



MOMENTUM

NEWS FROM CJR PROPULSION

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For CFD, turn to CJR

CJR's on-going investment in CFD

Printing prowes in 3D!

CJR Propulsion invests in latest
prototyping technology

CJR to double manufacturing capacity

CJR has announced plans to
establish a new technology and
automated production facility

Introduction



2013 has definitely been a year of new arrivals and strategic developments here at CJR. We've welcomed marine industry heavyweight, Karl Weston, as our new global sales director and we witnessed our design and manufacturing head counts swell to meet current demand and to ensure we have the right people in place to meet our future business objectives.

We are continuing to invest in the latest technology and manufacturing facilities, including the arrival of our first 3D printer! We've seen further developments within our CFD capabilities and have expanded the services we are able to offer on a consultancy basis – meaning everyone can now benefit from the significant

performance improvements available through our TrialDAS product and CFD department. All in all, our efforts this year have one common goal: to further CJR's mission to become the number one manufacturer of precision propulsion systems of the highest quality.

We hope you will already be familiar with CJR Propulsion, if not as an existing customer then as an admirer of the work we do and the performance standards we are able to reach. We have long-standing relationships with key builders around the world, spanning multiple markets, within commercial, leisure and superyacht sectors. So please accept our invitation to join us on

our stand for a short presentation on CJR's comprehensive design and manufacturing solutions or just visit our brand new website at www.cjrprop.com to hear about all the exciting developments that have been taking place.

We look forward to seeing you.

Mark Russell
Managing Director

“We are continuing to invest in the latest technology including the arrival of our first 3D printer”

For CFD, turn to CJR

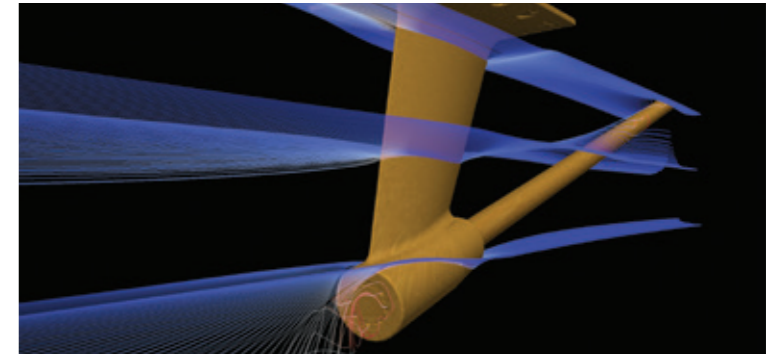
Since 2010, CJR Propulsion has been at the forefront of computational fluid dynamics (CFD) development –optimising propeller and stern gear packages for improved performance, fuel efficiency, longevity and reduced vibration.



CJR's on-going investment in CFD, as well as upgrading its computer cluster to ensure it has the capacity required to perform the required calculations, means the organisation is today one of only a handful of businesses capable of fully predicting the flow around the hull and propeller without carrying out expensive tank testing. This enhanced level of knowledge enables CJR to make a significant reduction to appendage drag – which contributes up to 15 per cent of the overall drag of the craft. This sort of improvement can equate to a two knot increase in cruise speed on a high-speed craft.

Whereas previously this service was only offered to those purchasing CJR's propulsion systems, the company has now developed a unique and highly cost effective consultancy service, available to any and all wishing to improve the performance of their vessel.

CJR managing director, Mark Russell, explains: “With our consultancy service you will be armed with all the insights you need to make



timely engineering decisions with confidence. Reducing development time, shortening time to market, optimising performance and improving efficiency... all of which translates into happier customers, able to enjoy a better product. We have already carried out a number of highly successful projects working directly with designers and builders. We've analysed the effects of changing the hull shape in the areas of the propeller tunnel and bow thrusters, and we've optimised the shaft bracket and rudder design for peak performance.”

By highlighting areas of the hull where the flow separates from the hull surface, CJR is also able to provide its clients information about the operating performance of a hull in calm water. Parameters such as the running trim angle and hull resistance can be calculated easily and quickly. CJR can also calculate the optimum longitudinal centre of gravity position for reduced drag.

