



MOMENTUM

NEWS FROM CJR PROPULSION

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When every second counts

The performance and operational benefits of CJR's precision approach is causing a stir in the competitive world of sport fishing

Peak performance

Solutions specifically developed for fully-optimised propulsion

To the rescue

Two-week turnaround for replacement props

Focus on sustainability

This year, CJR has made a number of strategic investments to support its environmental goals



Welcome...

It's been another incredible year for CJR, with some major developments taking place. In December 2022, together with Technical Director, Simon Lewis; Purchasing Director, Hannah Carter; and Operations Director, Oliver Goodley; we completed a management buyout of the business. This move secures CJR's long-term future and ensures that our customers will continue to receive the same level of exceptional quality, performance and service they expect from us.

For everyone who's known Mark and Belinda over the years, you'll be pleased to hear that they are still very much involved, moving to Chairman and Director roles as we complete a transition period. Their vision, knowledge and experience is critical to ensuring a seamless transfer to the new team, but they will gradually step back so they can spend more time with their families and enjoying life on the water...and golf course!

We believe the buyout brings several real benefits for our customers, not least that we have a well-considered succession plan, and the company will continue to be driven by people who are passionate about the industry and CJR, with decades of collective experience in the industry.

Our plan for the next couple of years is to build on our strengths and the unique proposition Mark and Belinda have developed. We will maintain our focus on designing and producing the very best propulsion solutions on the market, delivering significant performance and fuel efficiency gains through our leading-edge technology.

In other news, we've taken a significant step towards reducing our environmental footprint. We signed a green power purchase agreement (PPA), enabling us to significantly reduce our carbon emissions. Our new sand reclamation system recycles an impressive 98% of the sand used in our foundry, and we installed a new substation so we can run entirely on renewable energy sources for the first time.

Our commitment to quality and performance has also driven a massive increase in orders around the world, necessitating expansion in a number of areas, which we'll cover later in this edition of Momentum.

So, from all of us at CJR, we hope you enjoy our latest news and we look forward to chatting to you in the coming weeks.

Many thanks

Alex Stevens

NOT ALL PROPULSION SYSTEMS ARE CREATED EQUAL Delivering peak performance

When we say peak performance, we mean it. Our latest end-to-end design, engineering and manufacturing solutions have been specifically developed to provide fully-optimised propulsion packages that are proven to go faster, reduce fuel consumption, last longer, and increase ride comfort (compared to hand-finished propellers).

Whether you have a brand new motor yacht in build, require a replacement solution due to damage, or are experiencing issues with your current set-up, we can help.

Our CFD-designed, CNC-machined Class S propellers and stern gear packages can be manufactured in as few as two weeks using our rapid production process; plus, we are recognised as a key supplier to leading boatbuilders around the world, including Princess, Sunseeker, Galeon, Gulf Craft and Sunreef .

With decades of experience, combined with the very latest technology, including advanced robotics and machine learning, we know what

it takes to design and manufacture the perfect propeller and stern gear package.

We also understand how the design of your propellers and stern gear need to match your individual requirements. Because of this, we work with you to understand how your vessel is going to be used and design a solution to match – and always at a competitive price.

We don't use standard off-the-shelf patterns or a hand-made close match approach, and we always design and manufacture for a specific vessel. This provides our customers with peace of mind that everything we supply is going to perform exactly as expected, with maximum performance, efficiency, longevity and ride comfort.

Take a moment to explore our design and manufacturing process to understand the CJR difference, and why we are confident that our products are amongst the best in the world.

