A British company is ready to market a safer propeller for small craft, but also has its eye on 90-tonne units for VLCC-sized ships

Ringed propellers set for comeback

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For more or less a century the propeller has been a much-studied and highly-developed feature of modern ship design. So while it is perhaps surprising to find attempts to reinvent this particular wheel, there are aspects of performance which still tempt engineers looking to make improvements.

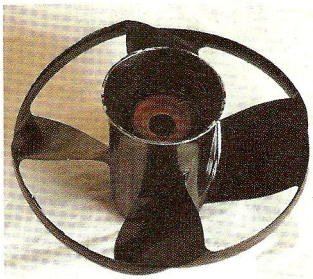
One benefit which has lured a British company very far down the development channel is safety. Open bladed-propellers pose grave danger of death or mutilation to wildlife and even people. The advent of modern composite materials has made it an achievable objective to introduce a potentially much safer ringed propeller. Designed by a British marine engineer scientist, Martin Renilson, and marketed by the aptly-named UK-based company RingProp, the current range of propellers is suitable only for smaller craft and will be targeted at the recreational market for boats with engines up to 300hp. The company is though seeking to develop larger ringed propellers for larger ships.

Until now, the only practical solution to the problem has been to cover propellers with guards that are fixed around the whole propeller but these act as a drag, slowing boats down by as much as 60%. The new ringprop, on the other hand, surrounds the propeller blades with an outer ring as an integral part of the propeller. The ring revolves with the blades and prevents them slicing through anything they come into contact with and the company says that anything the propeller hits will get a bump, but no more.

Johnny Townsend, executive chairman of RingProp, holding one of his company's composite propellers

The concept is not new and dates back at least to the 1960s when a group of Dutch researchers tried to build propellers of this type.

The lack of success of these earlier attempts at introducing ringed propellers onto the market was due to costly manufacturing processes using steel while the resultant prop



Lightweight composite materials are an attractive feature and make manufacture easy

was also found to be too heavy. RingProp uses extruded glass-filled nylon for its outboard motor range which is light and makes manufacturing cheap and quick while the design has been tweaked to ensure it works at maximum efficiency. The makers claim that in tests the propeller outperformed other conventional designs and RingProp says several US boat engine manufacturers have shown an interest in licensing its design.

Another area where there is a strong interest is in military ships, where weight saving and low noise signal are crucial. Already the outboard motor ringed propellers have been allocated a NATO part number and investigations are being carried out to assess the viability of composite ring prop propellers based around glass filled nylon material for warships up to corvette and frigate sizes.

The lightweight construction of the RingProp is one of its greatest virtues. A typical steel propeller for a 45hp outboard motor weighs around 4kg while the RingProp equivalent is only 800g, which translates into less pressure on the drive shaft and the gearbox.

But beyond the world of small leisure craft, the hazards of open blades cease to be an issue and efficiency becomes paramount. RingProp sees a market for its concept in big ships. Further research and development is under way in Australia to design larger sized propellers suitable for all types of cargo ships and this is expected to take up to 12 months. The initial market sector to be targeted will be coastal vessels but, ultimately, the company plans to design props weighting up to 90 tonnes for use on VLCC sized ships.

The efficiency of the concept is, however, controversial. Australian research in the 1980s and tests in 1991 carried out at the Netherlands Marine Research Institute (MARIN), suggested that ringed propellers may reduce vibration and resonance caused by cavitation at the tips of propeller blades which can cause fatigue cracks in a ship's hull. Other benefits included reduced engine wear, better fuel consumption, ability to position propellers closer to the hull and better manoeuvrability because the propulsive thrust can be more focused as a result of a reduction in losses in lateral outflow.

But while there may be improvements at the blade tips with a ringed design, the picture is not that simple. Dr Graham Patience, managing director of UK foundry Stone Manganese, tells *The Motor Ship*: "Theoretically it can be shown that the presence of the ring can reduce the energy losses of the propeller because there is no discontinuity in the vorticity at the blade tips – this results in higher efficiency." However, the additional drag of the ring may negate this gain.

"My understanding is that in most cases the viscous drag of the ring exceeds the hydrodynamic gains such that there is a net loss with the ring propeller – this is what I was taught many years ago and I have no reason to change this view – certainly not on the basis of anything I have seen."

He says that attempts to overcome the viscous drag problem have resulted in the "tip plate" concepts now available – such as the CLT, RUG and Kappel systems – for which small gains of some 3-5% may be achievable. He explains that such concepts involve "cutting away most of the ring that causes the increase in drag while still trying to maintain continuity of vorticity at the tip".

What is clear is that it is not clear what to expect from a large-scale version of the RingProp. Much work remains to be done, and it will be interesting to see what comes of the Australian research which will attempt to turn the concept into a practical reality for capital ships. At least in the short term, as much depends on finances as hydrodynamics; as *The Motor Ship* went to press RingProp was discussing the feasibility of a flotation on the London Stock Exchange, an eventuality on which current market conditions weigh heavily.

At least there are no overwhelming barriers to the actual manufacture of a ringed propeller big enough for an ocean-going ship. According to Stone Manganese's Patience: "This does present some problems but nothing that could not be overcome – for example we have already cast large components comprising multi-bladed elements attached to both a central hub and an outer ring as integral castings." □