



MOMENTUM

NEWS FROM CJR PROPULSION

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CJR Fabrication:

Investing for growth

Welcome...

Another year has passed and once again I have the opportunity to review our achievements over the last 12 months. Thankfully, it has been another year of continued investment and consistent growth across the company.



Our fabrication business, CJR Fabrication, has achieved incredible results, winning over major new customers and building a fantastic reputation for bespoke products of the highest quality. CJR Propulsion continues to win significant contracts for propulsion systems for some of the largest and most significant vessels being constructed, as well as bespoke projects requiring our unique CFD capabilities.

In this issue of Momentum, we're revealing two major projects which are currently in development. We have also made further investment in our manufacturing capabilities with the purchase and installation of a new lathe capable of producing shafts up to 10m in length, as well as a new 5-axis waterjet, which will remove restrictions on manufacturing process and enable us to improve manufacturing methods, as well as develop new products.

On the superyacht front, CJR Fabrication and CJR Propulsion have seen strong demand from old and new customers alike. Princess and

Sunseeker have both chosen CJR for a number of custom made staircases, handrails and stern gear projects, whilst the ever-growing Gulf Craft continues to select CJR for all vessels, most recently on its largest design, the Majesty 155. Italian yard Palumbo has now completed construction on its new Columbus yacht, a Classic 57m, which will feature one of the largest sets of stainless steel rudders we have ever produced.

Equally, in the commercial market, CJR is working on some exciting bespoke projects for clients around the globe. We recently delivered complete propeller and stern gear packages for a number of large ferries due to be operating in Russia and Norway. Over the channel in France we are working on another propulsion package order for a long time customer's four different pilot boat models.

With all this to talk about, we invite you to take a look at what we've been up to. Feel free to stop by for a chat about CJR's comprehensive design and manufacturing capabilities if you are

looking for a new supplier for your next project or simply to discuss how we can make a positive difference to your vessel.

Many thanks



Mark Russell

Unique trials system developed for tablets



Currently at an advanced stage of development, the new TrialsApp for android tablets has been designed to offer a cost-effective method of collecting trials data. It is designed as a lite version of CJR's very successful TrialDAS system, costing less than half the amount. The app is expected to be launched at this year's METS Trade exhibition in Amsterdam and will be delivered as a complete tablet-based kit, providing all hardware and software necessary to deliver the most accurate data.

"With the original TrialDAS we were using fairly pricey sensors to deliver the required data, such as trim and roll. They worked perfectly but more recently we realised that the hardware has moved on to the point where it is already built in to many decent quality tablets and smartphones. We could therefore develop an application which uses the tablet's own functionality to deliver a lite version of TrialDAS, at a far lower cost. TrialDAS remains the gold standard for gathering the most complete data on trials. The app offers a competitive alternative when such

detail is not as important" explained Simon Lewis, head of propeller design for CJR.

Suitable for all vessel types, from small work boats to the largest superyachts, the application will collect GPS, trim, roll, speed, heading and ground track data, which can be easily exported and even printed in PDF format to compare and interpret the information with other datasets. The tablet app is planned to include external wireless sensors, which are

able to collect vibration and noise data, as Simon concludes:

"Complying with the new RINA Comf (y) standards is increasingly important to many of our customers and the kit is ideally suited to providing the vibration and noise level data you need to get a vessel signed-off regarding RINA's class rule standard."



The new tablet based trial data collection system.

The BIGGER picture



Peak performance and higher efficiency growing in importance for the commercial boat market as more and more opt for CFD

Financial pressures, as well as a lack of understanding regarding the benefits of computational fluid dynamics, historically meant that cost was the motivating factor for the majority commercial marine projects. More recently, CJR has seen a noticeable shift in customer's priorities, as clients begin to appreciate the long-term benefits of opting for a better designed higher quality propulsion package.

"Since 2010, when we opened our own computational fluid dynamics (CFD) department, we have been on a mission to highlight the huge gains available through better design. Once you understand how the water flow is going to effect performance, vibration, longevity and efficiency, you suddenly realise that to not consider it is effectively throwing your money away," CJR managing director, Mark Russell commented.