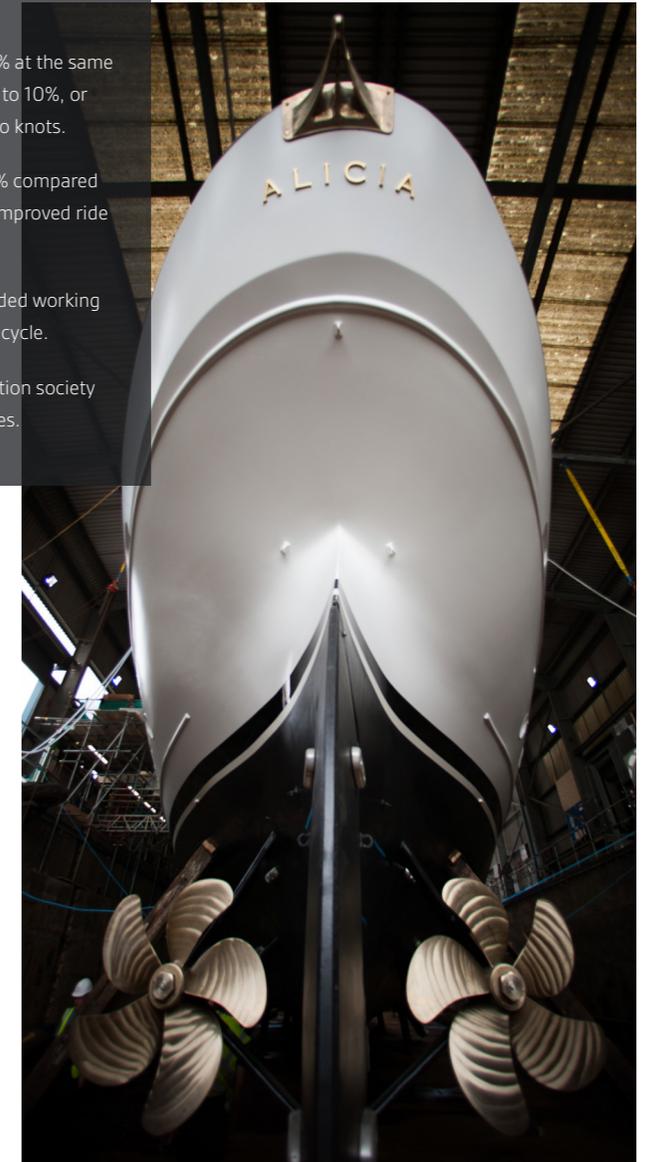


KEY FEATURES

- Designed using advanced computational fluid dynamics unique to every vessel, whilst considering expected use, location and owner's performance preferences.
- Manufactured using patternless mould-making and five-axis CNC machining for total adherence to the CAD design.
- Significantly improved propulsive efficiency due to bespoke blade design.
- Reduce engine load by up to 3% at the same RPM to reduce fuel burn by up to 10%, or increase top speed by up to two knots.
- Vibration reduced by up to 50% compared to standard pattern props for improved ride comfort.
- Minimised cavitation for extended working life and extended replacement cycle.
- Manufactured to any classification society rules, including all IACS societies.

“Working with CJR has been a revelation. As they have demonstrated, technology can dramatically improve the achievable standard for performance and vibration levels. We have learnt that fully-machined Class S propellers are the only option for minimising vibration, putting less strain on the sterngear system and extending the lifespan of the vessel, plus improving crew comfort. The vessel is now saving approximately 8–10% in fuel. For us, this is an incredible saving and demonstrates the value CJR provides its customers”

Bob Mainprize, Owner of Mainprize Offshore



Sport fishing: When every second counts

CJR Propulsion's Billfish propellers are changing the game: Discover how CJR is helping anglers gain the edge in the fiercely competitive world of competitive sport fishing.



In the world of US sport fishing, the market is currently riding high with production and custom boatbuilders working tirelessly to meet the demand for high-performance boats. As the market thrives, so too are the competitions that see anglers compete for the heaviest catch. Last year, for example, the White Marlin Open attracted 408 boats and over 3,500 contestants, awarding \$8.6 million dollars in prize money. The top individual prize was a staggering \$4.5 million dollars, setting a new world record in the process. With seven figure paydays on the table, competition is understandably fierce, and participants are looking anywhere they can to gain a competitive advantage.

Success on the water is intrinsically tied to performance. Competitors need vessels that excel in specific areas if they are to out-fish their rivals. Speed, manoeuvrability, stability, and quiet operation are all critical. Owners need huge amounts of power in relatively small vessels, which typically equates to compact propellers, and this can create specific challenges for propeller design.

