Foldable Foiling System

Background
Foiling has been around since early 1900, and there have been some commercial, military and private vessels presented over the years. Foiling is a great technology in reducing water resistance making boats move fast with less energy. Another important advantage is the fact that the vessel cruises above the waves making the transportation much more comfortable. The last ten years the interest in foiling have exploded in the surfing and sailing industry, and 2017 the AC50 catamaran showed up with an impressive 50 knots performance. Foiling kite and windsurfing are reaching speeds previously unheard of, especially in moderate wind conditions. Electric foiling surfboards are rapidly growing, and the advanced composites allow radical designs combined with low weight.

Foiling is also highly interesting for electric power boats due the smaller need of energy / power, and during 2018 Candela http://candelaspeedboat.com/ plan to launch their first consumer product, a 25 knots and 3 hours bow rider.

The main reason that foiling has never become a big success so far has been the need of continuously controlling the speed vs. lift making it complicated. Also, the foils are vulnerable when hitting floating debris which could potentially become dangerous when traveling at high speed compared to a normal hull which usually glides over e.g. a log. Another problem with foiling for large boats is that when you cruise at low speeds the foils generate a big drag, and also increases the need for deep water. Lifting the boat out of ware it’s also tricky since you either first has to remove the foils, or use special lifting equipment and unique stands. Also, the propulsion system has to follow the depth of the foiling system exposing propellers and transmissions.

Tasks
- Learn to work in a global product development team
- Study the challenges in a marine environment regarding hull design and propulsion
- Study how other companies have designed their foiling systems to find out what works
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- Design a foldable / retractable foiling system including the transmission and propulsion as a CAD model
- Design a foldable semi-foiling system including the transmission and propulsion as a CAD model
- System designed for a planning mono hull 30 foot boat with one engine / motor
- Build a 1:4 scale demonstrator of both systems

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**Students**
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**Målgrupp**
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**Gruppstorlek**
Tre studenter från Chalmers och tre från Penn State

(Projektet kan ej fördubblas)
References
Foiling is great in use, however a foldable system would probably make it much more attractive. Especially since it provides a more user friendly system and makes electric propulsion achievable as well as providing alternatives for retrofit.

The foldable system should be sleek and well designed, especially when lifted out of the water. For safety reasons both foils and propulsion should be designed so that they quickly could be lifted out of the water in case our safety systems detect an object, and in case of an impact they should break rather than ripping up a hole in the hull.

A semi foiling system will probably require minor changes on the transmission and propulsion, and the foil system will most likely be invisible, however, the benefits are smaller.