Several projects CJR has been working on in recent months have focused on designing propeller and stern gear systems which will deliver the highest possible efficiency, combined with peak performance and longevity.

"We have projects where the gains achieved through CFD resulted in a noticeable speed increase for the same number of revs. For a commercial vessel, on the water two or three thousand hours a year, this means you can reduce the power required to hit the optimum speed envelope, saving fuel, engine wear and reducing emissions. For one client, this equated to a £10,000 annual fuel saving, covering the cost of the CFD analysis in less than six months of operation." Russell added.

For production vessels, the benefits of CFD are even more obvious, with the relatively small cost of the research spread across all subsequent launches – further adding to the cost-reward ratio. Furthermore, if the CFD analysis is carried out early on in the vessel design process, it can be used to solve a wide range of issues that are of interest to commercial vessel builders and operators. Resistance, accurate speed prediction, as well as the optimisation of hull form or any related submerged appendages can be addressed as part of the project to ensure the vessel will perform as intended.

Equally, the role CFD can play in the design process is not limited to appendage placement and design; addressing optimisation of the hull itself is another area where further gains can be made, as Russell concluded:

"We are now seeing clients coming to us to perform CFD during the initial hull design stage. Tank testing can be prohibitively expensive so we are able to offer a cost-effective alternative to evaluate new hull designs and to understand where improvements can be made. CFD has so many possibilities when it comes to commercial vessels because many of the hulls still being used were designed ten, twenty years ago, when we simply didn't know what we know now. By taking a bottom up approach and looking at every aspect of the vessel, you are ensuring that it really is the best it can be. For a yard, being able to highlight to potential customers that the vessel is fully optimised is a fantastic selling point and provides a point of difference in a highly competitive market."



→ Recent commercial projects:

4 x Pilot boats:

Ranging from 12 – 19 metres the four vessels, destined for various French port authorities, all feature CJR's high-specification cast stern gear and propellers

4 x Ferries:

Destined for Norway, these DNV class approved vessels feature keyless shafts and hydraulic fit couplings and propellers to meet stringent customer requirements for fuel consumption and overall weight.

1 x Ferry:

Destined for Russia and class approved by the Russian Maritime Register of Shipping (RMRS), the vessel features a full set of CJR stern gear, including cast rudders, A-bracket, epoxy rudder tube with composite bearings and a flanged GRP stern tube with Wartsilla sealing system.

"Since 2010, when we opened our own computational fluid dynamics (CFD) department, we have been on a mission to highlight the huge gains available through better design."

PERFECT PARTNERS: CJR and Gulf Craft celebrate another successful launch



Last month saw the launch of Gulf Craft's new flagship superyacht, the 47 metre Majesty 155. The largest yacht to date from one of the UAE's largest yacht builders. She features a set of custom made CJR Propulsion propellers and stern gear, including a stainless steel rudder and two of the largest propellers CJR has manufactured, weighing 335kg each, with a 57 inch diameter.

The new semi-custom motor yacht, which features design and interior styling by Gulf Craft's own in-house team, is constructed in GRP, with a 9.60 metre beam, a draught of 2.05 metres, and gross tonnage of 467.

Powered by twin engines, with a combined power of over 4000 horse power, the new Majesty 155 is estimated to reach a top speed of 16 knots and achieve a range of 4,000 nautical miles.

"This was an important project for all involved and one which has helped embed CJR as Gulf Craft's supplier of choice for propulsion packages. We have been lucky enough to become Gulf Craft's main supplier in recent years and that is due to several reasons.

The quality of our products and customer service are up there with the most important," commented Or Andy Picken, head of sterngear design for CJR.

The Majesty 155 follows the success of previous launches, including the Majesty 135 and Majesty 105, both of which also feature CJR propulsion systems, representing the next step in Gulf Craft's development, as the company's chairman, Mohammed Hussain Al Shaali, explained to the Superyacht Times in 2013 when the project was first announced:

"The Middle East continues to lead demand in the global superyacht market. Moreover, Gulf Craft also highlights the regional marine industry's capability, sophistication and growing prominence on an international stage with the Majesty 155 being one of the largest composite superyachts ever to be constructed in the Middle East.