For more information on how you could take advantage of CJR's consultancy services, contact Simon Lewis; simon@cjrprop.com

Welcome to the team

CJR Propulsion today announced the arrival of Karl Weston as the company's new global sales director.

Karl will be responsible for delivering the business' growth objectives in key markets around the world. This will include overseeing the expansion of CJR's global dealer network and securing new exclusive supplier agreements with top-tier builders within both the leisure and commercial marine sectors.

During his extensive career, Karl has held a number of notable roles across Europe – including senior positions in commercial management, purchasing, sales and manufacturing. Most recently, Karl spent nine years as managing director of marine industry metal specialists, Blackburns Metals.

"Over the last decade I have been privileged to witness CJR's achievements, working with the business throughout that time. I now look forward to playing a pivotal role in assisting the company with their ambitious plans for the future.

"With over 25 years experience working within the marine supply chain, I am confident I will be able to utilise the relationships and skill set I have developed over my career to have a genuine and positive impact on the CJR's future development," Karl commented.

Prior to joining Blackburns in 2004, Karl held the title of managing director

at Klockner Aluminium, as well as being Chairman of the Aluminum Stockholders Association (ASA). Karl remains a key member of the ASA council, representing the industry in a wide range of issues at local, national and international level.

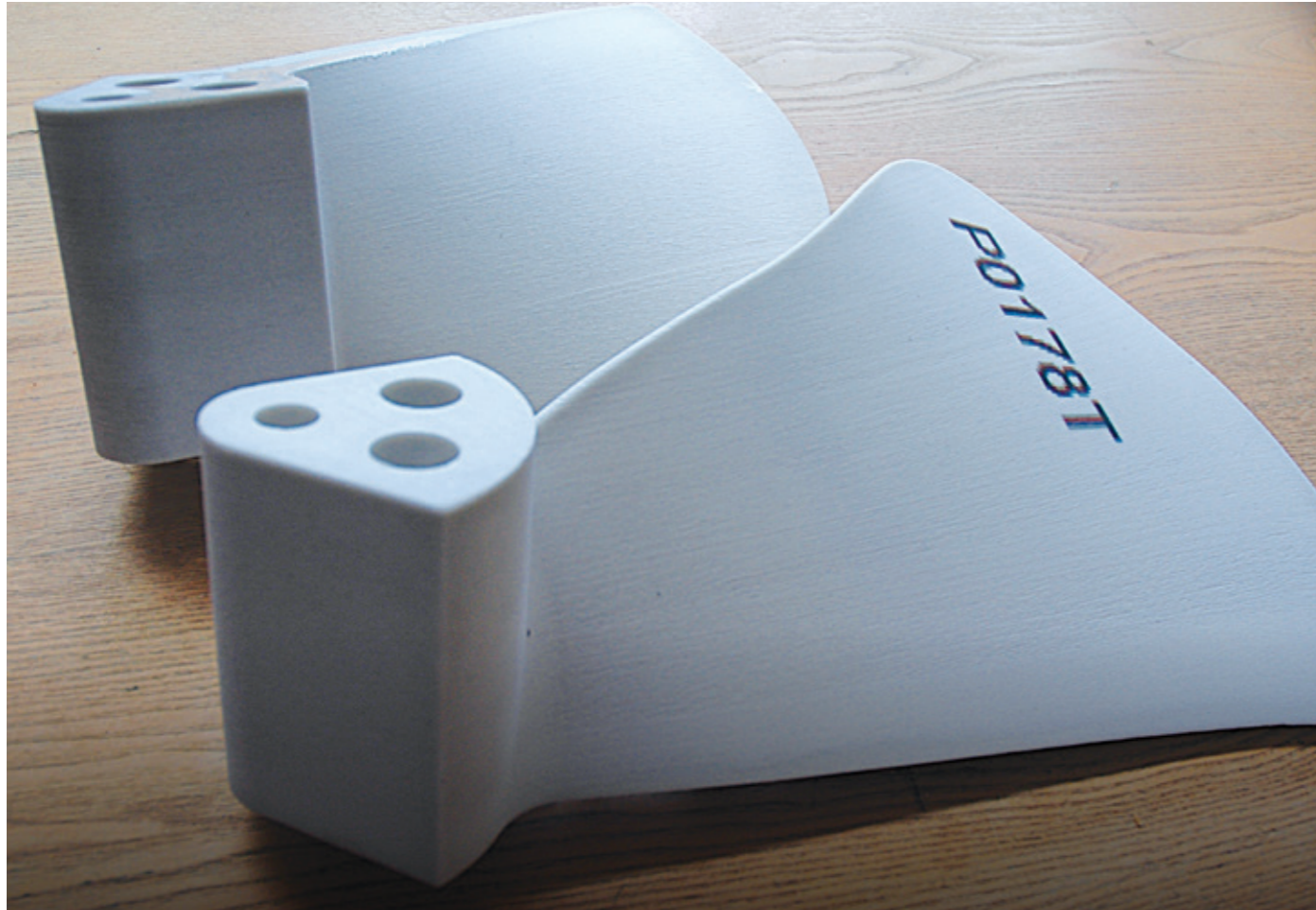
"Having developed a successful marine business at both Klockner and Blackburns, I have been looking for a new challenge that would provide me with greater involvement in the marine industry. However, the opportunities to find the right role, especially with a true market leader, are few and far between in any sector. That's why the prospect of joining a business of CJR's