In response to the demanding requirements, CJR developed its Billfish propeller range, designed specifically for high-speed sport fishing boats. It has proven to outperform competitors, enabling speeds of up to 50kts. The design and manufacture of the Billfish propeller takes into account the specific operating requirements of

the market, including maximum speed and quiet operation, but also the ability for operators to 'backdown' on fish, where the boat is put in reverse and steadily moved backward while the angler continues to reel in the line.

"First and foremost, our packages translate into real performance advantages, giving anglers the edge they need. And when you find out the winners have our props, they naturally want them too. Rapid delivery times are another reason we are so popular, ensuring that owners can get back on the water quickly if they suffer an accident, which is not uncommon. Boat owners and prop shops can send us 3D scans of damaged propellers so that we can run CFD, factoring in their requirements to design bespoke



“When we were getting into the design stages, we looked at the things on the boat we could make more efficient by (making) some simple design changes. One of the most efficient changes we did was the CJR running gear. We’re probably running two and a half to three knots faster. We’re burning the same amount of fuel so it’s about an 8% efficiency increase. On a standard trip of 100 miles out and back, we’re probably burning about 100 gallons less a day so that is a huge efficiency change.”

Joe Burner, owner of the Viking 72C 'Quick Raise'

flow aligned propulsion packages, including struts and rudders, which are optimised to the specific needs of the owner,” commented Joel Kmetz, President of CJR Propulsion USA.

One of CJR Propulsion’s key differentiators from local suppliers is its commitment to customisation, leveraging a team of experienced engineers who deploy cutting-edge technology to design the ideal propeller solutions for the specific vessel in question. This approach is what sets CJR Propulsion apart, with the added benefit that customers in the USA can access local support through a network of propeller shops, providing immediate assistance and service.



Go with the flow

LEVERAGING THE ADVANTAGES OF CJR'S FLOW-ALIGNED RUDDERS

In the world of ship design and propulsion engineering, every element plays a role in maximising yacht performance and safety. One often-overlooked component that can significantly impact a vessel's manoeuvrability and efficiency is the rudder.

Although traditionally motor yacht rudders are straight, they operate in an area of uneven water flow directly behind the propellers. As a result the rudder sees different angles of attack along its span, resulting in an uneven pressure distribution on the blade. Not only does this pressure negatively impact vessel performance and fuel efficiency but it is also where cavitation is more likely to occur.

Through another unique CJR innovation, we're able to accurately simulate these forces for any vessel and can predict how they would impact the propulsion system's performance. With this understanding, we're able to design a rudder with a unique, optimised profile – one which is perfectly aligned with the propeller flow angles along the entire

span. This design increases overall vessel performance and top speed by reducing the suction pressure peaks. In turn, this also minimises cavitation..

IMPROVED EFFICIENCY

Flow-aligned rudders are designed to minimise hydrodynamic resistance, making them more streamlined and efficient in the water. Traditional rudders do not operate at zero angle of attack over the whole rudder span, increasing drag and making it harder for a vessel to maintain its course. Flow-aligned rudders reduce this resistance, resulting in less energy required to steer the vessel. This also results in a reduction in engine load of up to 4%, meaning that a propeller of increased pitch can be added to absorb the available power and increase boat speed.

REDUCED VIBRATIONS AND NOISE

Traditional rudders can generate vibrations and noise as water flows unevenly around their surfaces. Flow-aligned rudders, with their optimised design, experience fewer disturbances in the water. As a result, yachts equipped with these rudders

operate more quietly, providing a more comfortable environment for both crew and passengers. Reduced vibrations also contribute to the longevity of the vessel's structure and equipment.

ENHANCED COMFORT

For passengers, the benefits of flow-aligned rudders go beyond the technical advantages. A smoother, quieter ride significantly improves the onboard experience. With less motion and noise, passengers' journeys are more enjoyable.

LONG-TERM COST SAVINGS

While the initial investment in flow-aligned rudders may be marginally higher than traditional rudders, the long-term cost savings are substantial. Reduced fuel consumption, lower maintenance costs due to decreased wear and tear, and improved safety contribute to a more cost-effective and reliable operation. Over time, these savings more than offset the initial expense of installing flow-aligned rudders.

