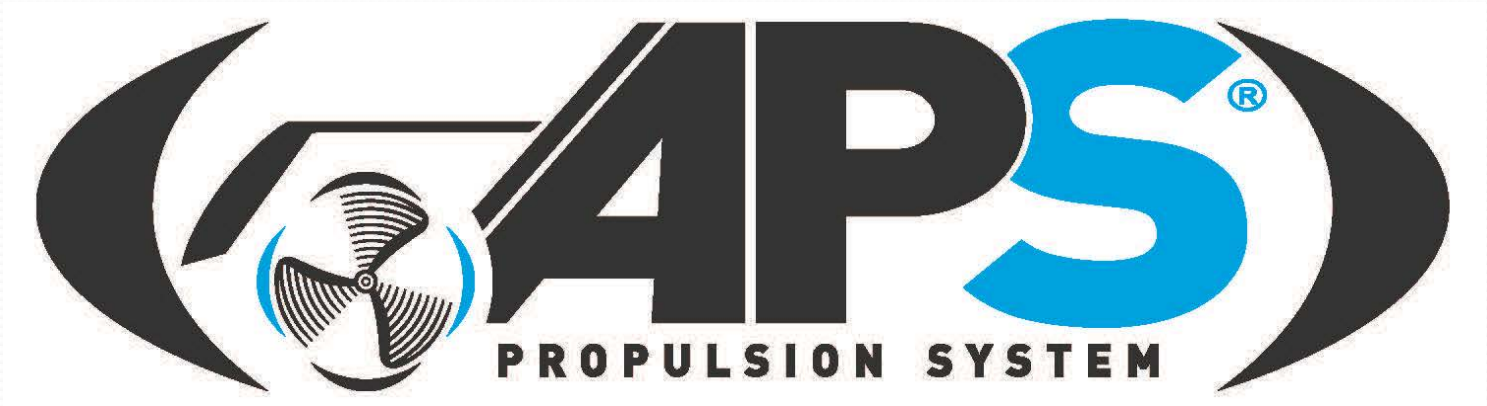

Talleres L. PIÑEIRO, S.L.
Fundada en 1934

www.talleresluispineiro.com

