

QUEBEC CARTIER RAILWAY



WEAR RATE REPORT

SYDNEY STEEL RAIL VS OTHER MANUFACTURERS

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Introduction:

The goal of this report is to determine the wear rate of the Sydney Steel Rail Low Alloy Head Hardened (LAHH) for different degree of curvature (1° to 6) on Quebec Cartier Railway and make a comparison with other manufacturers.

Methodology:

To achieve this project, I used the data from the **Advanced Rail Management** system we used on our railroad to measure different aspects of the rail with laser camera with an accuracy of .001". We do that kind of test twice a year to determine the wear and the profile of rail to forecast the rail change out program and we used it also for the grinding program.

This system consist of two laser cameras on each side of the track mounted under a truck and we take a picture of the rail every 5 feet and we do that on the whole railroad, from Port-Cartier to Mt-Wright (260 miles).

I used the same methodology for every manufacturer on the comparison chart.

On page 3 , you will see a graph showing the results of the wear rate for 4 different manufacturers, Sydney, British Steel, Japanese rail and Thyssen.

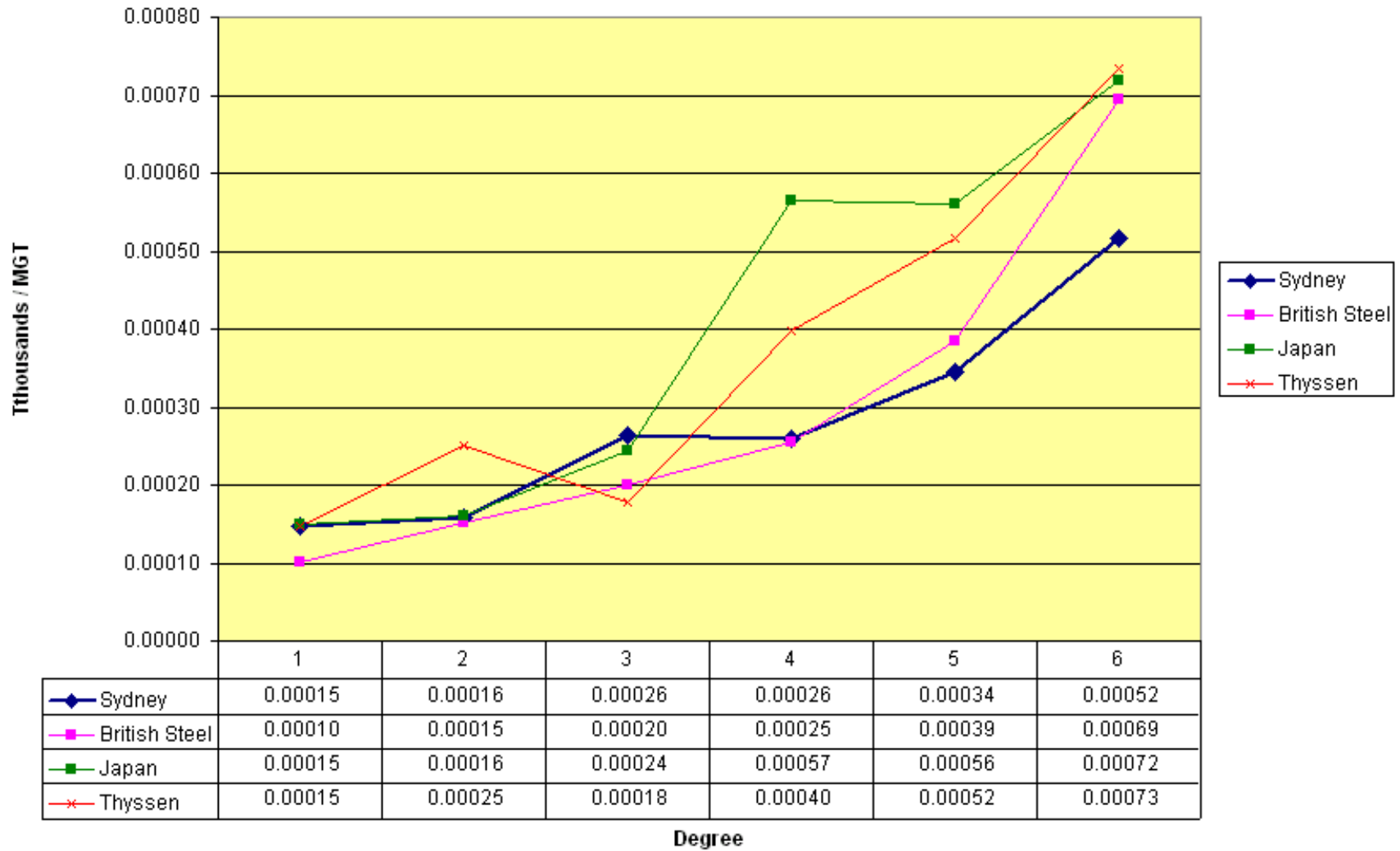
You can see that the Sydney LAHH rail has the best performance of the four companies.

On the bottom of that graph, you can see the data I used to make the graph.