"As a market for superyachts, the GCC (Gulf Cooperation Council and surrounding region is maturing rapidly," added Al Shaali. "We are very optimistic about this region as more people are

finding their way to the water. The destination building and infrastructure for superyachts in terms of larger berthing facilities, better equipped marinas and superior support facilities has progressed in recent years. With an active sales orientation towards a global client base, we are seeing increased demand worldwide for superyachts over 40m in general, with a particular appetite for the highly customised and individualised products we are able to provide."

Gulf Craft also announced last November that work has commenced on its second Majesty 155 superyacht.



Image courtesy of Gulf Craft and Majesty Yachts

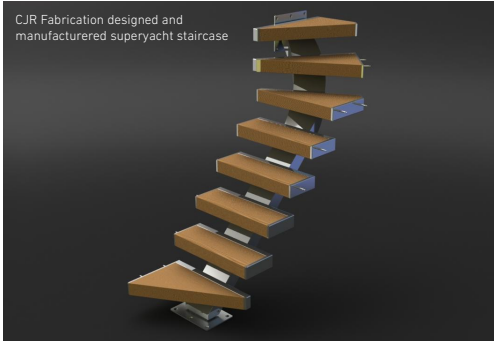
"This was an important project for all involved and one which has helped embed CJR as Gulf Craft's supplier of choice for propulsion packages.



CJR Fabrication designed and manufactured superyacht mast



CJR Fabrication designed and manufactured superyacht mast



CJR Fabrication designed and manufactured superyacht staircase

“We have also managed to find some incredible new talent that will help us reach our ambitious targets.”

CJR FABRICATION: Investing for growth



A little over a year after its acquisition, CJR Fabrication has gone from strength-to-strength, with a raft of new clients and an expansion of the business’ capabilities – delivered through significant investment in new technology and IT.

Since taking over the business in 2014, superyacht manufacturers have increasingly turned to CJR Fabrication for complex bespoke projects, building on long-established relationships already held with its sister company, CJR Propulsion. High profile UK yards have chosen CJR Fabrication for a wide variety of projects, ranging from bespoke staircases and oval handrails to large stainless rudders – all destined for some of the biggest superyachts currently under construction.

But, according to CJR, growth is only possible with continued investment as Michelle Davies, CJR Fabrication general manager, explains:

“When we took over the business it was clear that investment had not been forthcoming so that was our first priority – to bring the manufacturing capabilities up to our standards, with modern, efficient, precision equipment. The first round of investment saw us installing half a million pounds of new

manufacturing equipment. We have big ambitions for the business and on-going investment will continue to play a critical role in achieving our long-term goals.

“For example, we recently purchased a state-of-the-art 5-axis waterjet machine that enables us to cut in three dimensions with high precision and accuracy, at up to 10 metres a minute. We have also taken ownership of three new TIG welders, which may not sound like very exciting new pieces of equipment but in reality mean that we can offer finer, neater welds, using less heat, which is very important for our customers.”

The new equipment and new orders mean CJR Fabrication has also had to embark on a recruitment drive, increasing the company’s headcount by 60 per cent in the last twelve months alone.

“Several of the manufacturing tools

we now have on site require specialist training and highly skilled professionals to operate them so finding the right people has been another rewarding challenge. We were already fortunate to have several team members capable of meeting classification standards for the likes of ABS and Lloyds Register but we have also managed to find some incredible new talent that will help us reach our ambitious targets. That being said, we are already looking at the next stage, two or three years down the line and what investment is necessary to drive the business forward long term. The answer to that question really depends on what we think our customers are going to want. We are currently looking at an Amada CNC punching machine and a tube bender that can handle much larger diameters as these are potentially the areas where we are expecting growth,” Davies concluded.

BETTER RESULTS THROUGH SCIENCE: Increasing workboat performance and efficiency

Understanding an issue is said to be the first step to resolving it, but establishing the root cause of an unseen performance shortcoming is often the most challenging part.