Applus® ISO 9001 EC - 4137/08 Certification Technological Center

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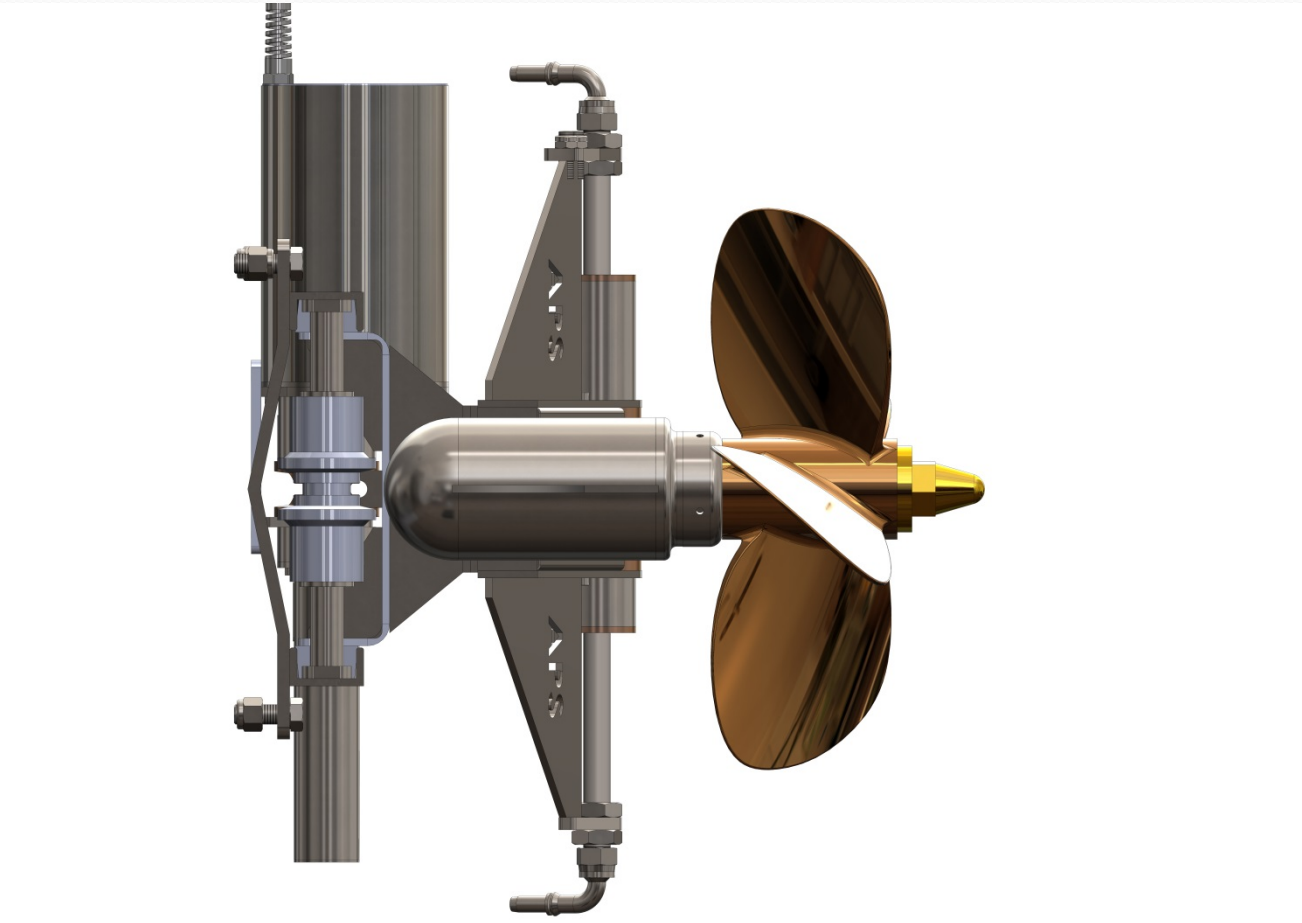
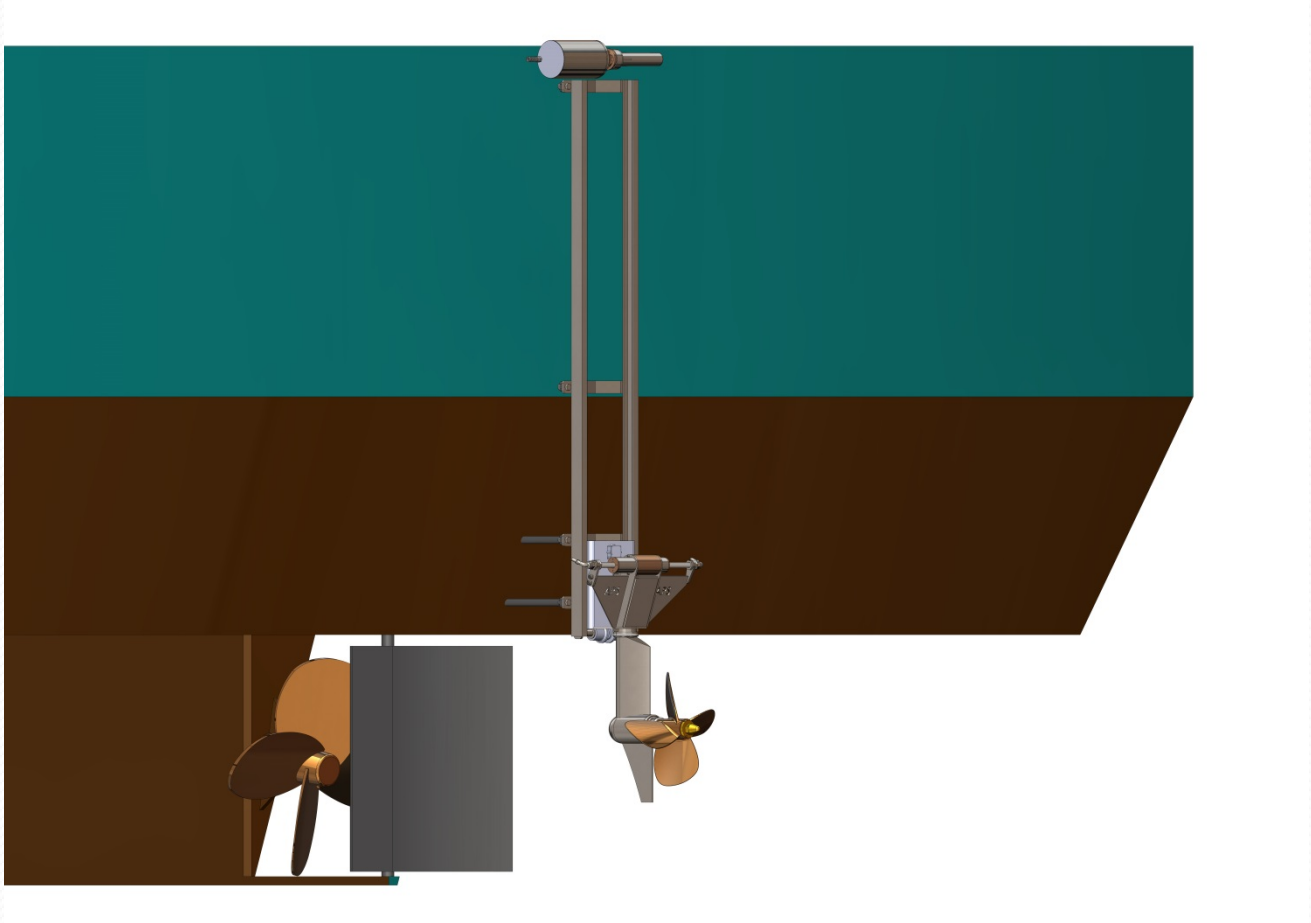
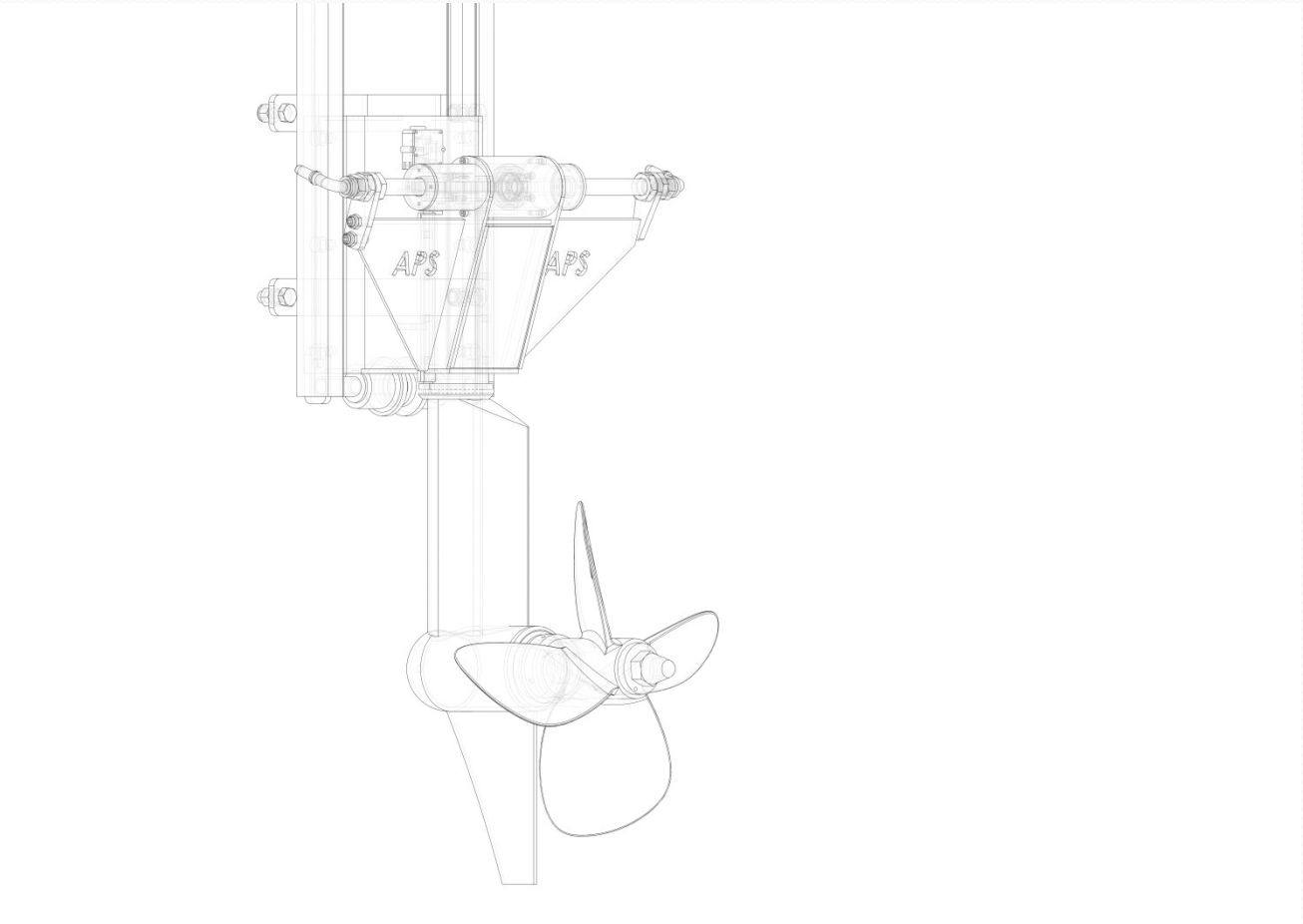
APS aerial view



