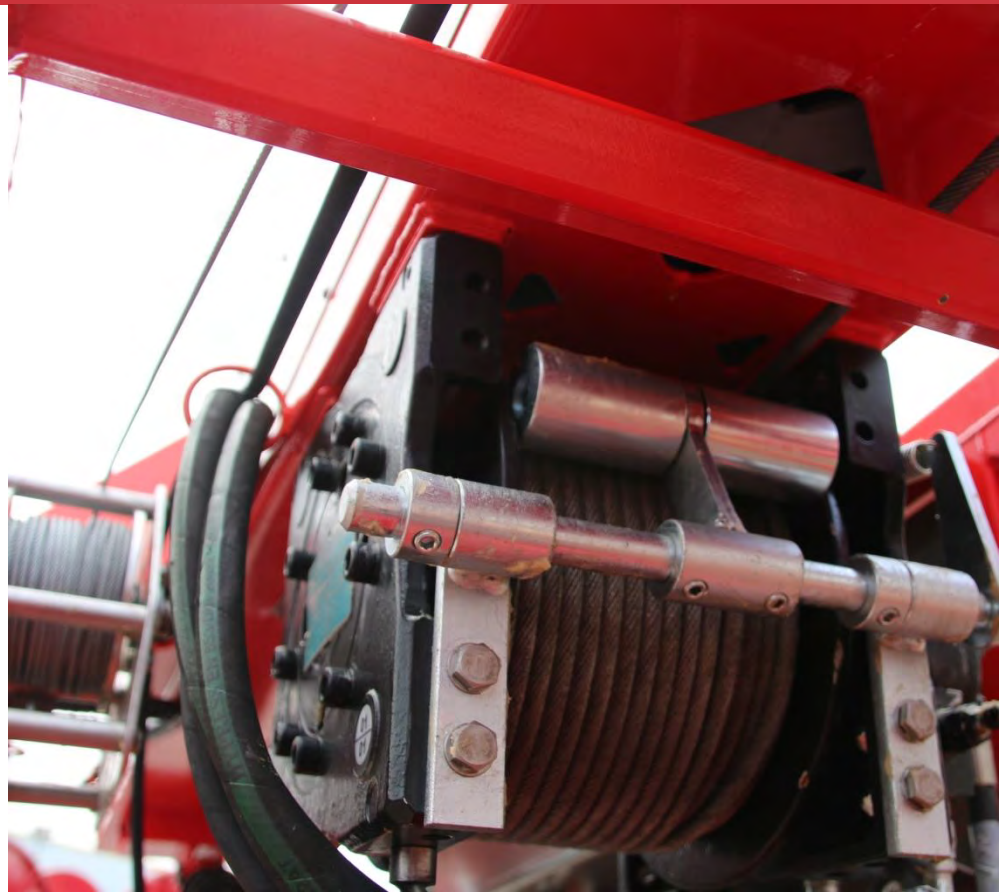
The Mast Frame houses a **JCB 444 Zone 2 Engine**, which is easily accessible by hinged mesh doors for start up and maintenance. This powerpack can also be used to power a double drum wireline winch, typically up to 0.25" wire.

TIS 40ft AHC Wireline Mast | Active Heave Compensation – Basic Principals

TIS Active Heave Compensation (AHC) systems are designed to increase the working weather window for offshore lifting operations while also providing safer deepwater seabed interfacing.

AHC configurations can be applied to any offshore crane or winch application in which it would be beneficial to reduce the amount of vessel motion transmitted to the hook load.