On page 4, you have the graph showing a 1 degree curve, the upper graph is the total vertical wear rail of that whole curve and the lower graph is an example of the rail profile for the same curve and on the next pages you will see the same graphs from a 2 degree to a 6 degree curve.

On the last page, you have the data for all the manufacturers that I used for the graph on page 3.

Wear rate vs Manufacturers

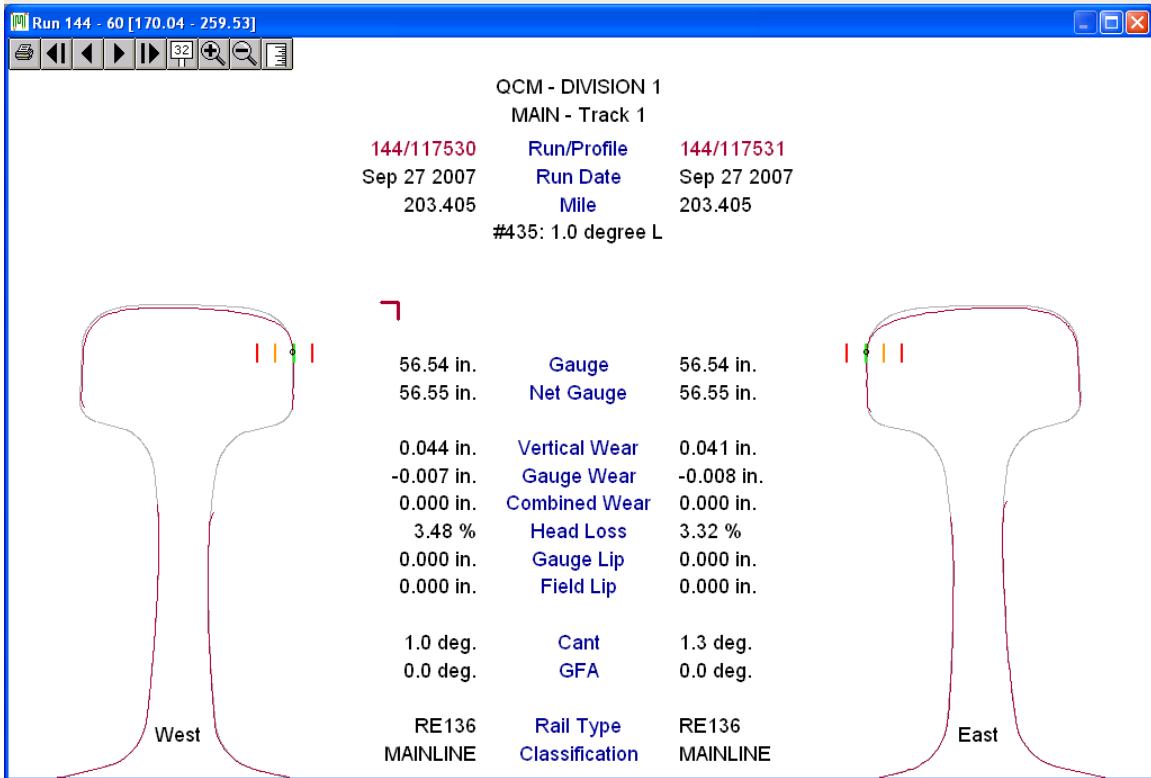




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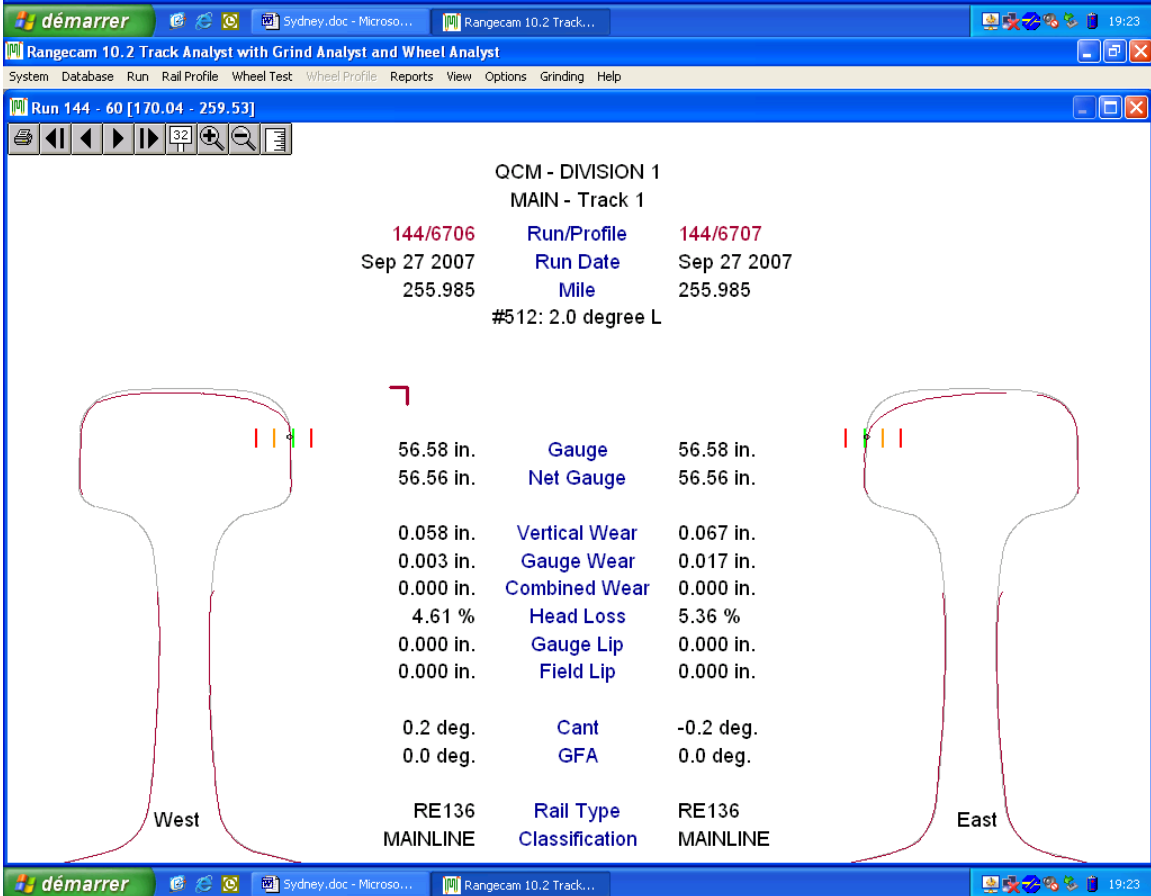
Rangecam 10.2 Track Analyst with Grind Analyst and Wheel Analyst

