

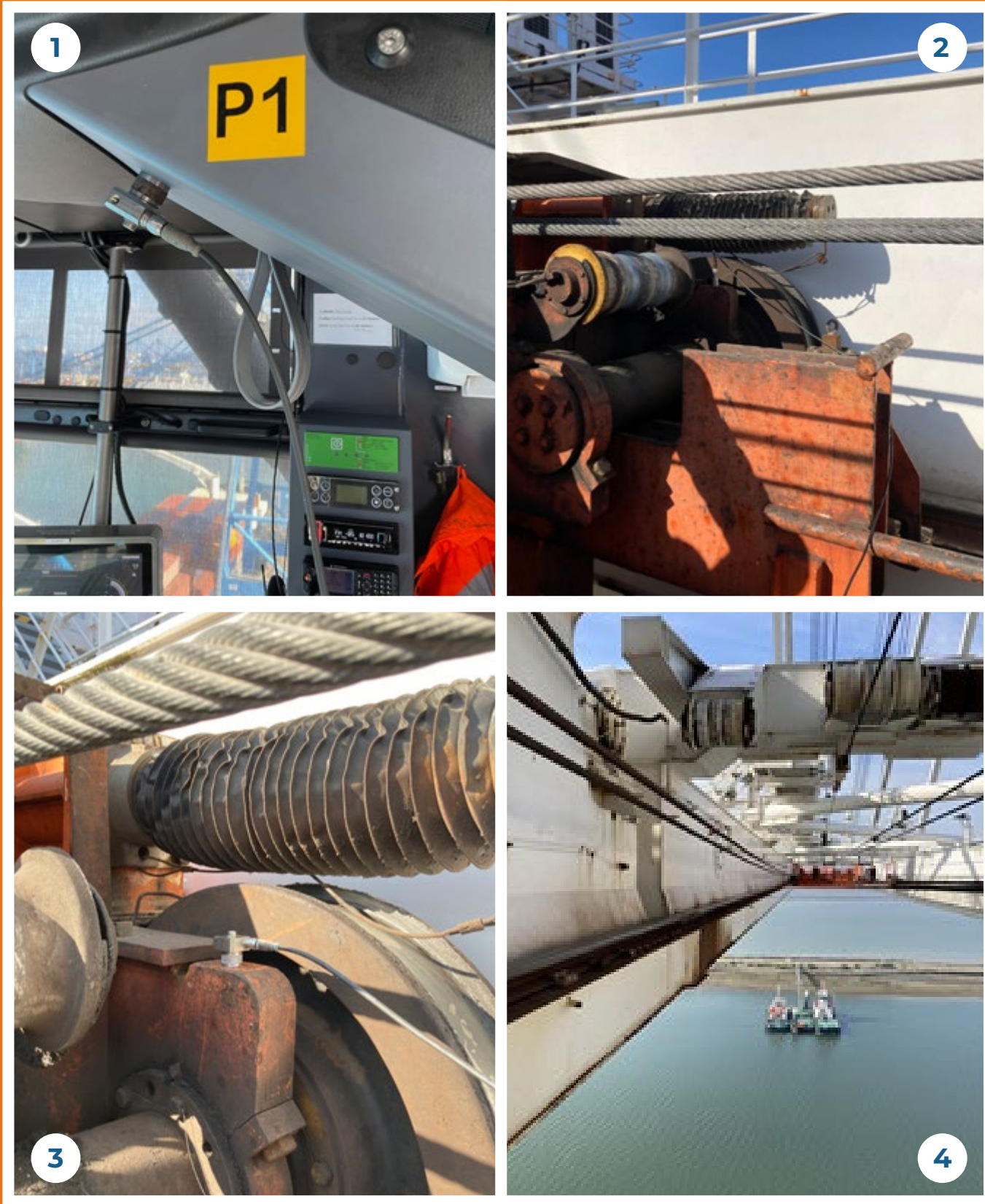
# VIBRATION ANALYSIS OF TROLLEY RAIL TRACK ON SHIP TO SHORE CRANE.

With significant experience in the analysis of vibratory phenomena occurring during the trolley movements, Stratébord offers you its expertise to evaluate the quality of your trolley rail track.

