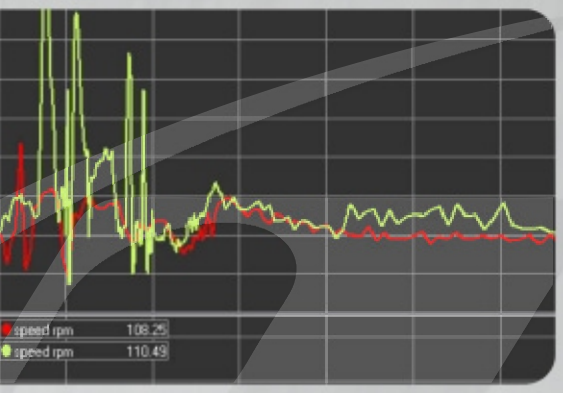
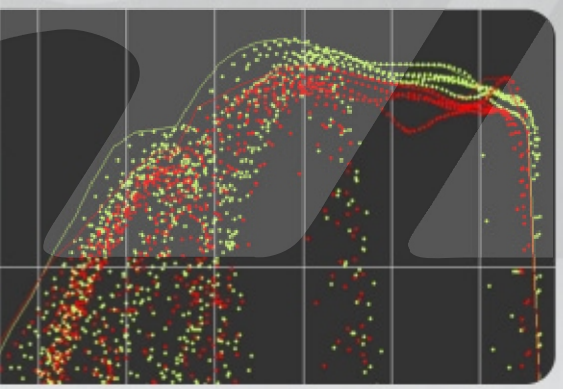
Racing Data Power

# GPS MODULE

## A REVOLUTION IN YOUR KART TECHNICAL ANALYSIS

## ON-TRACK SESSIONS



**An example of AIM GPS module use on a 4 strokes engine**

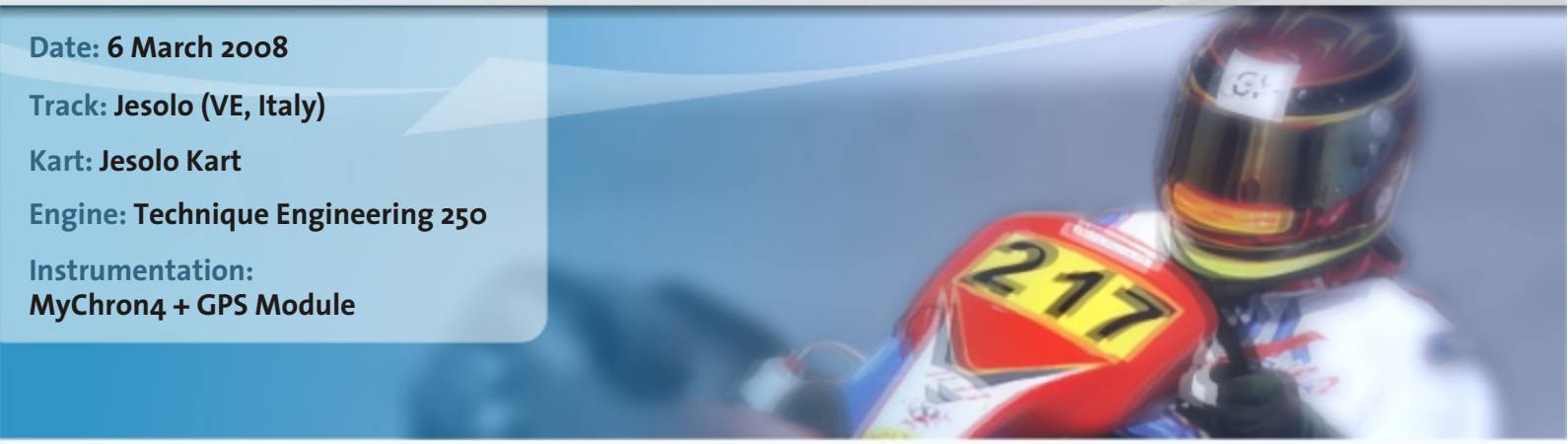
**Date:** 6 March 2008

**Track:** Jesolo (VE, Italy)

**Kart:** Jesolo Kart

**Engine:** Technique Engineering 250

**Instrumentation:**
MyChron4 + GPS Module




DYNAMIC ANALYSIS

RELEASE 1.00

# INDICE

# 1 – The track

The test occurred on Pista Azzurra (Jesolo, near Venice), in the North of Italy (www.pista-azzurra.com). Here below are the track maps taken from the track website on the left and Google Earth™ image on the right (**Figure 1**).
The track is made of slow and fast parts and is difficult to approach. **MyChron4**, together with **GPS Module**, shows up to be once again the best instrument to discover its secrets.