System Database Run Rail Profile Wheel Test Wheel Profile Reports View Options Grinding Help

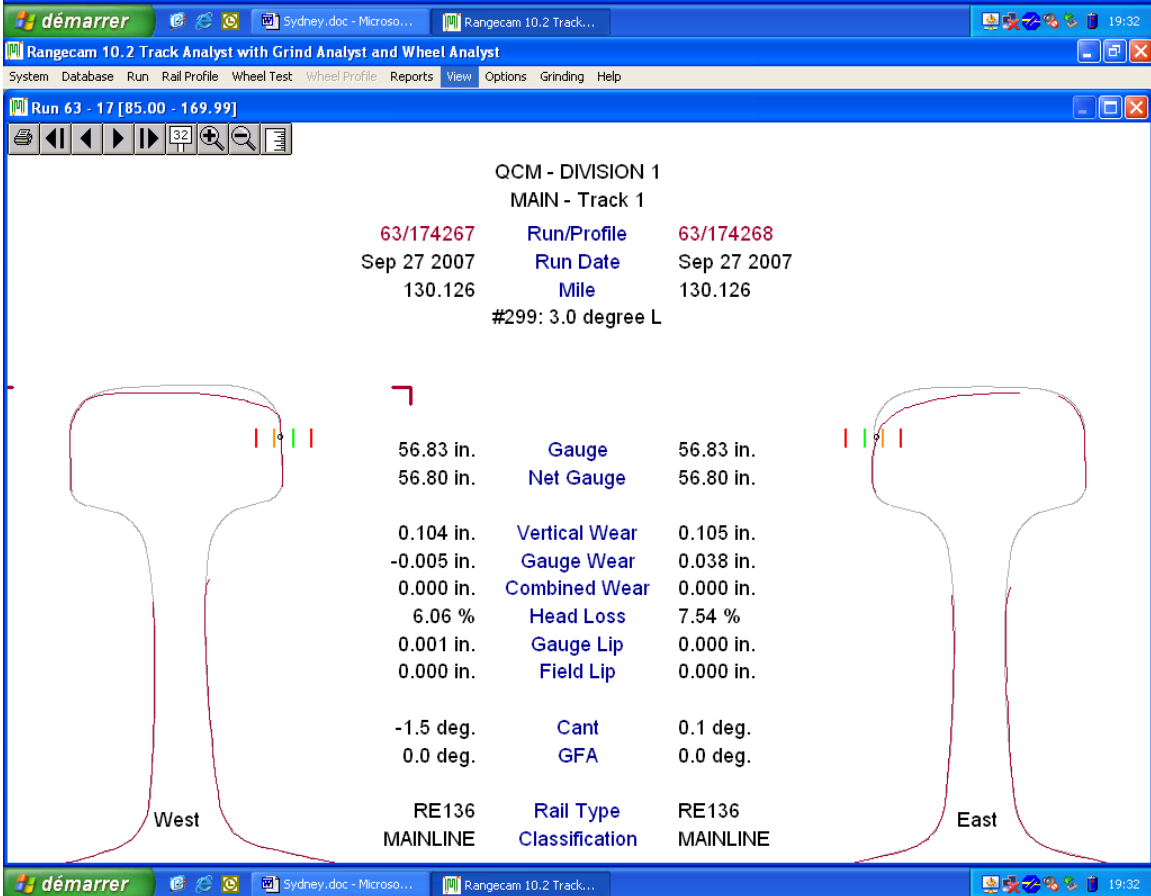
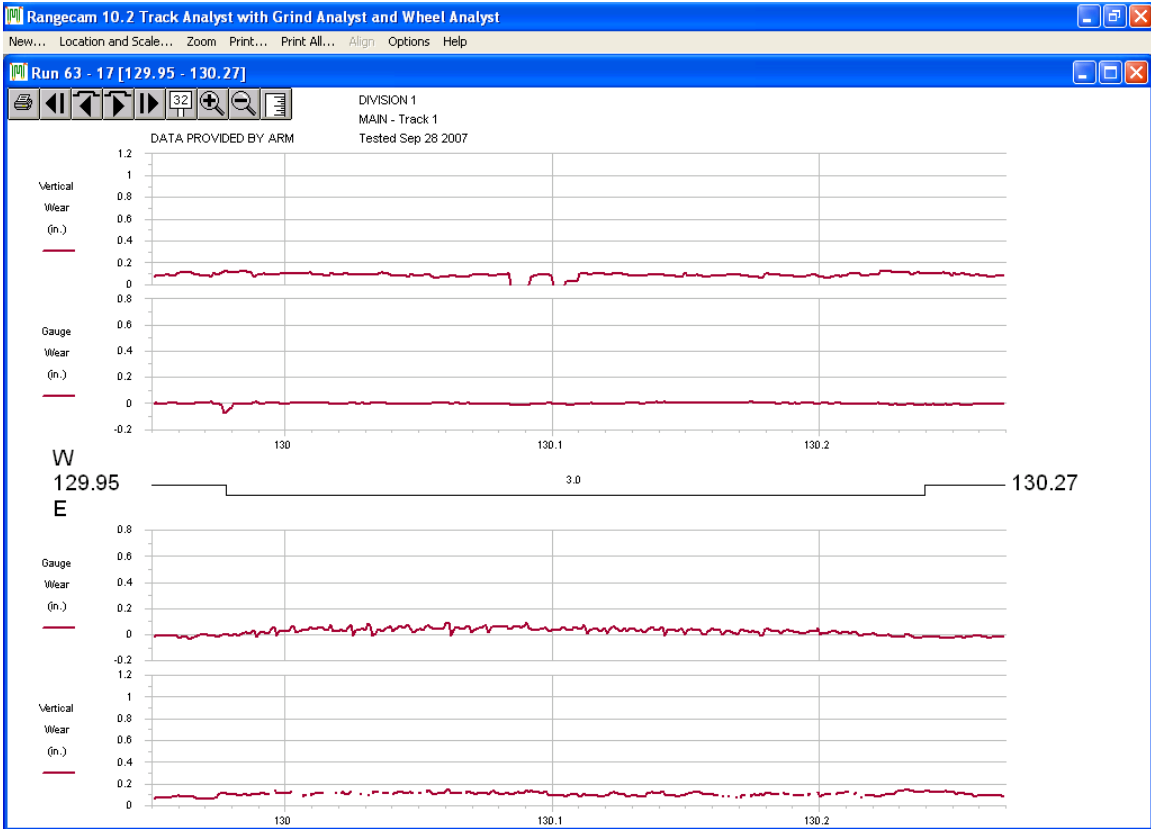