According to a proven protocol, with reference analysis tools, our engineers take care of measuring the vibration levels on the trolley structure, from the trolley wheels to the driver's seat.

The signals recorded on the track/ rails are then analysed to highlight faults and wear that cause significant disturbance in the driver's cabin.





1- Sensor on Merford driver's seat support  
 2- Sensor on trolley wheel structure (1/2)  
 3- Sensor on trolley wheel structure (2/2)  
 4- Trolley track

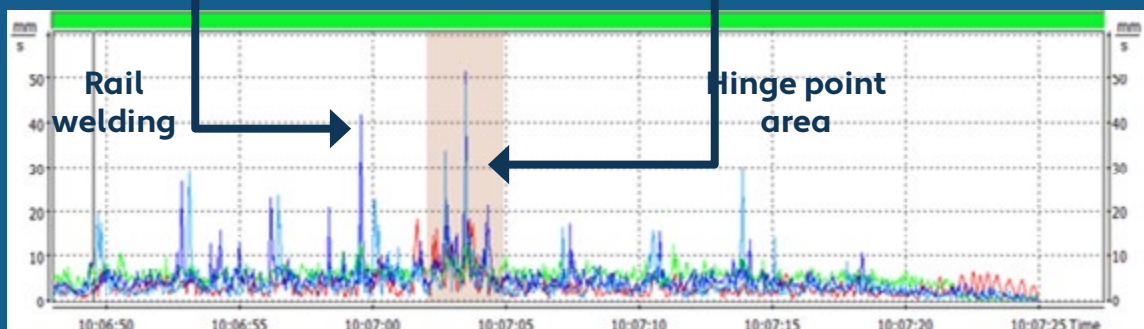
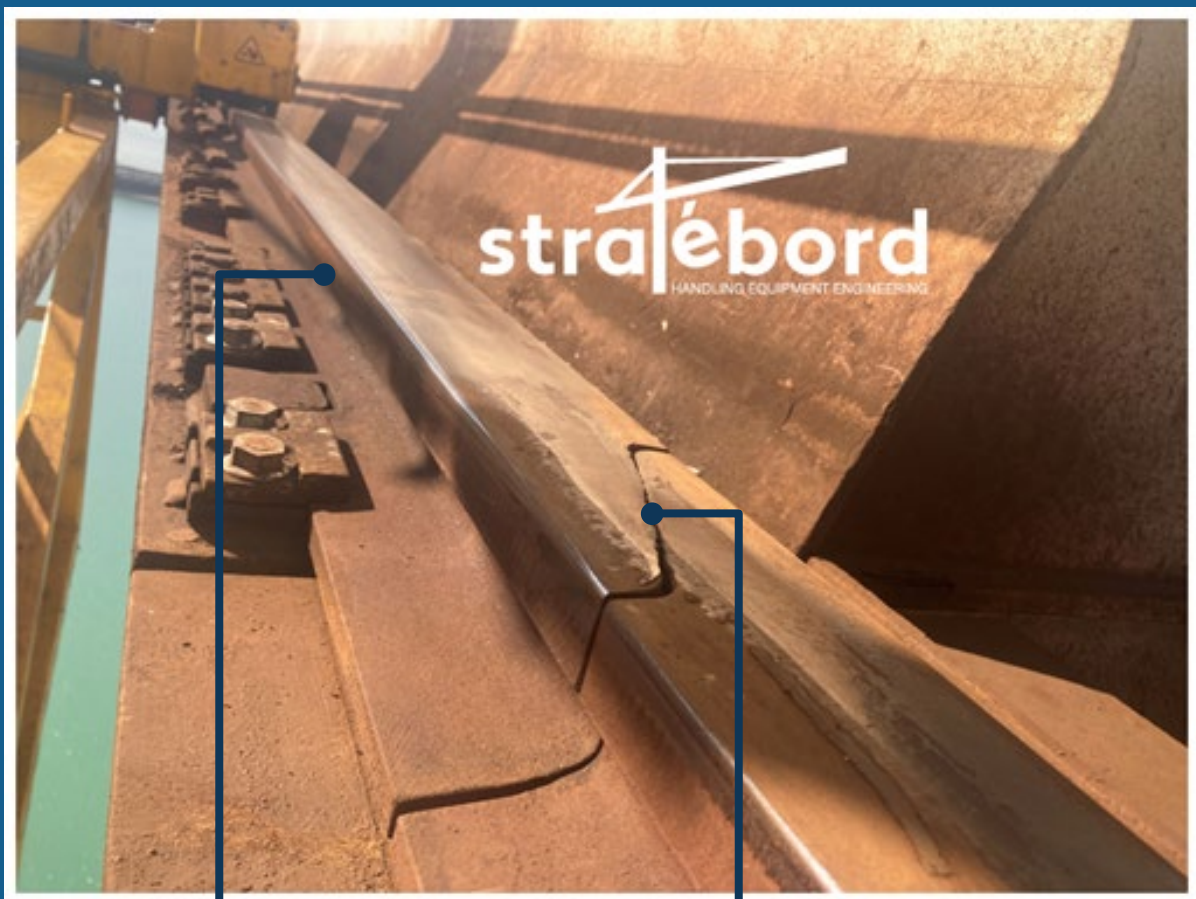