“ With this approach, we can increase range by designing the rudder flow for a specific cruise speed to reduce drag at that speed, and we're also optimising p-struts for sport fish boats to improve the flow into the propellers to increase efficiency and gain even more speed. ”

Simon Lewis, CJR Technical Director



KEY FEATURES

- Reduced rotational losses and minimised drag provide the potential to increase top speed by up to two knots.
- Optimised profile of each rudder – never 'off-the-shelf'.
- Improved propulsive efficiency, with no impact on vessel manoeuvrability or steering performance.
- Power savings provide the opportunity to reduce engine load by up to 4% at the same RPM, in turn significantly reducing fuel burn.
- Lower suction pressure peaks to reduce cavitation, noise and vibration, improving both ride comfort and rudder lifespan.
- The potential to downsize the steering rams to save weight and cost.
- Manufactured to any classification society rules.

CJR to the rescue

FULLY OPTIMISED CLASS-S SUPERYACHT DELIVERED PROPS IN JUST TWO WEEKS

Historically, when it came to the design and production of propellers, you could have speed of delivery or high quality, not both.

Rapid production meant opting for an off-the-shelf pattern that was considered a 'close match' to your vessel. The notable downside to this approach is that the propellers aren't designed for a specific boat or its requirements, and therefore are not optimised for performance or efficiency. This could cost you in multiple ways, including top speed, fuel burn, ride comfort and longevity. Alternatively, if you required a bespoke, fully-optimised Class S propeller, you would likely be waiting eight weeks or more before it was shipped.

Thankfully, this is no longer the case. With our rapid turnaround service, we'll have you back on the water in two weeks or less.

Our total control of the design and manufacturing process, with every step managed by our in-house teams, means we're able to offer a unique service to deliver the highest quality, fully-machined Class S propellers in just 14 days.

The reduction in lead times is achieved through an end-to-end process that combines our in-house CFD and FEA capabilities, with dedicated cells for robotic patternless mould making, CNC machining and product handling automation. This is augmented with 3D mobile scanning and a global network of support partners, meaning six weeks or more can be saved and a superior product supplied anywhere in the world.

Our promise was put to the test when we were approached by Seawing Europe to help resolve issues with its client's 2015 San Lorenzo SL106 superyacht.

The owner had complained of vibration and performance issues and needed a solution fast in order to enjoy the rest of the summer season.

We were provided with the hull form and current specification and in just 14 days we designed, manufactured, and installed a complete set of 5B 46.5x52.25 MRK Rev 1.05 props. The new set-up instantly resolved the issues and left the owner delighted with the improved on-board experience.



“These guys are mustard. The one-stop-shop for all your propeller and stern gear needs. Turnaround from point of order is impressive. Quality is impeccable with Class S propellers and highest tolerances on shafting, available in a wide range of custom materials. Coupling and propeller fits are perfect, and technical support from in-house Chartered Engineers is on hand, with personal attention to detail on every product. Price and value for money is unbeatable in Europe. ”

Peter G. Stembridge, Managing Director, Seawing Europe Ltd

KEY FEATURES

- Fully-optimised 'Class Approved' Class-S propellers delivered in just two weeks, anywhere in the world
- Enhanced top speed performance by up to two knots or a 10% saving in fuel burn
- Improved ride comfort through a reduction in vibration of up to 75% at blade pass frequency and 50% at shaft rotational frequency
- Ability to 3D scan any prop in the world and reverse-engineer to match existing
- Leverages the latest advances in CFD and FEA design software, and robotic patternless mould making technology
- Multiple CNC machining centres, operating 24/7, ensures adherence to the smallest tolerances, in line with the original CFD design
- High-efficiency product handling automation reduces production timescales and maximises efficiency

Looking to the future

This year, CJR has taken significant steps towards reducing its environmental footprint and enhancing the business' operational efficiency, reflecting the company's continued commitment to innovation and sustainability.

SAND RECLAMATION SYSTEM

CJR's recent adoption of an FMS sand reclamation system accomplishes something truly remarkable—recycling 98% of the sand used in our foundry operations. In addition to the environmental benefits, this innovative technology actually improves the sand's working properties and also has a positive impact on our bottom line. It significantly reduces the amount of sand waste destined for landfills, saving on both transport and disposal costs. Win-win.