"Karl's wealth of experience will be an invaluable asset to CJR and I am confident he can introduce new initiatives to drive growth based on CJR's strategic plan."

calibre, which is committed to driving the industry forward, is such a fantastic and exciting prospect." Karl concluded.

"CJR's strategy for the next five years is centred around continued investment in the business and especially in our manufacturing facilities. We want to build on our reputation for advanced design capabilities and product excellence and be globally recognised as the number one manufacturer of precision propulsion systems. Karl's appointment is undoubtedly a significant part of us being able to accomplish these objectives. His wealth of experience will be an invaluable asset to CJR and I am confident he can introduce new initiatives to drive growth based on CJR's strategic plan. All in all, we are delighted to have managed to secure such a heavyweight candidate – for what is undoubtedly one of the most important roles in the business." added CJR managing director, Mark Russell.





“The printer is able to produce three-dimensional solid objects of virtually any shape directly from a 3D CAD model”

Printing prowess in 3D!

CJR Propulsion invests in latest prototyping technology to drive the next level of propulsion system development.



When it comes to manufacturing the highest-performing propulsion systems on the market, using the latest, most advanced 3D design software is vital for creating accurate models of the desired product. At CJR, new designs are developed using the company's own bespoke design software, before being analysed using computational fluid dynamics (CFD) and tested for strength using finite element analysis (FEA).

Once the design is complete and fully optimised to its application, the next task is to move from design to physical concept, before going into production. This transition presents a number of distinct challenges relating to precisely replicating the design to within a number of microns. Until relatively recently, CJR had to outsource the production of patterns for the casting of products. These were generally made out of wood, with a lead time of up to three weeks.

Today, the latest 3D printing prototyping tools are providing a cost effective solution to this issue

and it is with this in mind that CJR has decided to invest in the one of the largest and most advanced 3D printers on the market. The product, from leading specialist 3D Systems, is able to produce three-dimensional solid objects of virtually any shape directly from a 3D CAD model. This enables CJR to produce male moulds of propellers, rudders and countless other components, which replicate the design perfectly and which can then be used to create highly accurate casting moulds for use during the manufacturing process.