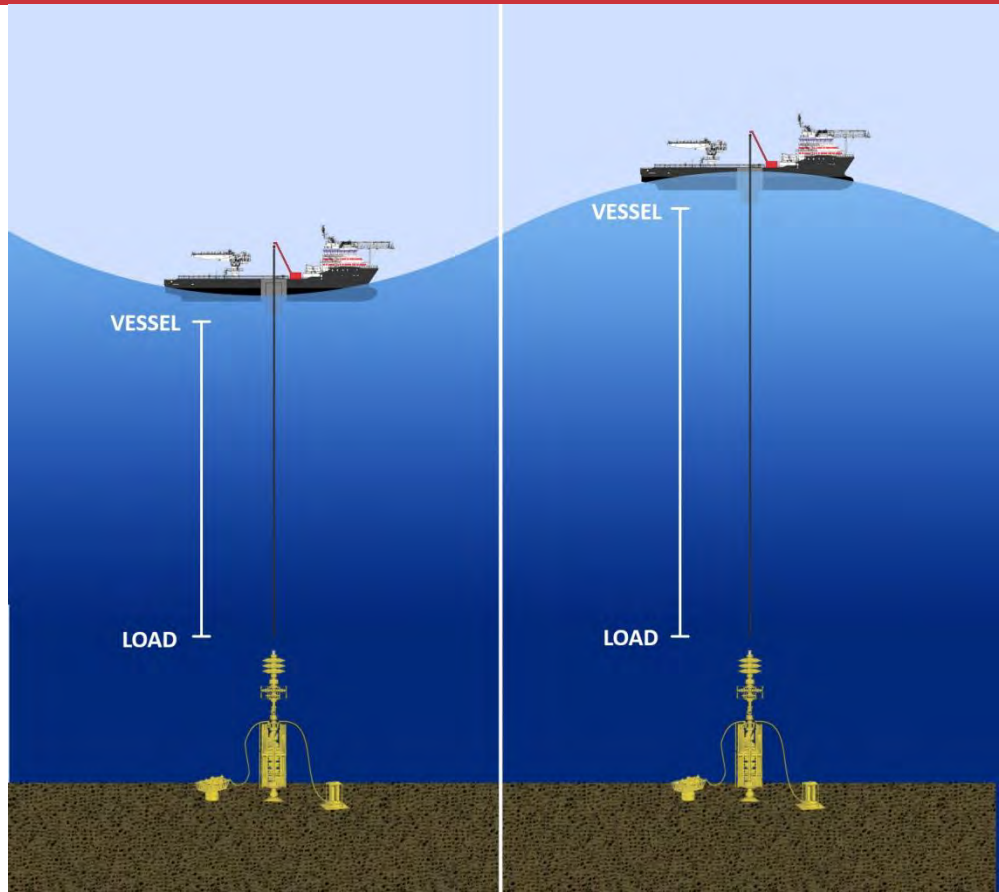
TIS Manufacturing's AHC systems use the latest computing hardware and software to ensure optimum processing speeds when calculating for heave compensation. High quality system components have also led to a comprehensive understanding of AHC and its operational restrictions.



TIS 40ft AHC Wireline Mast | Active Heave Compensation – Basic Principals

As the vessel moves up and down from the wave's crest to trough, the winch automatically reels in or pays out wire to ensure the load end remains in a near constant position.

Movement is sensed at the lifting foundation and the data is electronically communicated to a computer, which then interprets information and sends control signals that make necessary changes to the drum speed and direction.



TIS 40ft AHC Wireline Mast | Active Heave Compensation – Basic Principals

An **AHC System Display** screen provides the operator with live data on vessel movement in contrast to the load movement, and the percentage of winch capacity used for AHC.

Continuous monitoring of vessel motion and winch operation ensure that optimum AHC is achieved without overloading the winch.

POINT OF ENGAGING AHC SYSTEM

TIS 40ft AHC Wireline Mast | Active Heave Compensation – Basic Principals

The system includes a **Motion Reference Unit (MRU)** measuring vessel heave, pitch and roll motion.

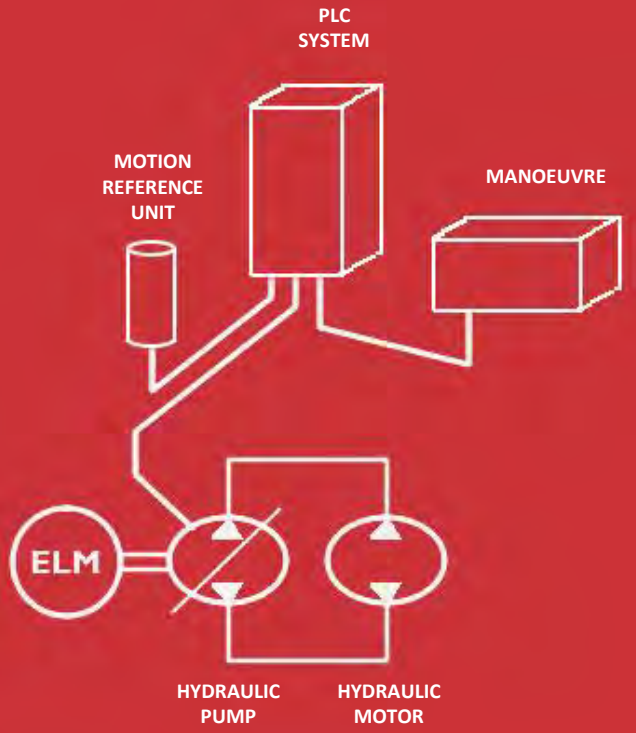
Signals from the MRU are then processed by the **Programmable Logic Controller (PLC)**, which regulates direction and speed of the hydraulic motor on the winch.