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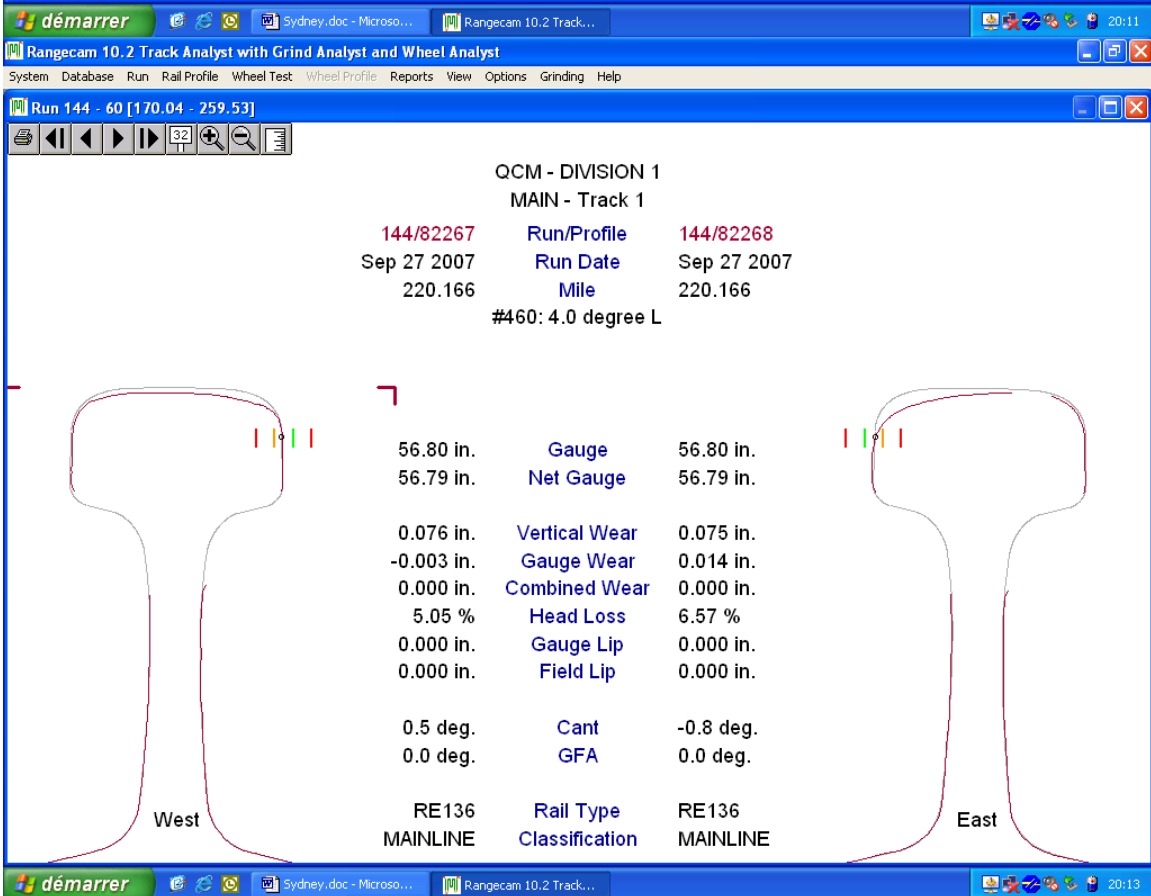
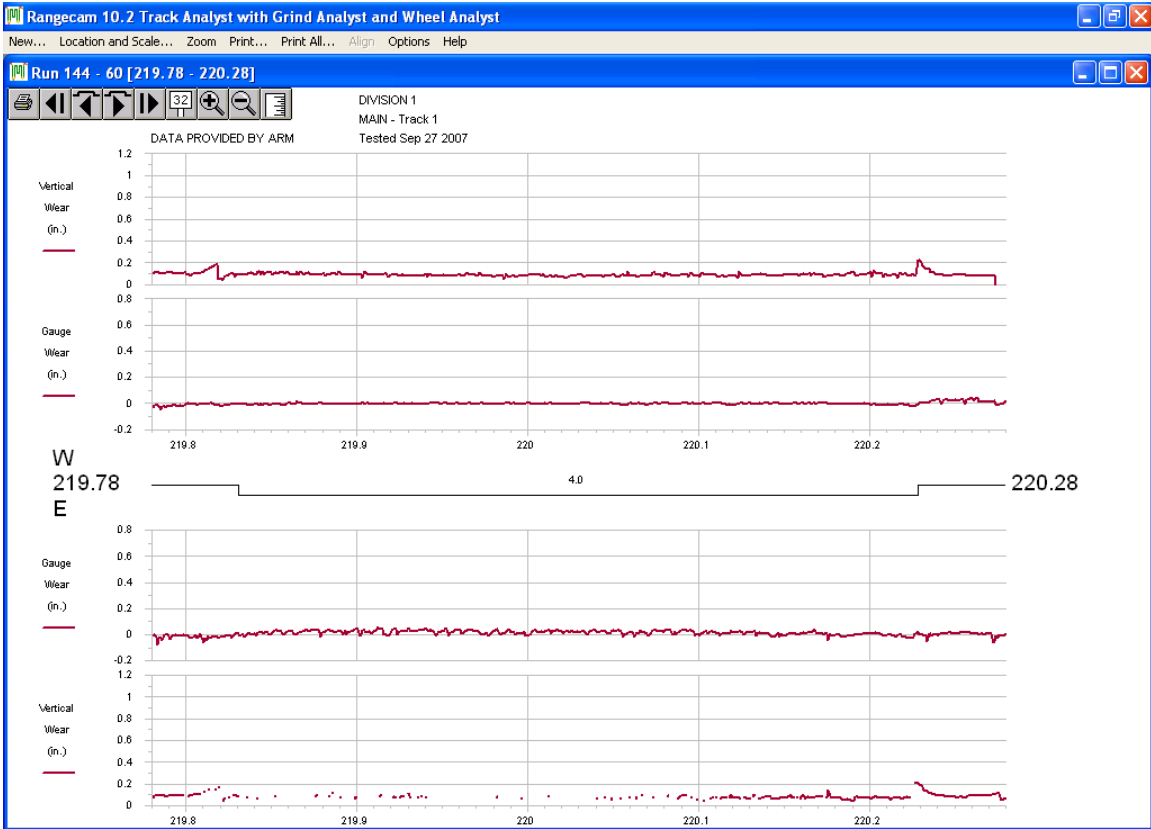
Curve mile 203.40 1 degree Sydney LAHH rail 399.1MGT