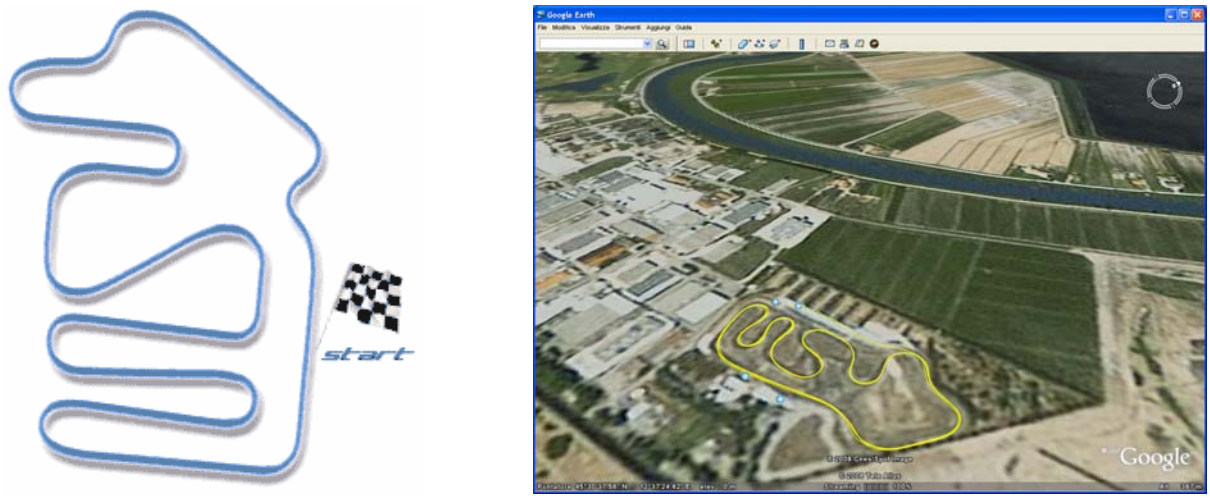



**Figure 1**: the track map form the circuit website on the left and on Google Earth™ on the right

As shown in **Figure 2**, GPS lines of the three racers (in their best lap) cross continuously, which means that they approached the track in different ways. In light blue the reader, in red Kristian Ghedina, in green Gianni Morbidelli.