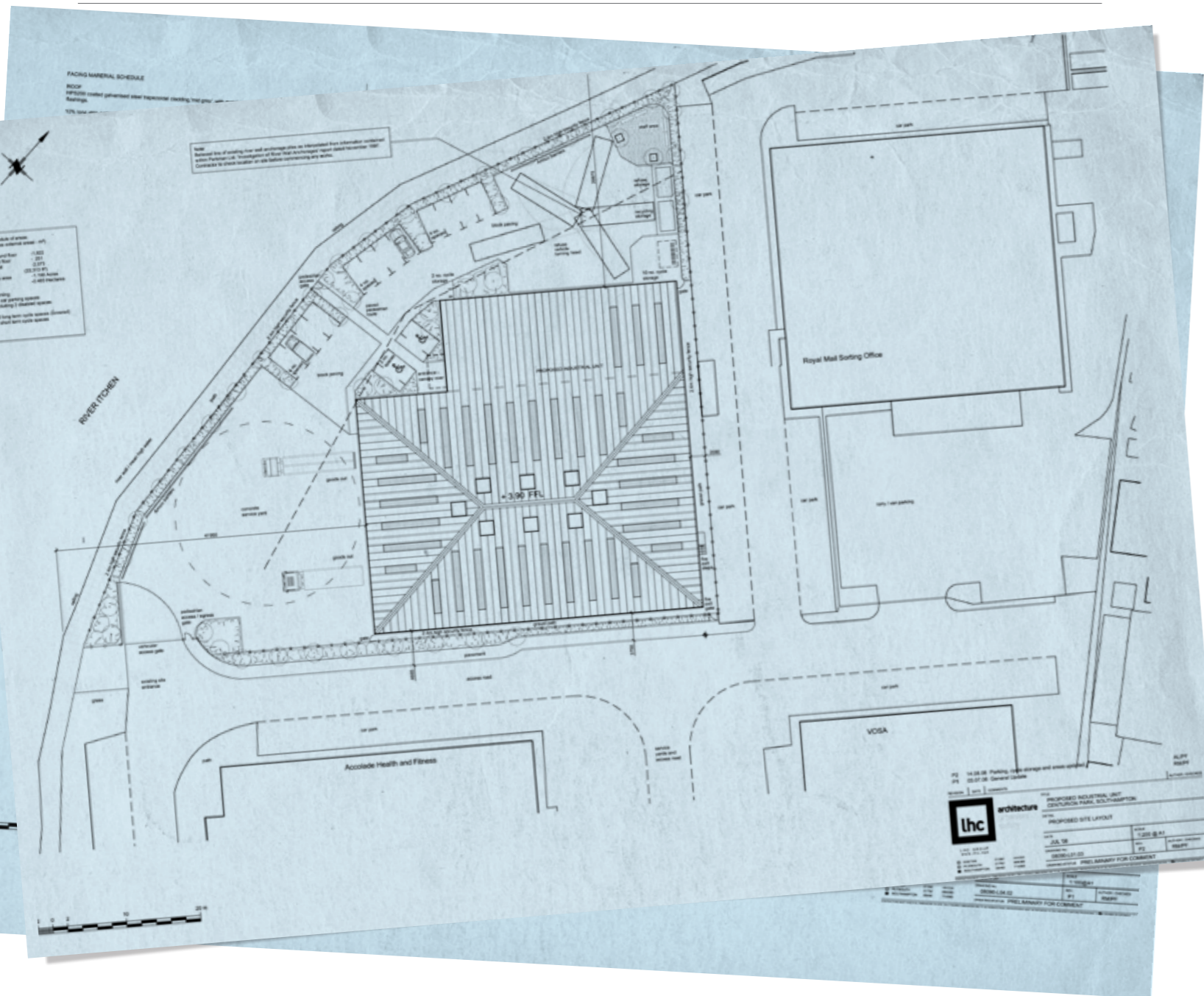
To perform a print, the printer slices a 3D model into hundreds of digital cross-sections, with each 0.004 inch (0.1 mm) slice corresponds to a layer of the model to be fabricated by the printer.

Once the pre-build routine is complete, the printer immediately begins printing the layers created in the printer's own software. To achieve this, the machine deposits a layer of plastic-based powder across the build area. The print carriage then moves across the layer, depositing a water-

based adhesive that solidifies the powder in the pattern of the first slice. Any areas not required remain as a powder, ready to be removed and recycled.