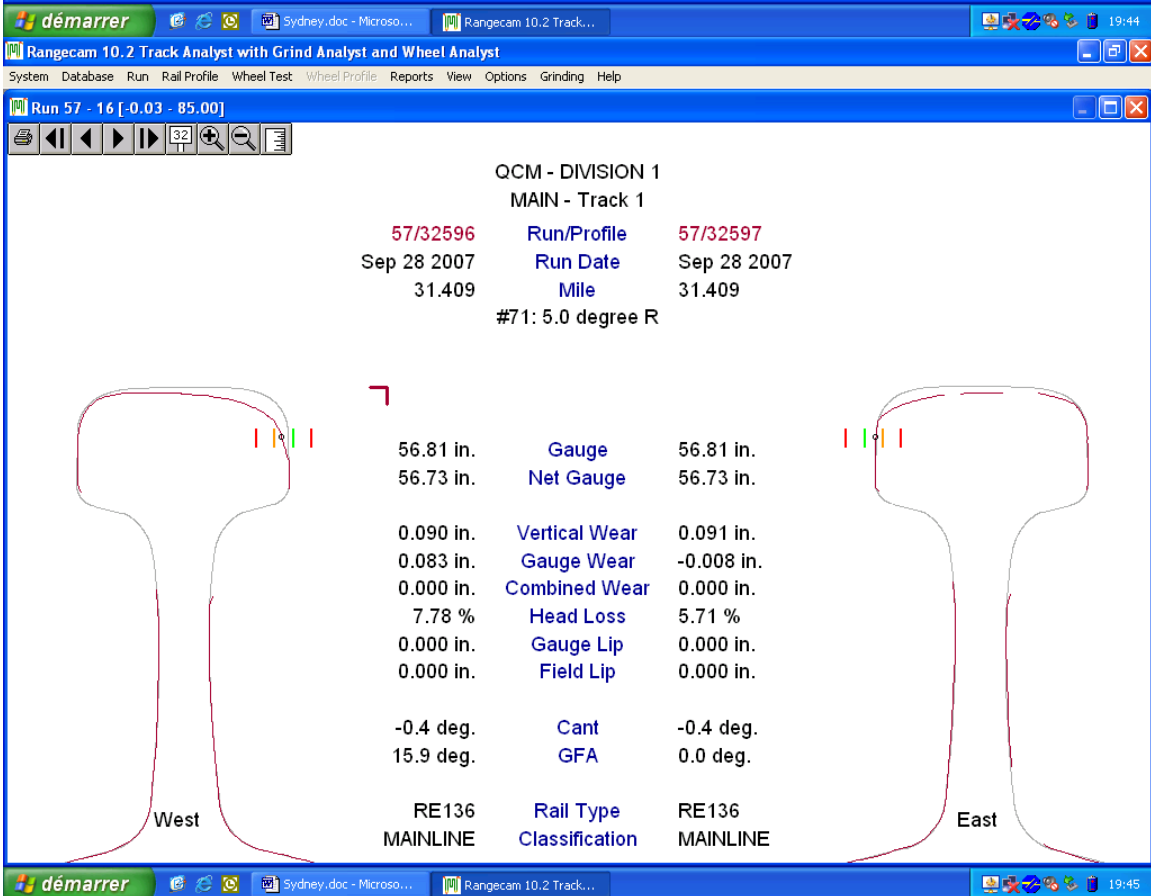
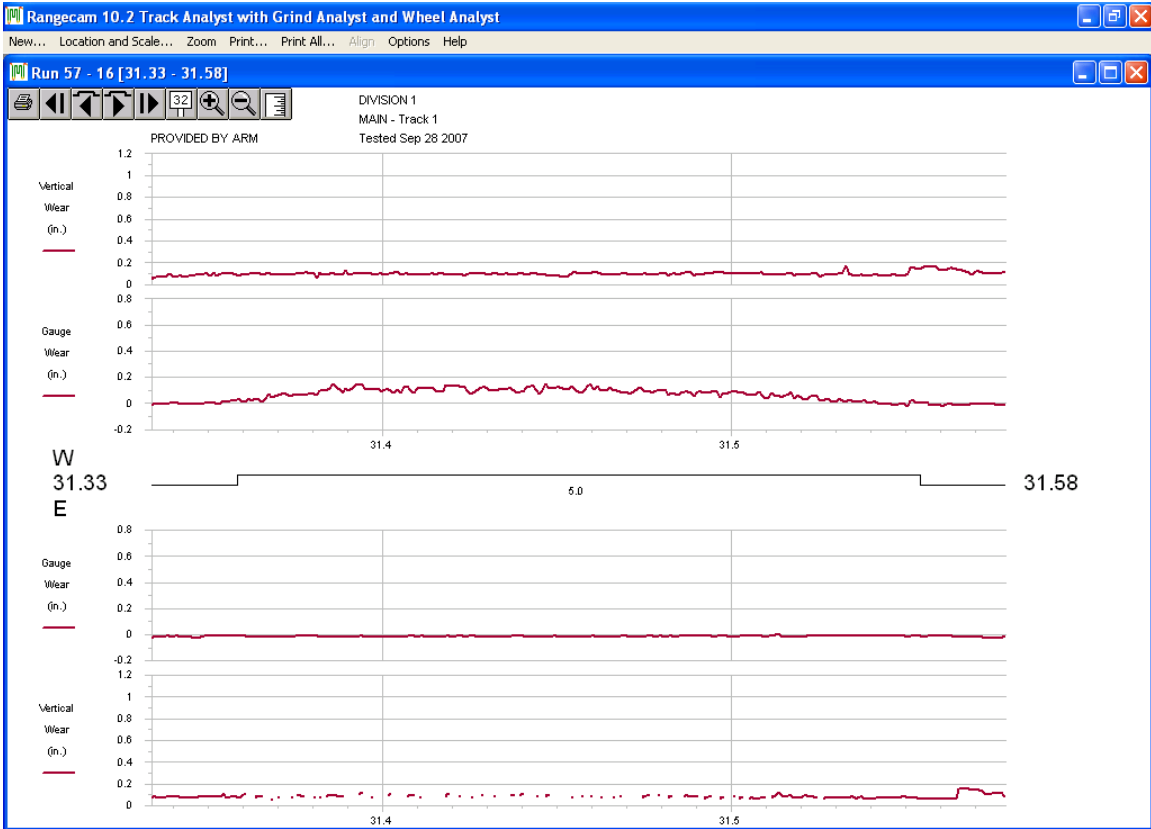
Curve mile 256.04 2 degree Sydney rail LAHH 399.7MGT