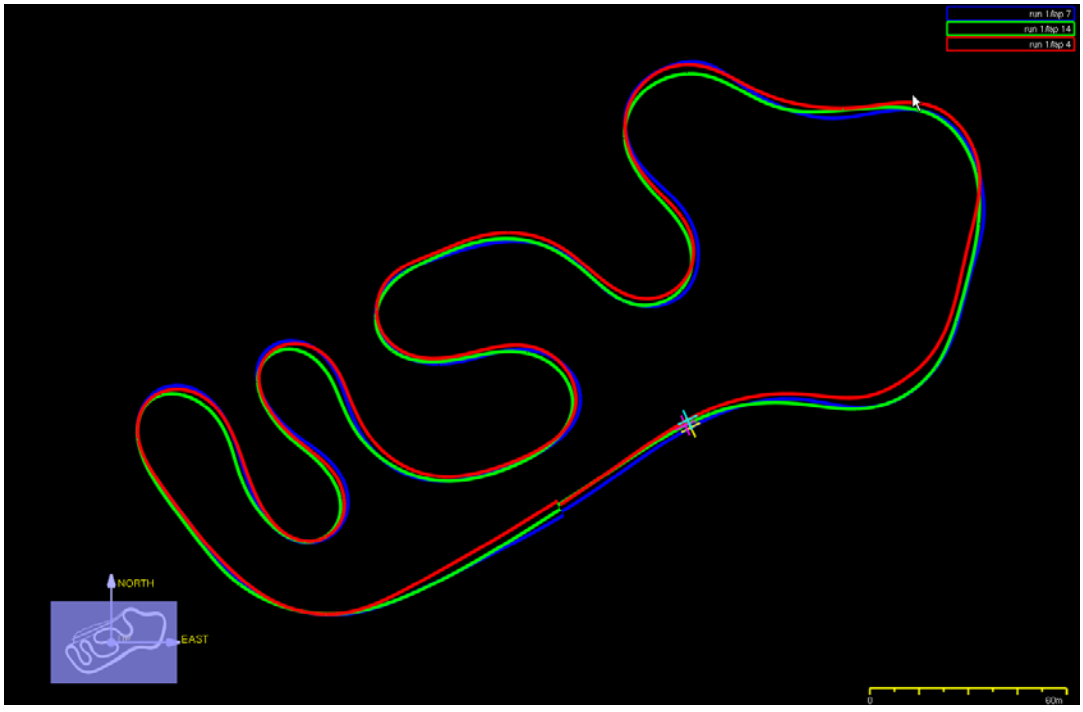



**Figure 2**: track map obtained through the GPS Module

# 2 – Lap times and split times

Here below the analysis of the racers best lap times (**Figure 3**). The difference between a professional like Gianni Morbidelli, showing an incredible performance steadiness, and the reader comes immediately out. Speaking again about Morbidelli, it is possible to notice the 'usual' slow lap before the best performance, useful both for wheels cooling and to relax the racer mind. As far as Ghedina is concerned, on the contrary, it is only available a test made up of three laps.

### Gianni Morbidelli

Lap 14 – 50.720
Lap 11 – 51.170
Lap 3 – 51.260

### Kristian Ghedina

Lap 14 – 50.720
Lap 11 – 51.170
Lap 3 – 51.260

### Reader

Lap 7 – 53.570
Lap 6 – 53.690
Lap 5 – 54.090

| | | | 1 | 2 | | |
|---|---|---|---|---|---|---|
| | | histo | histo | histo | histo | |
| **Absolute split times** | | | | | | |
| LETTORE | run 1 lap 2 | 5.129 | 27.527 | 15.489 | 6.115 | 00.54.260 |
| LETTORE | run 1 lap 3 | 4.725 | 27.748 | 16.046 | 6.891 | 00.55.410 |
| LETTORE | run 1 lap 4 | 4.900 | 28.217 | 15.901 | 6.503 | 00.55.520 |
| LETTORE | run 1 lap 5 | 4.686 | 27.353 | 15.770 | 6.281 | 00.54.090 |
| LETTORE | run 1 lap 6 | 4.799 | 27.304 | 15.467 | 6.121 | 00.53.690 |
| **LETTORE (best)** | **run 1 lap 7** | 4.684 | 27.311 | 15.379 | 6.196 | 00.53.570 |
| LETTORE | run 1 lap 8 | 4.661 | 27.135 | 15.970 | 6.434 | 00.54.200 |
| GIANNI | run 1 lap 2 | 5.153 | 28.238 | 14.849 | 5.730 | 00.53.970 |
| GIANNI | run 1 lap 3 | 4.303 | 26.393 | 14.845 | 5.719 | 00.51.260 |
| GIANNI | run 1 lap 4 | 4.214 | 26.456 | 15.479 | 5.760 | 00.51.910 |
| GIANNI | run 1 lap 5 | 4.301 | 26.703 | 15.062 | 5.764 | 00.51.830 |
| GIANNI | run 1 lap 6 | 4.204 | 26.556 | 15.025 | 5.794 | 00.51.580 |
| GIANNI | run 1 lap 7 | 4.334 | 26.450 | 15.235 | 5.770 | 00.51.790 |
| **GIANNI (best)** | **run 1 lap 8** | 2.810 | 22.426 | 10.598 | 4.066 | 00.39.900 |
| GIANNI | run 1 lap 9 | 4.246 | 26.367 | 14.904 | 5.843 | 00.51.360 |
| GIANNI | run 1 lap 10 | 4.186 | 29.195 | 15.195 | 5.684 | 00.54.260 |
| GIANNI | run 1 lap 11 | 4.203 | 26.193 | 15.017 | 5.757 | 00.51.170 |
| GIANNI | run 1 lap 12 | 4.172 | 47.236 | 21.879 | 7.302 | 01.20.590 |
| GIANNI | run 1 lap 13 | 4.576 | 28.302 | 14.931 | 5.731 | 00.53.540 |
| GIANNI | run 1 lap 14 | 4.166 | 26.084 | 14.741 | 5.728 | 00.50.720 |
| GHEDINA | run 1 lap 2 | 5.233 | 29.346 | 15.911 | 6.090 | 00.56.580 |
| GHEDINA | run 1 lap 3 | 4.359 | 27.131 | 15.565 | 6.065 | 00.53.120 |
| **GHEDINA (best)** | **run 1 lap 4** | 4.409 | 27.065 | 15.135 | 6.061 | 00.52.670 |

