Task:

*A free-roving (no umbilical cable) submarine inspection drone is required for undersea cables: operating down to 250 m depth.  
endurance of 2 hours continuously powered operation, carrying video and ultrasound imaging equipment drawing a 30 W electrical load,   
and have suitable propulsion to travel up to 4 m/s peak speed with 1 m/s cruise.   
Total mass is to be < 25 kg, to allow easy handling on board the mother ship.   
Key technical issues are electrical power and communications.*

A simple model for power consumption is as follows.

Text

Description automatically generated with low confidence

Where,  
P-prop is the propulsion power  
H is ‘hotel power’ i.e everything that isn’t propulsion.  
Cd is drag coefficient  
A is frontal area of vehicle  
p is density of water  
v is speed of vehicle  
n is efficiency

Using their example vehicle that is a 0.32m diameter torpedo-like AUV, Cd=0.2 (based  
on frontal area), A=0.082 m2 and n=0.5

Sensors

Navigation

Propulsion

Communication

Power