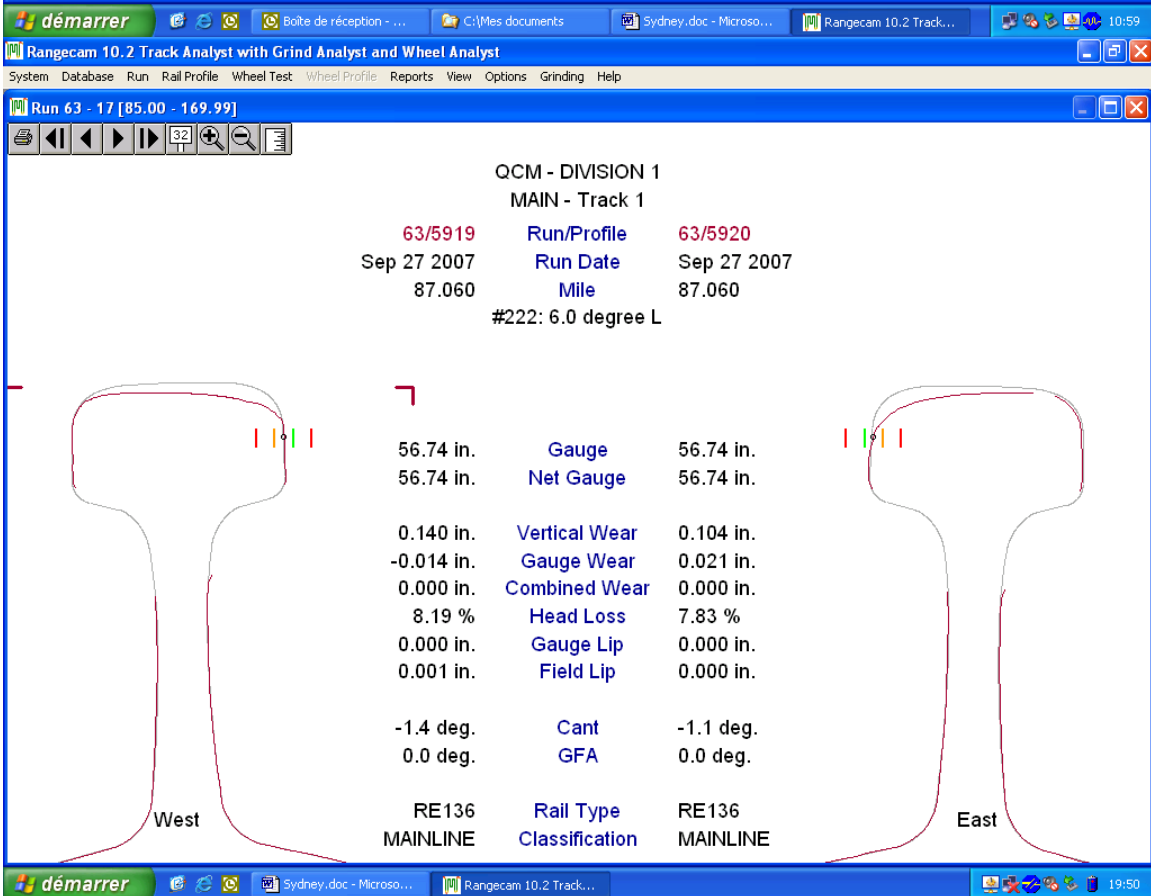
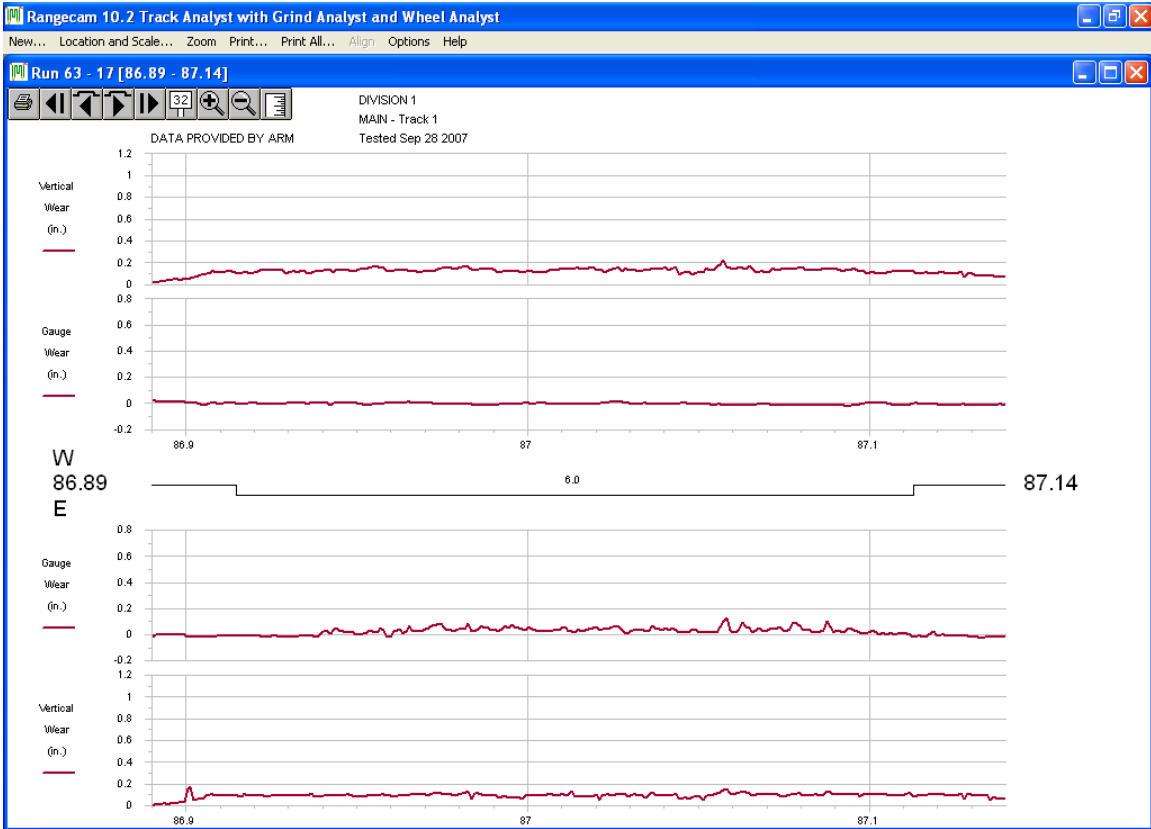
Curve mile 130.10 3 degree Sydney LAHH rail 399.7 MGT