**Figure 3**: Race Studio Analysis – split analysis window

# 3 – Speed

In the track is a straight where speed reaches around 120 km/h, followed by three slow corners (around 40 km/h). The three 50 km/h corners lead to the end of the track, which includes two corners to be run at around 80 km/h that lead to the main straight.

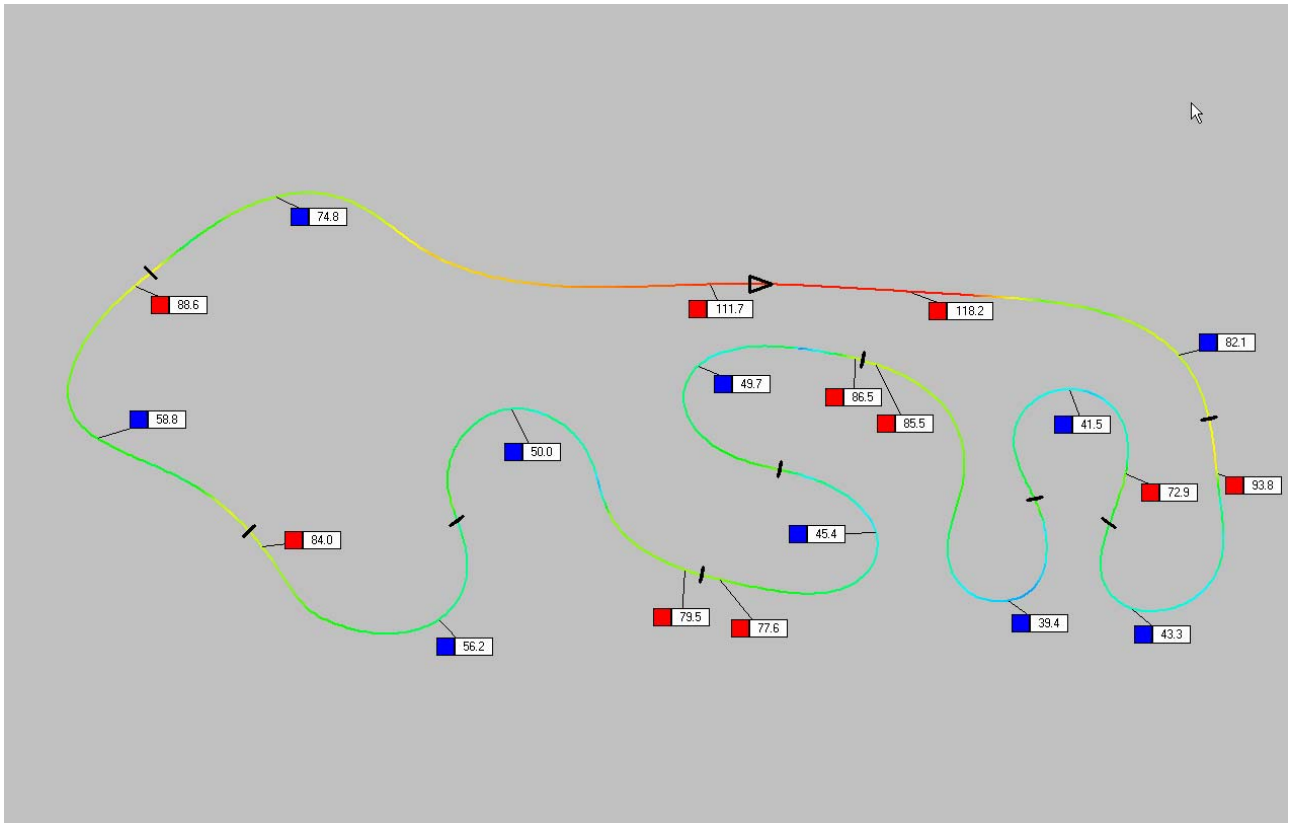



**Figure 4**: Morbidelli's best lap
Race Studio Analysis – track report window
In red max speed values – in blue min speed values

# 4 – Lateral acceleration

Lateral accelerations are important even if not so high in values: in the first slow corners values are around 1,6 g and reach 1,8 in the last fast ones (**Figure 5**).