At this point, the printer lowers the powder bed 0.004 inch (0.1 mm), preparing for the next layer to be created. The cycle then repeats itself until the model is complete. Once the printer completes the final layer, a short drying cycle runs. Then the physical object can be removed. Historically, this process could take days but with the latest advanced technology, this has been reduced to a few hours and even less on simpler designs.

Marek Skrzynski, head of design for CJR commented: "For us, 3D printing is the final link in the design to manufacture process. We can now maintain the accuracy of our designs throughout, with a significantly reduced requirement for finishing. This has multiple benefits for the customer. Cost, time scales and quality are all improved through the use of this incredible technology."



CJR to double manufacturing capacity

CJR has announced plans to establish a new technology and automated production facility within its existing manufacturing complex in Southampton, UK.



The company has identified a site for the 21,000-square-foot unit and plans are in place to initially invest approximately 2.5 million Euros outfitting the new operation with the latest design and manufacturing technology.

The facility, which will double CJR's manufacturing capacity once online, will employ up to 20 additional designers, technology specialists, engineers and support staff when fully operational.

"This new centre will be a state-of-the-art facility for manufacturing the latest and most advanced propulsion

systems on the market," commented CJR's managing director, Mark Russell. "It will enable us to continue to improve the finish and precision of our products, as well as reduce manufacturing lead times, which in turn ensures we remain competitive on price and are able to provide our customers with the commercial advantage they're looking for," he continued.

In line with CJR's commitment to driving quality standards through better design, those working within the new facility will also be responsible for developing the next generation of CJR propulsion systems – utilising

the very latest design and prototyping technology to do so, including CFD, FEA analysis and advanced 3D printing.

"I can't think of any competitors which can match our current level of investment when it comes to design and manufacturing technology and the infrastructure to support it. This latest announcement is a perfect example of that commitment. The new facility will enable us to achieve continuous improvement of our products and services and help us maintain our position as market leaders, supplying professionally manufactured, quality propulsion systems," Mark concluded.

"This new centre will be a state-of-the-art facility for manufacturing the latest and most advanced propulsion systems on the market"

Perfect shaft alignment and lateral vibration **analysis**

Over the last 12 months, CJR has invested heavily in advanced computational modelling in order to improve its design capabilities and the accuracy of its finished products.



One area that has particularly benefited from this sustained investment is the analysis of shaft lines, and in particular, shaft alignment and lateral vibration analysis.

With its latest developments, CJR is able to create highly accurate reports during the design stage which identify

any potential issues in the shaft line alignment, whilst also establishing the required vertical offsets of the gearbox bearings. In turn, this minimises the possibility of requiring costly realignment and ensures that the optimal gearbox bearing loads and vibration are understood to enable the life of the bearings to be maximised.

“To achieve this level of detail, we are using complex algorithms to determine the bush loadings and deformation on supporting bearings in the shaft line. Our alignment analysis is then able to calculate the loading on each bearing – ensuring that the gearbox bearings are within the limits set by the manufacturer’s warranty. The software

“The software can even take stiffness and wear into account to provide incredibly accurate results that simply weren’t possible a few years ago”