APS view



APS view



APS view

History

- Talleres Luis Piñeiro are a small family business located in Galicia, at northwest of Spain.
- The company was founded at 1934 as a forge shop, who, with effort and determination, has progressed in line with the local market , of marking marine character.
- We has always guided by the passion for the mechanics, applied in the search for solutions to problems that were arasing in our scope, analyzing how and why.

APS development

- APS refers to a propulsion device of a ship, consisting on a hydraulic engine whose shaft directly drives the propeller, and provided with, positioning system at different heights of draft in relation to the hull and provided with side orientation system.

- This device has been designed with the purpose of propelling a ship and supplies the main engine in the event of failure of it or during those maneuvers, or times, when the vessel does not require a high speed.

- Another alternative is to use APS for samller boats or sailing as main propulsion system, using a hydraulic driving coupled to the generator of lighting or services.

APS development

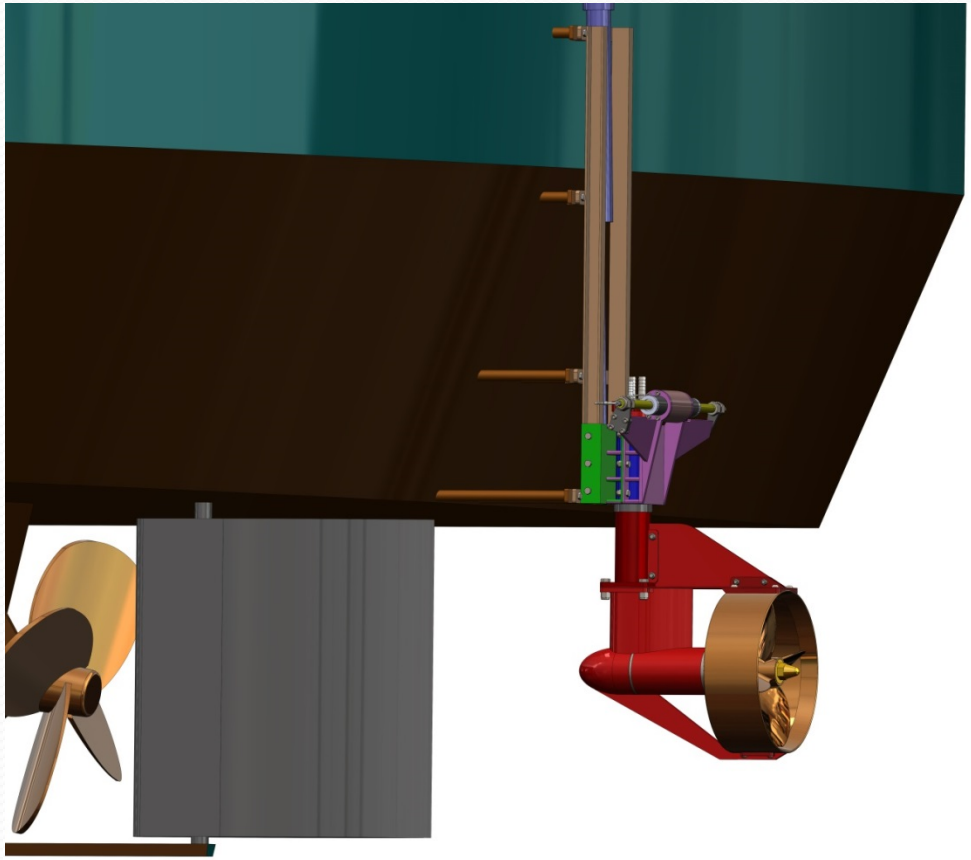
- Fishing vessels generally have a main engine (powerfull and with big displacement) and two auxiliary engines, where one, or both, are current generators. Moreover, each of the engines are usually coupled with one ore more hydraulic pumps.