# OUR ANALYSIS APPROACH

## GLOBAL AND LOCAL ANALYSIS:

Whether it is defects due to the crossing of the hinge point, or welding defects, and this independently on the left and right rails, our measurements make it possible to clearly identify the global and local quality of the entire track.

In a preventive maintenance approach, the operator is thus able to anticipate these costly works on this type of equipment, and to prioritize these interventions.



# APPLICATION EXAMPLES

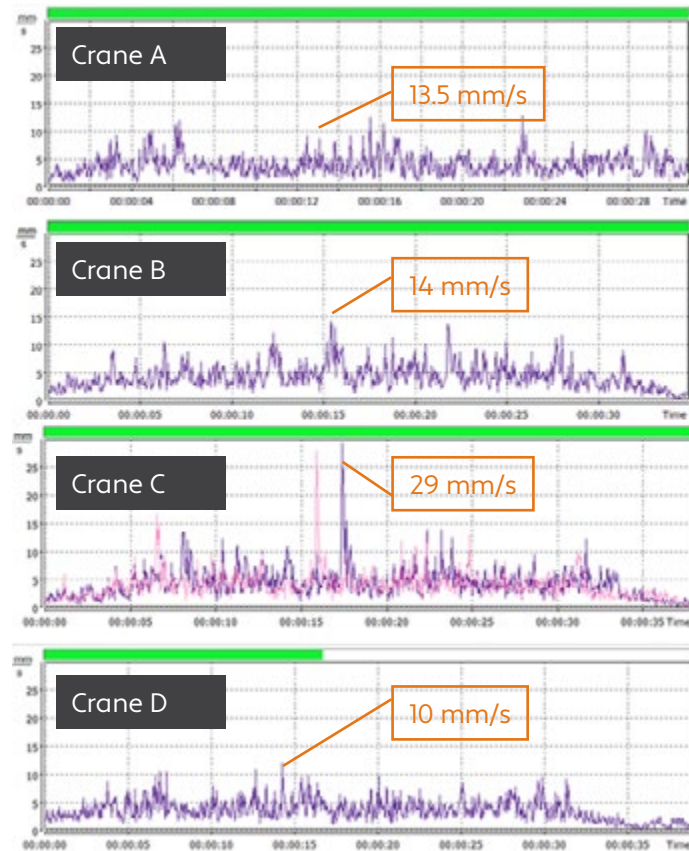


Figure 2 - Comparison of 4 identical new STS delivered at the same time.

## ACCEPTANCE OF NEW EQUIPMENT

For one of our customers, having received 4 new STS, the drivers noticed that one of the cranes did not have a good junction quality.

We were therefore asked to compare the vibrations propagated on each of the cranes. The diagrams above are extracted from the straight rail analyses.

The maximum vibration level, here at the junction, is identified as 230% higher on the «STS C» (peak RMS velocity at 29mm/s compared to an average of 12.5mm/s on the other 3 identical STS, verified on several runs).

In this example, our client was able to argue rigorously and indisputably that one of the rails on this crane was not compliant.

## RECEPTION OF JUNCTION RENOVATION WORKS

The following comparison shows the results of two junction renovations.