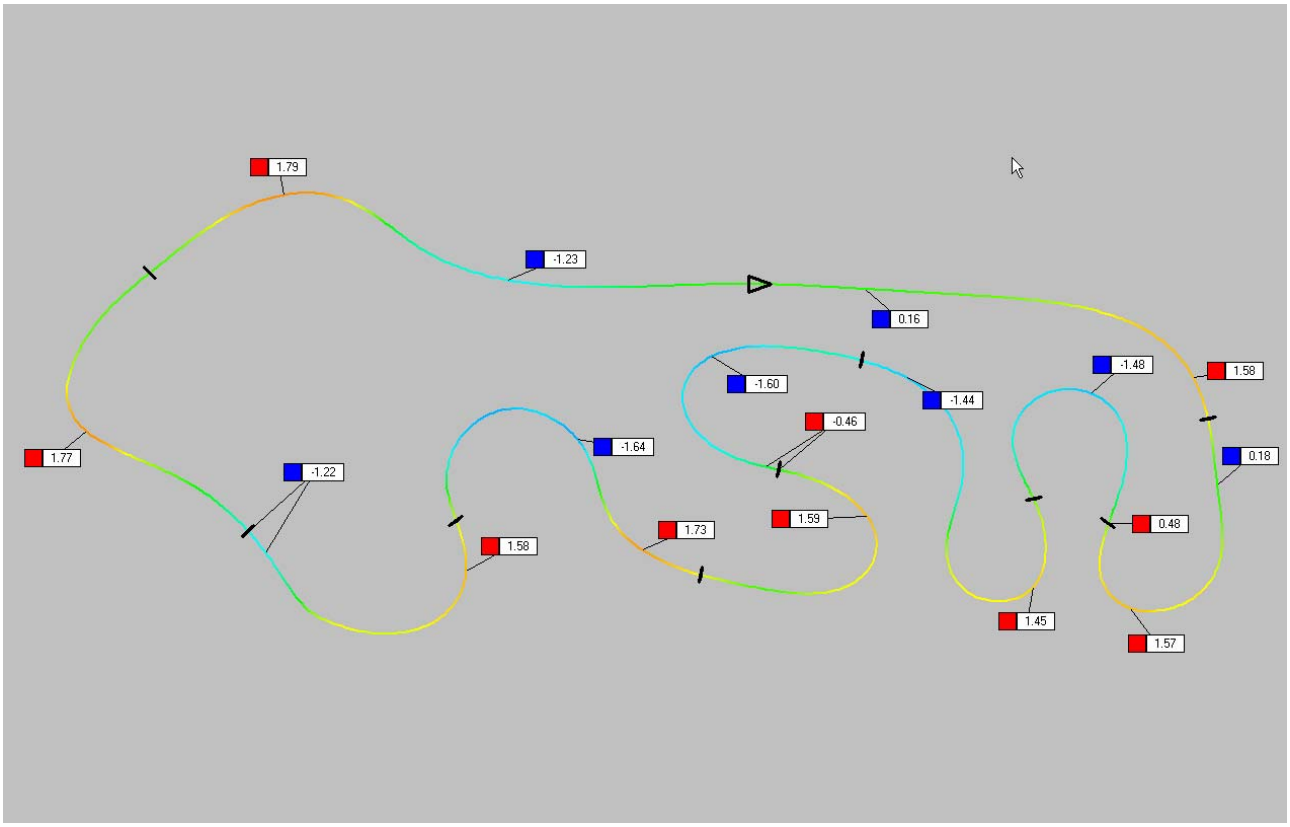



**Figure 5**: Morbidelli's best lap
Race Studio Analysis – track report window
In red max lateral acceleration values – in blue min lateral acceleration values

# 5 – Longitudinal acceleration

In the first part of the track are “important” hard-breakings (around 0,9 g) but it is not possible to let the kart running fast while cornering out because another corner is already coming.
This is possible in the second part of the track only, where acceleration values reach around 0,7 g (**Figure 6**).

