

# Measuring the Surface Quality of Gelcoat Composites

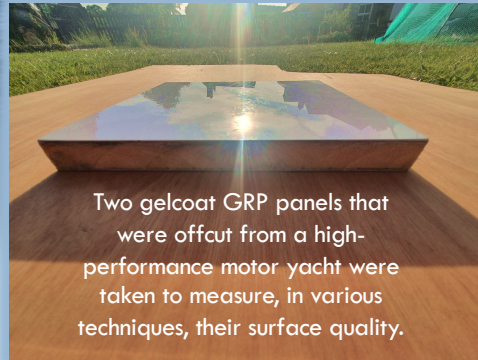
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The marine industry is constantly looking to improve composite hull construction to increase performance while reducing cost. A way of achieving this is by improving the surface finish of gelcoat composite materials.



This project looks at accurately measuring the gelcoat surface quality and validating these various techniques. The study's results will benefit the marine industry to improve the design and manufacture of more efficient composite structures.



Two gelcoat GRP panels that were offcut from a high-performance motor yacht were taken to measure, in various techniques, their surface quality.

## Methods and Results of Measuring Surface Quality

### Experiment 1- Talysurf profilometer

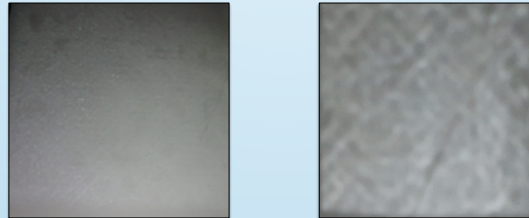
This method involved the use of a highly sensitive measuring device that runs across the surface of the plates which detects miniscule attributes of it.



The results showed waviness of the surface, which resembled the weave of a woven composite and was much more prominent on one of the plates. This indicates ununiform production with more waviness in areas.

### Experiment 2- Fractal dimension analysis

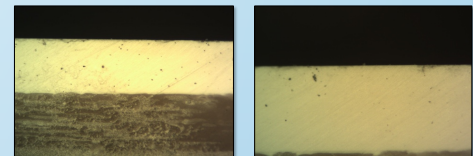
This method involved the use of a light box, where images were taken of the reflected surface of the gelcoat. This was then run through a fractal dimension software which detected the complexity and shape of defects.



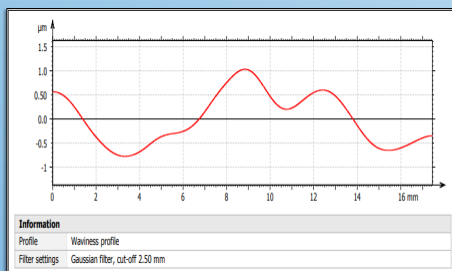
The images from the fractal dimension measurement shows some distinctive patterns that were not visible with the naked eye. This pattern could also be seen in the results from the profilometer in the forms of waves.

### Experiment 3- Microscopic imagery

This method included taking magnified images of the side profile of the gelcoat surface, which would give its characteristics.



This method showed a difference in thickness of gelcoat between the plates, which showed how a fault in the manufacturing process could cause a lack of uniformity.



*In conclusion,* using tried and tested measuring techniques, as well as relatively obscure methods, companies such as Princess Yachts can use results gained at a low cost to innovate and improve their product, especially in their manufacturing processes where most of the product's fault lie. By using these newer techniques, additional information can be acquired to help locate areas of poor quality, thus improving the overall quality of products and saving money for the future.