

7

David de Vall

2010 959

ACM A 4000

304 Stainless Steel has a much higher yield strength and will not ~~dis~~ rust in salt water. It is still dense, but the higher yield strength allows the cylinder walls to be thinner, off setting this and increasing the air space.

Pre-pregnated carbon fibre composite has an incredibly high yield strength and a very low density. It is likely expensive but non-corrosive in water given its applications in helicopter blades and wind turbines. This is an ideal material and will be used.

c) The formula indicates the following:

- the higher the yield strength, the thinner the walls can be. This allows for a lighter cylinder carrying more air and would be highly desirable.
- the lower the pressure, the thinner the walls can be. However, the yield strength being high would likely result in less air being stored.

$$d) i) t = \frac{2 * 20 \times 10^6 * 0.1}{1850 \times 10^6} = 0.000216 \text{ m} = 216 \mu\text{m}$$

$$\begin{aligned} ii) m &= 2 + dL(A - a) = 2 + dL(\pi R^2 - \pi r^2) \\ &= 2 + 1.74(0.6(\pi 0.1^2 - \pi (0.1 - 0.000216)^2)) \\ &= 2.000142 \text{ kg} \end{aligned}$$