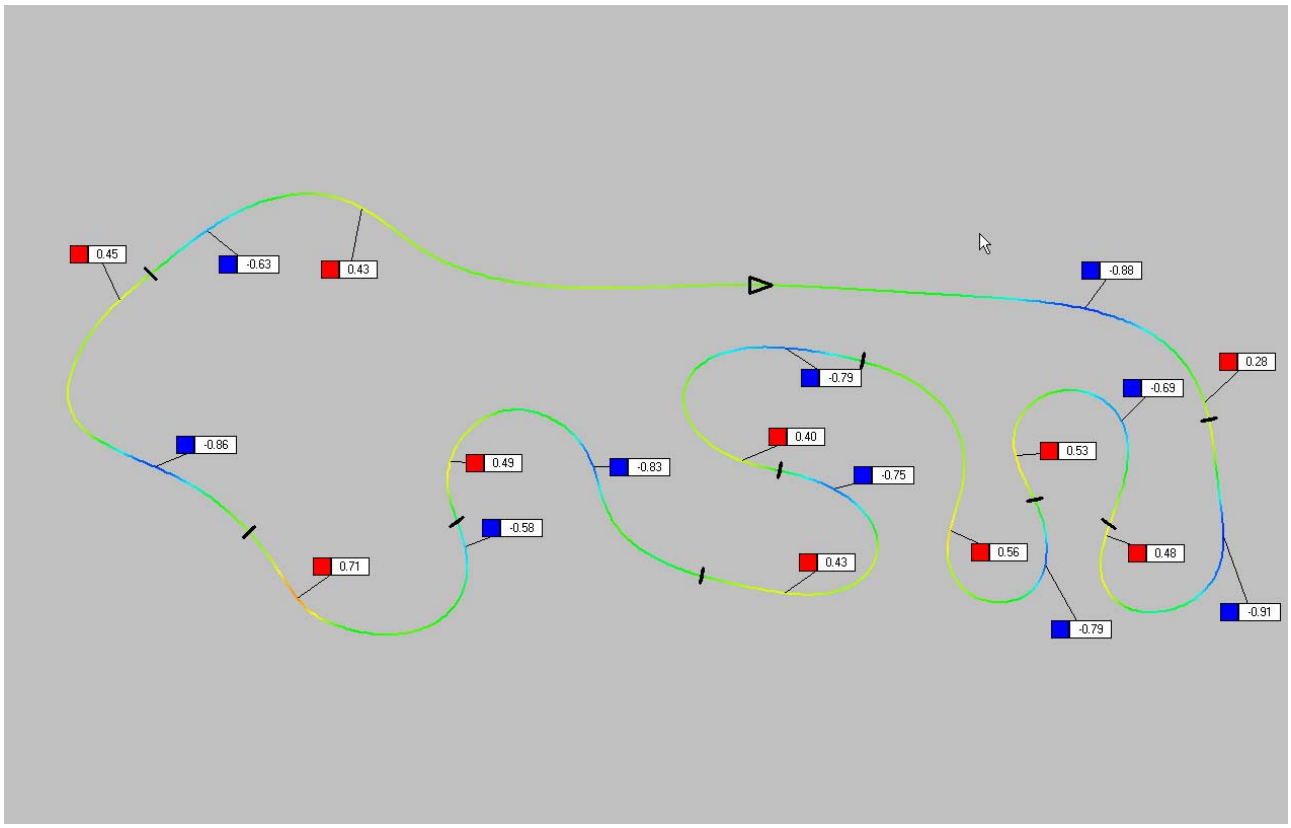



**Figure 6**: Morbidelli’s best lap
Race Studio Analysis – track report window
In red max longitudinal acceleration values – in blue min longitudinal acceleration values

# 6 – RPM Histogram

In light blue you see the reader's best lap histogram, in red Ghedina's one and in green Morbidelli's.

As already observed on other track sessions, best lap time comes directly from higher speed on the track. In Rpm histogram (**Figure 7**) keeping longer a higher speed means longer bars in the top part of the histogram.

