

FAMU & FSU COE Mechanical Engineering Senior Design Project

Adjustable Pitch Propeller: Spring Scope

Submitted to:

Growth Innovations

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Problem Generation

In order to understand this need it is first necessary to understand the application. Hunters and swamp boating enthusiasts at times find it necessary to hunt and explore uncharted waters and land. This water, on occasion is more swamp like, than it is like an open lake, with its muddy bottom extending to the surface in many locations. Weeds and mud are a commonplace along with scattered stumps and stones lying below the surface, able to cause a greater level of damage to the propeller than the naturally occurring cavitation and ventilation. These phenomena, cavitation and ventilation, cause rapid degradation of the propellers material.

Problem Definition(FALL)

Now that the use of such a propeller is known, the needs of the design define the objectives of the project. The following section list what objectives were completed in the fall semester.

1. Redesign of the mechanism that allows for pitch adjustment inside the hub. A more robust design will, theoretically, reduce significantly the stress wear in the slot and the play in the prop blades as the pitch is adjusted. Slot design is curved to include fore and rear locking positions.
2. Material analysis and selection shall be done to ensure prop manufacturability; possibilities include casting or molding. Material selection should also affect how easily the prop is to balance, due to the reduction in blade weight. This application should be able to be maintained by the boat owner with no special skill. The material should not break down as rapidly as metals subject to destructive forces, but upon failure, the replacement should be economically cost effective.

Spring Forecast

With problem definition and design in mind, the manufacture of our product needs to be made as seamless as possible. The spring term presents the following list of objectives that should come together to produce what has been designed in the past; the layout of the spring can be followed by Gant chart.

1. It is first essential to order and receive materials necessary for a complete build.
This will save time and money to have as many parts as possible in one shipment instead of making repeated orders. Included in this time the location of specialty tools needs to be accounted for because these might be slightly more difficult to acquire. For instance, the primary tool needed to cut the necessary 4in. rounds is a ball cutter; a very limited number of manufacturers exist in this market that create cutters this size. But once located, the bulk of our assembly can be manufactured.
2. Prepare materials and transfer to CNC Machinist following a planning meeting. Items that will be discussed are a turning schedule detailing when certain parts will be turned and a machining schedule so all parts come together at a reasonably similar time.
3. Fitment and assembly follow machining to ensure all manufactured parts fit correctly.
4. Following assembly will be testing to see how well blade performs; items that will be checked are balance and vibrations.

This will conclude the manufacture of our design pending verification of proper operation.