Curve mile 220.16 4 degree Sydney LAHH rail 399.7 MGT



Curve mile 31.41 5 degree Sydney LAHH rail 264.4 MGT



Curve mile 87.06 6 degree Sydney LAHH rail 236.5 MGT

| Degree | Sydney | | |
|--------|------------|-------|------------|
| | Total Wear | MGT | .000 / mgt |
| 1 | 0.043 | 291.9 | 0.00015 |
| 2 | 0.063 | 399.7 | 0.00016 |
| 3 | 0.105 | 399.7 | 0.00026 |
| 4 | 0.076 | 291.9 | 0.00026 |
| 5 | 0.091 | 264.4 | 0.00034 |
| 6 | 0.122 | 236.5 | 0.00052 |

| Degree | British Steel | | |
|--------|---------------|-------|------------|
| | Total Wear | MGT | .000 / mgt |
| 1 | 0.038 | 373.5 | 0.00010 |
| 2 | 0.057 | 373.5 | 0.00015 |
| 3 | 0.075 | 373.5 | 0.00020 |
| 4 | 0.095 | 373.5 | 0.00025 |
| 5 | 0.144 | 373.5 | 0.00039 |
| 6 | 0.259 | 373.5 | 0.00069 |

| Degree | Japan | | |
|--------|------------|-------|------------|
| | Total Wear | MGT | .000 / mgt |
| 1 | 0.064 | 428.1 | 0.00015 |
| 2 | 0.073 | 453.2 | 0.00016 |
| 3 | 0.104 | 428.1 | 0.00024 |
| 4 | 0.242 | 428.1 | 0.00057 |
| 5 | 0.240 | 428.1 | 0.00056 |
| 6 | 0.326 | 453.2 | 0.00072 |

| Degree | Thyssen | | |
|--------|------------|-------|------------|
| | Total Wear | MGT | .000 / mgt |
| 1 | 0.063 | 428.1 | 0.00015 |
| 2 | 0.107 | 428.1 | 0.00025 |
| 3 | 0.076 | 428.1 | 0.00018 |
| 4 | 0.170 | 428.1 | 0.00040 |
| 5 | 0.221 | 428.1 | 0.00052 |
| 6 | 0.333 | 453.2 | 0.00073 |