It is in fact possible to see how in the range highlighted by the white arrow - representing the percentage of engine working in a range of between 11000 and 13000 rpm - the green bar (Morbidelli) overcomes; the reader, really, never reaches these Rpm values. Likewise happens in the range highlighted by a yellow arrow (engine between 9000 and 11000 Rpm).

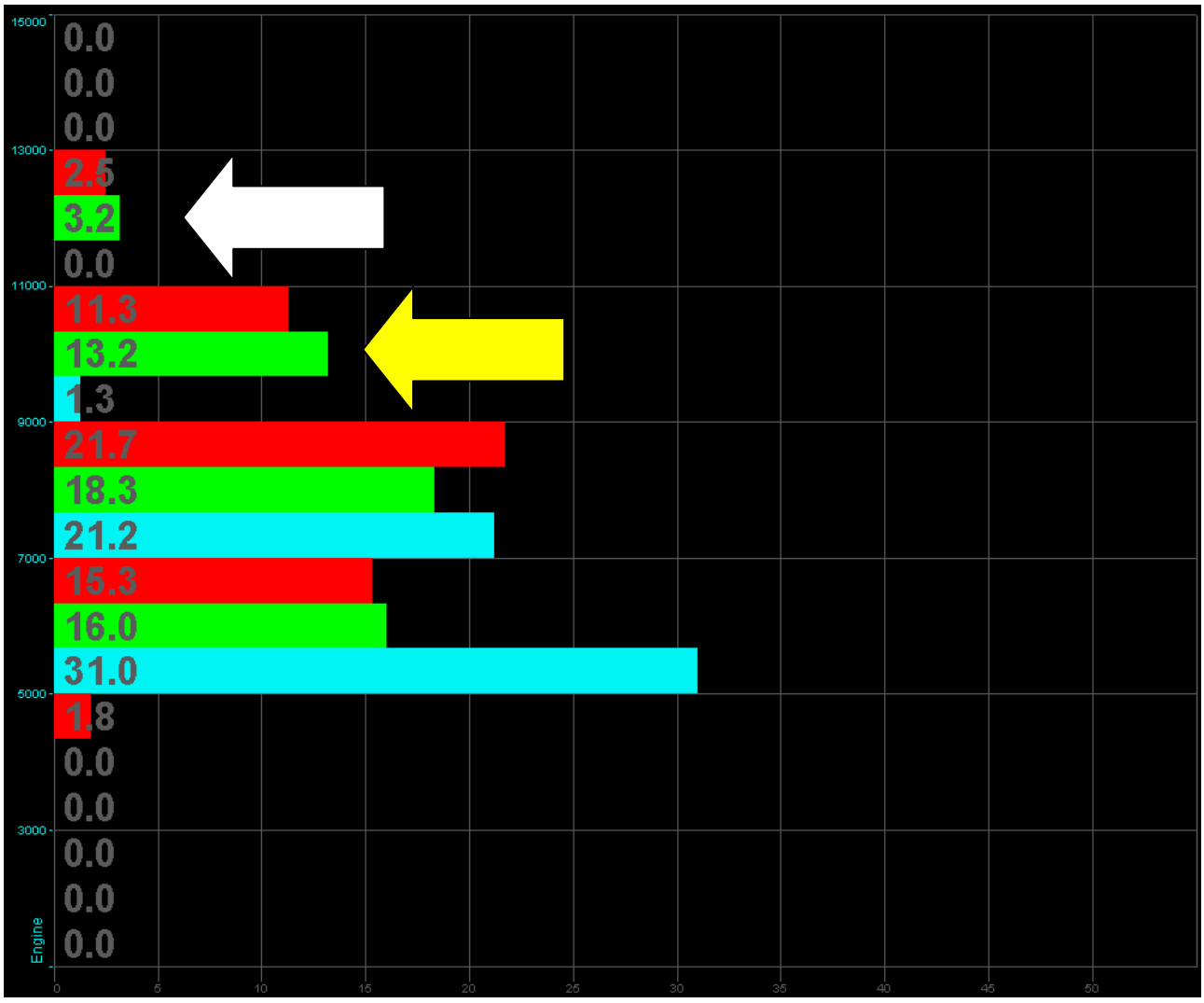



**Figure 7**: racers RPM values compare
Race Studio Analysis –Histogram window
The digits indicate the time (in seconds) the kart engine worked at an Rpm value included in the range indicated on the left.