These analyses, Figure 3, show examples of the results, before and after work, from two different renovations. In the example on the left, «Crane E» in green, the vibrations were increased after the work (+38%). In the example on the right, «Crane F» in blue, the vibrations were greatly reduced (-50%), thus indicating the success of the work undertaken.

These highly accurate results were in line with the «sensory» feedback given by the machine operators, and their impressions are thus objectified and quantified. Here again, the operator was able to make a strong case for the quality of the work carried out by his contractor, clearly locating the rail concerned and the critical area.

Thanks to this analysis, the work, which initially cost more than €40,000, was carried out without any additional cost for the crane operator.

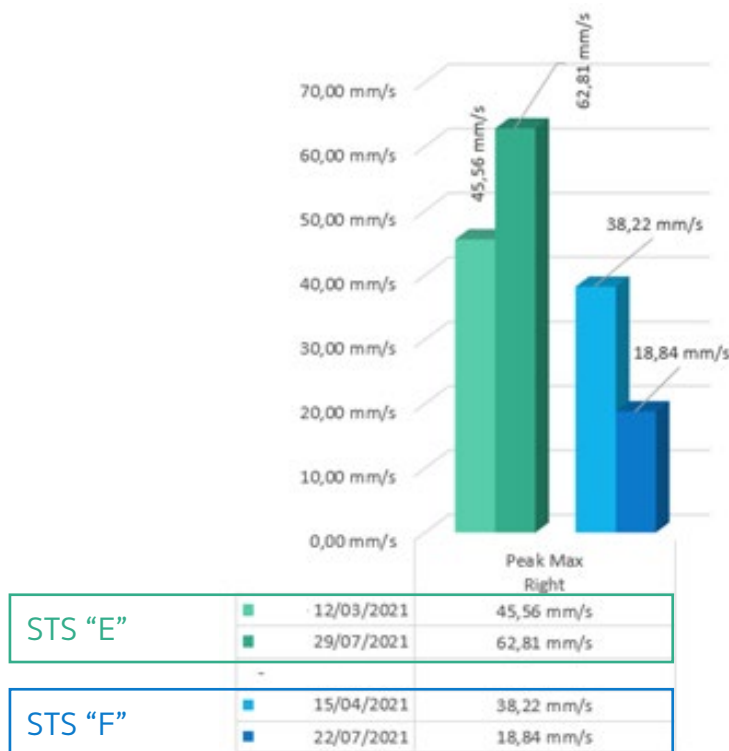


Figure 3 - Comparison of two renovations on two different STS

# APPLICATION EXAMPLES



Figure 4 – Above RMS vibration in mm/s measured on the trolley wheels, below RMS vibration in mm/s on the driver seat

## CHARACTERISATION OF VIBRATIONS IN THE CABIN

In our protocol we also measure the consequences of the vibration phenomena that propagate at the driver's seat. These data allow us to correlate the effects felt by the driver with the characteristics of the track.





## A CUSTOMISED PROTOCOL AND HIGH-PERFORMANCE TOOLS

During each measurement campaign, our methods and results are consolidated by assessments of the levels of uncertainty and verified repeatability, in particular to exclude any risk of accidental value and any error of assessment.

Our measuring equipment consists of a vibration analyser, capable of capturing a time signal at a frequency of 12kHz on each of the channels (signals captured by unidirectional and tri-directional sensors). From these signals, we have specialized software for processing vibration data, enabling us to carry out our analyses (RMS values, average values and peak values, on the complete track and on the junction, etc.).

In order to ensure that defects are identified along the track, in a synchronized manner with our vibration measurements, we also use a 5K Ultra HD camera.

To propose a control plan adapted to your equipment and to your operating specificities, Stratébord is at your disposal and will bring its know-how to meet your objectives.

## HOW MUCH DOES IT COST?

The price of a service for an STS, excluding travelling cost, is €1,200, unless special conditions are established with the client (number of measurements, number of STS, etc.).

The proposed service includes Data collection, signal analysis, production of a report and provision of comparative measurement tables.

We also propose to include a presentation of the approach and the results to the referring drivers, in order to positively involve all the actors concerned by the operation of the gantries.