Advantages

- Decrease weather related downtime
- Additional installation for AHC is minimal
- Good regulation with small fault and adapted regulation parameters for compensation task
- AHC, winch drive and control systems are fully integrated into a single unit

Disadvantages

- Full power consumption



TIS 40ft AHC Wireline Mast | Active Heave Compensation – Control Console

1) **PLC Display** – display for wire length, tension, and AHC % capacity.

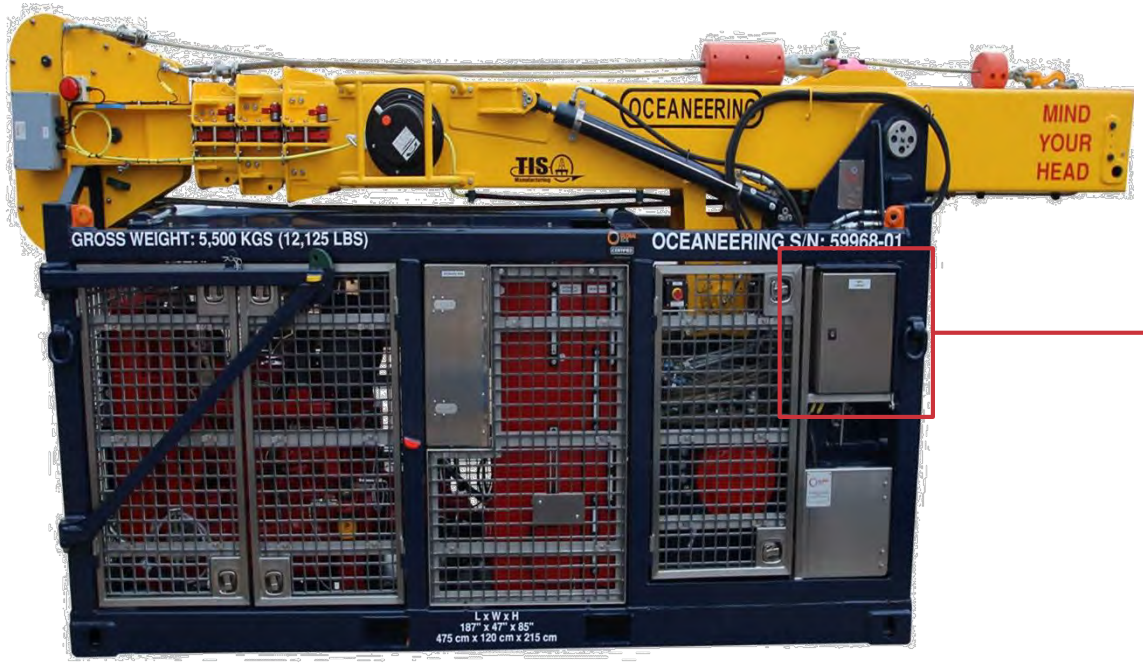
2) **Power Switch** – first switch on Battery Isolator Switch, located adjacent to engine control, to allow power to reach the AHC Control Panel.

3) **Mode Switches** –AHC Mode and Manual Winch Control Mode.

4) **Indicator Lights** – Standby, Cabinet Temperature OK, Cabinet Temperature Low.

5) **AHC Winch Joystick** – pays in or out the AHC winch line.

TIS 40ft AHC Wireline Mast | Active Heave Compensation – Motion Reference Unit



Motion Reference Unit

TIS 40ft AHC Wireline Mast | Stainless Steel Hydraulic Control Console

1) **Selector Valve** – Mast Functions or Winch Functions. Safety feature ensuring that once the Boom is fully deployed, the Boom cannot be accidently moved.