- During navigation and boat works, an auxiliary, at least, and the main engine, must be running. The auxiliary engine to provide electricity for lighting, electrical equipment, etc, and the main engine to move and guide the ship continuously.

- In some fishing boats ocurrs during the working journey, and specially at the time of rest, spaces of time where the main engine is used at very low rpm, to move the ship slowly, because it is not necessary speed.

- At the same time one of the auxiliary, at least, must be also runing to generate electricity.

APS in CAD 3D



APS description

- The auxiliary propulsion system APS includes a second propeller, stopping the main engine to move the boat, which stopping the main engine, allows us to move the boat, obviously slower than the main engine. It also facilitates the maneuverability of the vessel, because it can be guide to make the propellant impulse at certain direction, even as a transverse propeller or docking system.

- With the APS device, in those moments when the boat do not navigate at cruising speed we take advantage of the hydrulic power produced by one of the auxiliary engine to propel the ship slowly. Altough there is an increease in consumption of auxiliary engine, it is samller than the main engine consumption at idle, and the speed achieved is enough for a stable government of the ship, so the main engine can ramain stopped.

Economic benefits – energy performance

- Using the APS device we improved significantly the energy efficiency of the ship(reducing energy consumption, but with the same result).

- But the savings of energy comes not only from the lower fuel consumption, a major factor due to having the main engine stopped but also comes from achiving hours of work in this main engine.

- The less engine working hours save influence in the costly maintenance intervals, that you can now distend. For this reason the amount of oil, oil filters, diesel filters, air filters, etc, and ultimately, spare parts to be used for the mere fact of having operating hours are significantly reduced.

- In the case of the main engine, we should also comment that the use of a large displacement engine with variable rate of rpm at very low speed , reverses in premature turns.

Environmental benefits

The residues generatd by the ship are lower:

- Speaking of exhaust emissions, we can emphasize that an auxiliary motor works at a constant rate of rpm(1500/1800) so that their emissions are significantly lower than those engines of a variable rpm engine.

- We also generate fewer emissions since we have less operation hours at the main engine.

- We must remark also that the residues generated by the intervals discussed, that is, oils, filters, etc, are much lower.

Security and redundancy

- The Aps device can be used also in case of failure of the main propulsion system of the vessel. This would allow not only to meet the conditions of the sea state, or away from possible threats as stones, aimlessly merchant ship, etc, but also allows us to return to port.
- Regarding redundancy, this is an essential factor in any safety device.
- Studying the devices aboard the ship we found that the energy source that is more present is the hydraulic.
- It is very common to find the main engine with a hydraulic pump coupled with clutch, hydraulic pumps coupled to the auxiliary engines, and even electro hydraulic pumps. Enumerating, it wouls be four possible sources present onboard with hydraulic power (proven redundancy).
- For this reason is why we have chosen hydropower as a source of energy of APS system..

Features

- APS provides a an auxiliary propeller located at the stern of the ship, powered by a hydraulic engine, integrated into a sealed enclosure, connected to the hydraulic circuit of the ship .

- The engine and propeller assembly is incorporated in a structure including a vertical axis on wich it acts upon a yaw mechanism that rotates the set of -90º to 90º. The steering allows to direct the thrust of the propeller in order to maneuver the ship.

- APS also has a lift system with a guided installed system in the rear of the vessel through wich runs a carriage that supports the propeller-engine mechanism. By raising the APS device can be removed from the water when it is not in use, or to do maintenance works. APS is protected with a casing open at the bottom to prevent snagging of nets, hooks, etc.

APS Parts

- **PROPULSION**

This device is hydraulic and consists of one or more hydraulic engines which directly driving the propeller shaft used for propulsion.

- **HIDRODYNAMICS**

The special design of the hyudraulic engine and its housing, allows us to reduce the volume of the hydraulic engine housing, and therefore its diameter. This allows greater efficiency.

APS Parts

ELEVATION

- The APS device has a elevation system. This consists of a hydraulic cylinder, and guides installed on the rear of the vessel through wich runs a carriage that holds the stern and a electric engienwith chain completely guided.

- By the elevation the APS device can be removed from the water when is not in use or to do maintenance works.

STEERING

- The device have steering with 180º (from -90º to +90 º), enabling direct the thrust of the propeller in order to maneuver the ship or dock.
- ***Note:*** In some cases, management is not required and is not installed because the vessel has an auxiliary maneuver that moves the rudder of the ship itself.