When it comes to marine propulsion efficiency, having the right data is crucial to identifying and optimising the factors which cause inefficiencies. But, once the challenges are understood, there are substantial financial and environmental savings on offer. This is certainly CJR's belief and one which has led it to initiate a ground breaking, three year research programme, working alongside world leading UAV sensor and data processing specialists to improve fuel efficiency of workboats through an on-board monitoring system.

CJR Joined forces with with data processing specialist Avenca, unmanned air vehicle (UAV) expert Callen-Lenz and pilot boat operator, Estuary services. After securing partial funding through The Technology Strategy Board – a programme designed to speed up innovation and help businesses grow through R&D the group began examining

how collectively they could develop a suite of innovative monitoring tools which would cost-effectively record key information relating to a vessel's performance.

This is not CJR's first foray into software development and follows the success of the company's TrialDAS data acquisition system, which was launched three years ago. Simon Lewis, head of propeller design at CJR explains why it was time to look at the issue again: "When we designed TrialDAS we wanted a system that enabled us to see what was going on 'on the water'. Working with Callen Lenz, or Sky Circuits as they were then, we created a bespoke tool which borrowed much of its tech from the drone industry but was really designed for sea trials of new vessels. TrialDAS enables you to see if the vessel is performing as expected when she first goes in the water but was never meant to be used on the same boat

long-term. More recently we realised that there are significant gains available during a vessel's normal operation and that is what is really exciting – the opportunity to deliver on-going savings to workboat operators."

Currently in the first year of three, the project's main aim is to develop a cost-effective monitoring tool, which can be installed long-term and which will provide detailed stats relating to boat speed, fuel consumption, trim angle, engine RPM and engine power usage. The data is collected using the latest sensor technology developed by Callen Lenz. The large data set is then collated, processed and filtered using algorithms developed by Avenca, highlighting the most important information, which can then be interpreted and used to implement necessary operational improvements.

"Our aim is to have a permanent on board display which indicates the vessel's current level of efficiency using a simple traffic light system, as well as showing how efficiency can be improved by making small alterations on the fly."



Looking at potential opportunities and applications, Simon highlighted that the project is already making good progress. "Although the project has only been running for 6 months we have already highlighted some areas of Estuary's vessel operation that can be improved. These improvements will come from the way that the vessels are handled – optimising parameters such as running trim angle, as well as more fundamental operational optimisation, such as vessel routing and trip planning."

Another key-benefit of the new technology is the development of displacement sensors. Boat builder's displacement figures are often based on estimates and typically without any form of payload, which is often added after delivery. Increasing the vessel's weight has obvious implications but it isn't easy to accurately gauge the full impact. Through the use of innovative displacement sensors and the information they provide, pilots could potentially make small adjustments to ensure that the vessel is always

running at optimum trim angle for any displacement. According to Simon "the new technology can lead to substantial advancements and cost savings, whilst the system itself will be inexpensive. Applying the technology to Estuary's service is predicted to save up to 5% in fuel costs due to the innovation".

BIGGER IS BETTER

CJR constructs its largest rudder to date

On Saturday 16th of May 2015, at its Naples Yard in Southern Italy, Palumbo Group's Columbus brand launched two new yachts, a Sport Hybrid 40m and a Classic 57m that happens to feature the largest rudders CJR has ever manufactured.



The full displacement yacht had been somewhat of a mystery up to this point, without even a rendering being made available before the launch so it was with a sense of heightened anticipation that the industry's media lined up to see what Columbus has described as a yacht with 'airy interiors and excellent deck-space, a trademark of the Classic Collection'. Built with a steel hull and aluminium superstructure, she 'accommodates eight guests in four staterooms on the lower deck, with the owner's accommodation on the main deck and a guest cabin on the upper deck. She is operated by fourteen crew and has a good-sized tender garage, private and versatile entertaining and sunning areas with a large Jacuzzi on the sun-deck'.

"This is a prime example of CJR looking to push the envelope of what we are physically able to create. These fabricated rudders are manufactured in stainless steel to save weight, without impacting longevity or performance and the finished result is very impressive. Three years ago we would not have been able to supply a rudder of this size so it is another demonstration of our investment strategy paying dividends for both our clients and the business," commented Mark Russell.