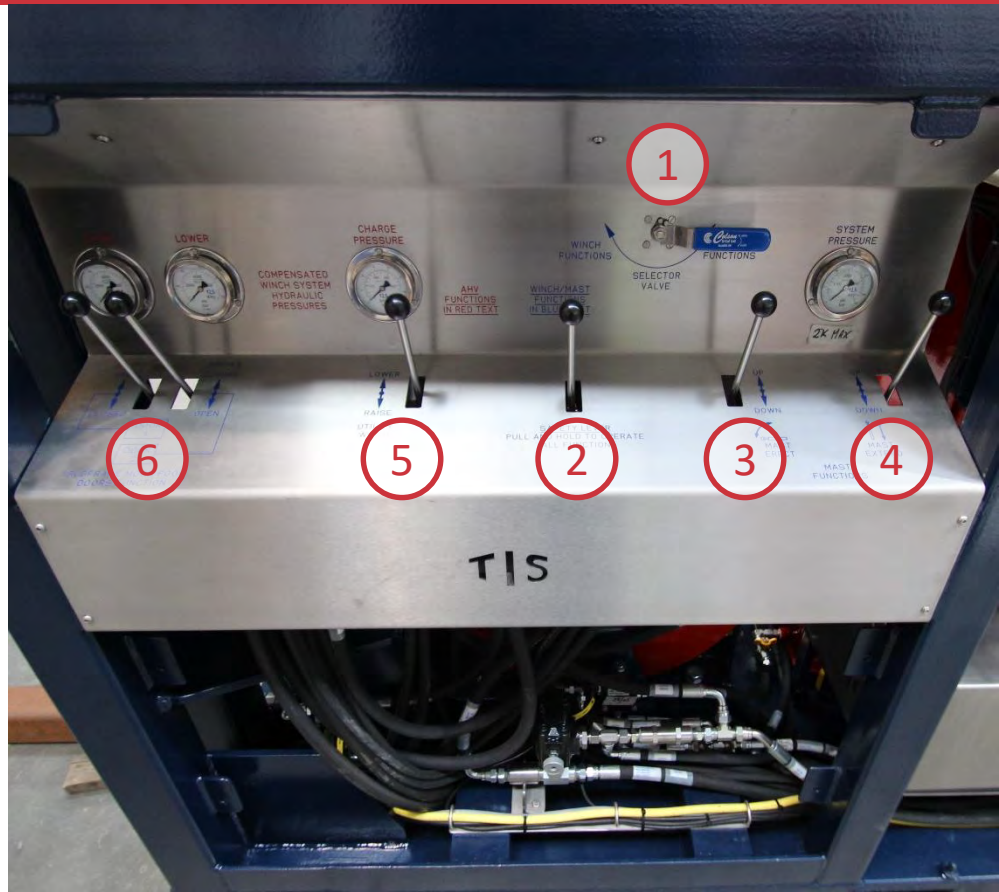
2) **Safety Lever** – ‘dead-man’s switch’.

3) **Mast Erect Lever** –moves the Mast Boom between a horizontal and vertical position to erect or fold the Mast.

4) **Mast Extend Lever** – extends or lowers the telescopic Mast Boom sections, via the internal hydraulic cylinder, once the Boom has been locked in the vertical erect position.

5) **Utility Winch Lever** – the Utility Winch Lever pays in or out the utility winch line.

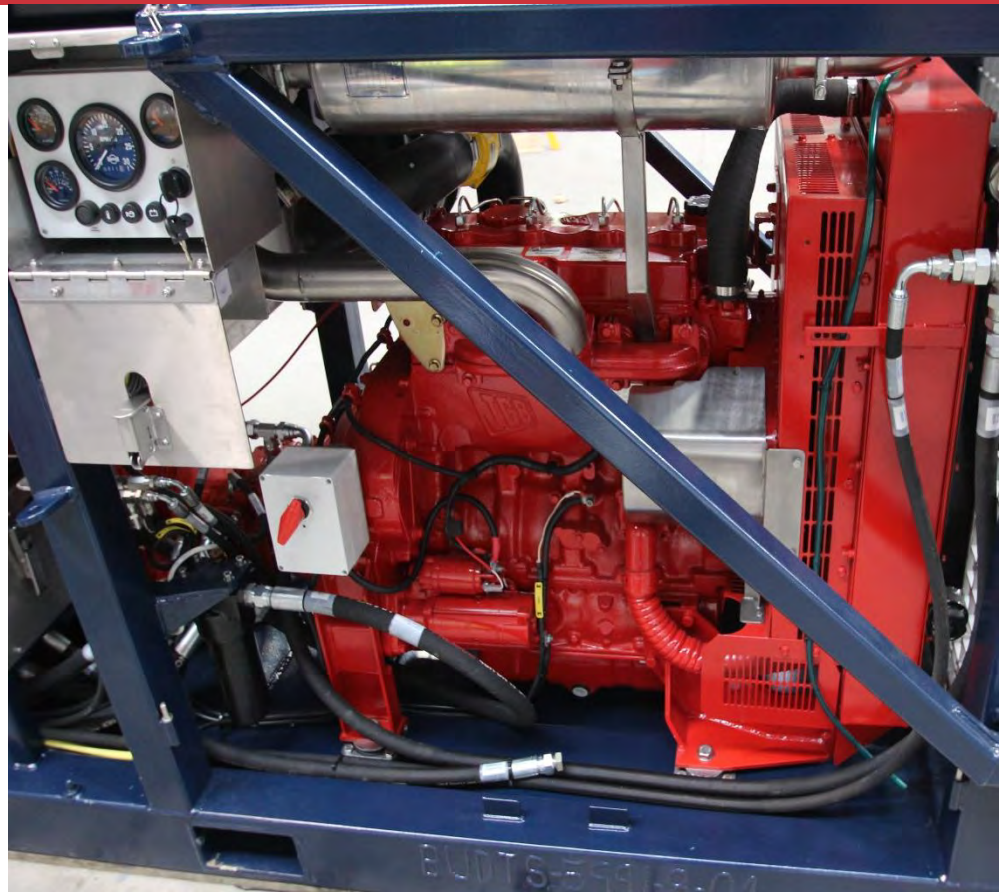
6) **Subframe Moon Pool Door Levers** – The Moon Pool Door Levers open or close the moon pool doors 1 and 2 independently as labelled.