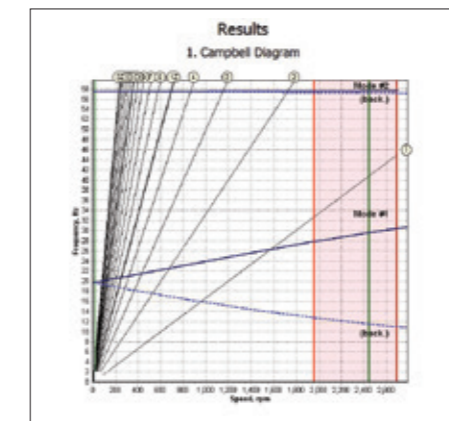
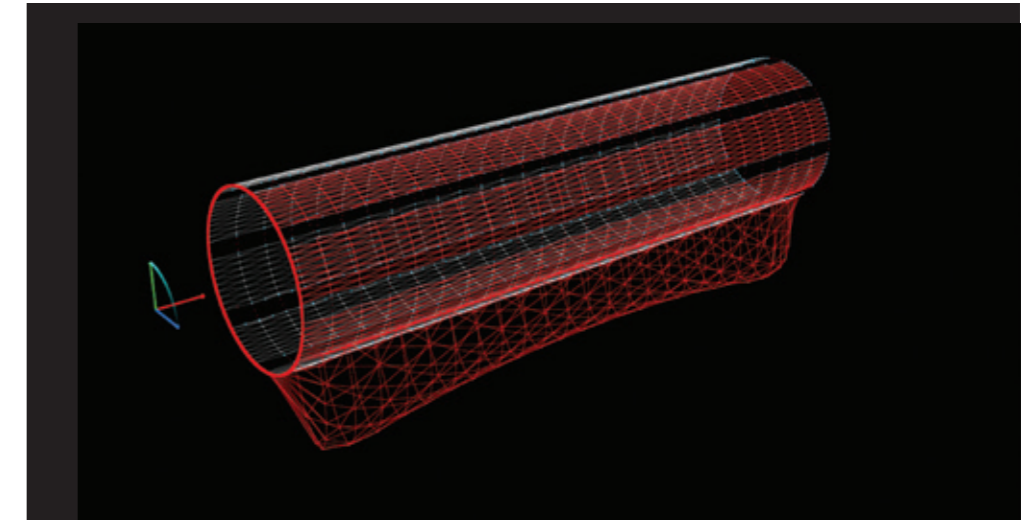
can even take stiffness and wear into account to provide incredibly accurate results that simply weren’t possible a few years ago,” commented Simon Lewis, CFD engineering manager for CJR.

With regards to lateral vibration, excessive whirling vibration can adversely influence propulsion system elements, in particular:

- shaft and shaft elements fatigue life;
- fatigue cracks at shaft brackets and foundations;
- stern tube bearing fatigue damage;
- excessive noise, hull and superstructure vibrations

CJR’s report also includes a Campbell diagram detailing any dangerous engine speeds that would excite the shaft at its natural frequency, generating vibrations in the process. If there are any problems, they are highlighted by red points on the Campbell diagram, and indicate possible dangerous frequencies.

This service can be IACS approved if necessary.



TrialDAS proving popular

Following excellent feedback from early adopters and repeated requests to make the product available for sale, CJR has announced that it is now possible to purchase or hire its TrialDAS precision data acquisition system — specifically tailored for monitoring sea trials and identifying vibrations issues.



The system can be used to analyse noise and vibration, and provides valuable information about the possible source and cause of unwanted noise. In addition, TrialDAS provides general information about yacht performance such as speed, trim angle, heading, and engine RPMs – all utilising the latest GPS technology.



“We knew it was an incredibly valuable and useful tool so it’s come as no surprise to see so many top tier boat builders wishing to purchase their own TrialDAS, or commissioning our team on a consultancy basis to gather the results and produce accurate reporting. The product has been especially popular with those with a requirement to benchmark boat performance or where a particular vibration issue needs to be identified and isolated,” commented CJR director, Belinda Russell.

“We’ve found the product especially popular with production boat builders who need to know the precise performance credentials for a new vessel. Two top-tier builders have already purchased the system and the feedback has been fantastic. No other single product on the market is able to gather and collate all the required information in one easy to use device,” Belinda continued.

The system is based on rate gyros, GPS, accelerometers and magnetic field sensors to record every movement of the boat. As well as accurate position information, the unit is customisable, allowing the monitoring of over 100 other parameters on board. Two vibration sensors, two RPM sensors and a microphone for sound noise level measurements are included as standard, but other sensors can be connected, including temperature and pressure, depending on the client’s requirements.

The unit is small, light and portable, and is very easy to setup and use. The software provided with the system can be installed on a low end laptop with a USB interface. It produces real time reports in PDF format that can be viewed before the yacht has returned to shore and it completely eliminates the need to use hand written paper sheets during trials.