1MVA HIGH VOLTAGE SUBSTATION

Earlier this year, we transitioned from a low voltage power supply to a 1MVA high voltage substation. This substantial increase in capacity not only prepares the business for future growth and additional energy demands but allows us to cut our carbon emissions. The switch to green energy procurement through

a power purchase agreement (PPA) also significantly reduces our carbon footprint. The move to high voltage and green energy was a key objective of our long-term sustainability goals, and it underscores our commitment to reducing our environmental impact across the business.

NEW 250M² STORES HANGAR

Driven by a growth in international orders and a healthy forecast for 2024, CJR broke ground on a new 250m² stores hangar in Southampton. The new facility doubles our storage capabilities, enabling efficient inventory management and ensuring timely and efficient order processing.

MORE ROBOTS!

CJR's decision to double its robot machining capacity delivers a substantial increase in production capacity. This expansion reduces

lead times, streamlines operational efficiency, and solidifies our competitive advantage in the industry. Utilising robotics for precision machining not only boosts production but also minimises waste and energy consumption.

MELTECH FURNACE VOLUME UPGRADE

The introduction of a larger induction furnace enhances our foundry's production capacity, allowing us to meet the growing demand for molds and castings. This state-of-the-art furnace is designed for energy efficiency and, when combined with our switch to 100% renewable energy, ensures we maintain our commitment to reducing our environmental footprint and operating costs.



“At CJR, we want to lead our sector's push towards sustainability and ultimately become carbon neutral by 2030. Our strategy is to embrace technology that makes environmental and economic sense, and our recent investments reflect our continuous pursuit of both product excellence and sustainable practices, delivering benefits not only to our customers but also to the environment and our local community. As we look to the future, we remain committed to innovative solutions that drive progress in both the propulsion industry and the broader context of responsible business practices.”

Alex Stevens. CJR Technical Sales Director

ANOTHER BUSY 12 MONTHS SEES CJR BREAK ITS OWN RECORD FOR Completed projects



As awareness of the benefits of our unique design and manufacturing capability proliferates through the industry, an increasing number of boatbuilders, refit yards and owners are looking to CJR to help solve complex propulsion-related challenges or commission performance-oriented, highly-efficient propulsion packages.

In 2023 so far, over 500 projects have benefited from CJR's CFD capabilities to design and build optimised propellers and propulsion packages that maximise performance, efficiency and longevity.

"To put it plainly, if you don't understand how a propulsion package is going to perform, you are never going to get the best possible performance or experience on-board. Our ability to create the highest-

performing products puts us amongst the very best specialists around the world, and we certainly surpass any other manufacturer in the UK.

We've been on this journey for a decade but we're still constantly innovating and finding new ways to extract the absolute maximum from our products, and our customers see that. They see that we listen to what they want and we work tirelessly to exceed their expectations. This isn't only true of bespoke projects either. More and more boatbuilders are championing optimised propulsion systems as a distinct advantage for their customers. The expansion of our customer base and the breadth of our offerings reflect the growing awareness of the opportunities at hand," stated Alex Stevens, Technical Sales Director at CJR Propulsion.

“We're still constantly innovating and finding new ways to extract the absolute maximum from our products, and our customers see that. They see that we listen to what they want and we work tirelessly to exceed their expectations.”

Alex Stevens, CJR Technical Sales Director

→ Project recap

- › 30 pairs of bespoke CFD-optimised stainless steel flow aligned rudders to Sport Fish boats for even higher reduction in drag and enhanced top speed
- › 30 pairs of bespoke CFD-optimised flow aligned struts
- › 50 pairs of propeller reverse engineered from 3D scans of damaged propellers
- › 50 pairs of rapid delivery Class-S, fully CFD optimised propellers
- › More than 600 complete shaftlines / brackets / rudders to production motoryacht builders
- › Supply of the first ever windfarm support vessels equipped with two piece flow aligned rudders and six blade Class-S optimised propellers
- › 50 complete sterngear packages to pilot boats
- › Increased the speed from 31-33kts on our Marex 360 test boat by fitting a bespoke flow aligned package – more info to follow in next Momentum
- › Contract won and delivered for the supply of propellers to the US Coastguard
- › Contract to design and manufacture propellers to all propellers on the US NSW Combatant Craft vessels in operation





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