TIS 40ft AHC Wireline Mast | Integral Powerpack

Diesel Engine

- Model: JCB 444 Diesel
- Power: 63KW (Intermittent: 60.8kW, Continuous: 54.7kW)
- Type: 4.4L, 4 cylinder, liquid cooled
- Naturally aspirated
- Emission: EU Stage 2 (mechanical fuel injection system)
- Fuel Consumption: BSFC - 228 g/kWh
- Complete with captive rubber isolators, alternator (24v) and electric start(24v,4.2kW).
- A tropical marinized cooling radiator with pusher fan and hydraulic heat exchanger.
- Complete with instrument panel comprising: water temp gauge, engine oil pressure gauge, starter keys and anti vibration mounts.
- Engine fitted with over speed shutdown valve



TIS 40ft AHC Wireline Mast | Telescopic Boom

A **Four-Section Telescopic Boom** lies horizontal in transportation position and is erected to a vertical position by a **Double-acting Hydraulic Cylinder**.

A **Three Stage Integral Telescopic Hydraulic Cylinder** extends each section of the boom into locking position.

Automatic latching mechanisms secure each of the sections in place as the boom extends.

TIS 40ft AHC Wireline Mast | Guy Ropes

TIS 40ft AHC Wireline Mast | Mast Head Marker Beacon

TIS 40ft AHC Wireline Mast | Operational Capacities & Unit Dimensions

OPERATIONAL CAPACITIES - AHC WINCH	
AHC Winch SWL:	12,000 lbs (single fall)
Sea State / Swell:	Max 14ft @ 10 sec period
Hook Travel (AHC Mode):	7 ft
Hook Travel (Manual Mode):	12 m
Top Limit Cutout Switch:	Yes

OPERATIONAL CAPACITIES - UTILITY WINCH	
AHC Winch SWL:	2,000 lbs
Hook speed:	5m/min (approx)
Hook Travel (AHC Mode):	12 m
Top Limit Cutout Switch:	Yes

OPERATIONAL ENVIRONMENT	
Ambient Temperature (Storage):	-18°C to 50°C
Ambient Temperature (Working):	-18°C to 50°C
Humidity (non-condensing):	10% to 90%

UNIT DIMENSIONS (TRANSPORTATION)	
Length:	4,720 mm
Width:	1,120 mm
Height:	2,150 mm
Weight:	5,350 kg

UNIT DIMENSIONS (OPERATION)	
Deployed Height:	12,600 mm (41 ft)
Deployed Width:	4,470 mm (14.6 ft)
Deployed Length:	6,050 mm (19.8 ft)

UNIT CERTIFICATION	
Mast Frame:	DNV 2.7-3
Slings:	DNV 2.7-1
Mast Boom:	DNV 2.22
Environment:	Safe Area

TIS 40ft AHC Wireline Mast | Package Delivery

Topside LWI Equipment Package

TIS Manufacturing was contracted to supply a topside lightweight well intervention package for the Oceaneering BORIS system. Supply included ATEX & IECEx Dual Certified Subsea Control HPU & A60 Control Cabin, as well as an Active Heave Compensated Wireline Mast

Workscope Included:

- Subsea Control HPU, A60 Control Cabin & AHC Wireline Mast
- ATEX & IECEx Dual Certification
- Integration with Client Topside Arrangement
- Integration with Client Software Control Systems

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