# 7 – Channels report

Channels report (**Figure 8**), where the distance run in the lap is shown (third column highlighted by an arrow), underlines Morbidelli ability to shorten trajectories and choose the most effective ones.

Min and Max Rpm values tell a little more than Rpm histogram does.

Lateral acceleration absolute values show that the reader and Ghedina come close to Morbidelli for the ability of exploiting wheel friction, but Morbidelli can corner out better than anybody else, as shown by longitudinal acceleration data.

Test compare | 1 - LETTORE | 2 - GIANNI | 3 - GHEDINA

| Lap | | | Engine | | GPS_Speed | | GPS_LatAcc | | GPS_LonAcc | |
|---|---|---|---|---|---|---|---|---|---|---|
| Num | Time | Dist | min | max | min | max | min | max | min | max |
| LETTORE | | | | | | | | | | |
| **lap 7** | **00.53.570** | **1006.2** | **4879** | **12648** | **42.2** | **115.5** | **-1.67** | **1.82** | **-0.73** | **0.69** |
| lap 6 | 00.53.690 | 1009.1 | 4793 | 12594 | 39.8 | 114.6 | -1.73 | 1.77 | -0.72 | 0.68 |
| lap 5 | 00.54.090 | 995.8 | 4914 | 12540 | 41.0 | 113.5 | -1.58 | 1.67 | -0.72 | 0.67 |
| lap 8 | 00.54.200 | 1009.4 | 4827 | 12698 | 39.6 | 115.5 | -1.62 | 1.67 | -0.63 | 0.77 |
| lap 2 | 00.54.260 | 1003.0 | 4989 | 12451 | 41.2 | 111.8 | -1.53 | 1.85 | -0.60 | 0.66 |
| lap 3 | 00.55.410 | 1014.0 | 5133 | 12719 | 42.3 | 116.1 | -1.55 | 1.77 | -0.68 | 0.68 |
| lap 4 | 00.55.520 | 1010.0 | 4759 | 12211 | 40.6 | 110.7 | -1.46 | 1.64 | -0.64 | 0.60 |
| GIANNI | | | | | | | | | | |
| **lap 14** | **00.50.720** | **977.7** | **4506** | **12830** | **39.4** | **118.2** | **-1.64** | **1.79** | **-0.91** | **0.71** |
| lap 11 | 00.51.170 | 979.4 | 4646 | 12864 | 39.1 | 118.4 | -1.63 | 1.81 | -0.89 | 0.84 |
| lap 3 | 00.51.260 | 983.0 | 4467 | 12851 | 36.9 | 117.2 | -1.62 | 1.83 | -0.91 | 0.72 |
| lap 9 | 00.51.360 | 977.5 | 4561 | 12764 | 38.6 | 119.1 | -1.65 | 1.72 | -0.91 | 0.68 |
| lap 6 | 00.51.580 | 979.9 | 4619 | 12827 | 39.8 | 119.1 | -1.60 | 1.71 | -0.91 | 0.84 |
| lap 7 | 00.51.790 | 982.2 | 4582 | 12790 | 40.1 | 117.2 | -1.56 | 1.75 | -0.91 | 0.69 |
| lap 5 | 00.51.830 | 981.9 | 4828 | 12845 | 40.0 | 118.4 | -1.55 | 1.73 | -0.96 | 0.89 |
| lap 4 | 00.51.910 | 976.6 | 4607 | 12902 | 38.4 | 117.5 | -1.57 | 1.75 | -0.89 | 0.69 |
| lap 13 | 00.53.540 | 987.9 | 3534 | 12551 | 29.1 | 112.7 | -1.70 | 1.72 | -0.84 | 0.91 |
| lap 2 | 00.53.970 | 976.6 | 3781 | 12447 | 36.0 | 112.0 | -1.60 | 1.77 | -0.85 | 0.71 |
| lap 10 | 00.54.260 | 979.3 | 3683 | 12898 | 32.3 | 118.6 | -1.58 | 1.71 | -0.82 | 0.71 |
| lap 12 | 01.20.590 | 975.5 | 2393 | 12856 | 21.4 | 118.2 | -0.83 | 1.66 | -0.91 | 0.44 |
| GHEDINA | | | | | | | | | | |
| **lap 4** | **00.52.670** | **984.6** | **2885** | **12822** | **41.5** | **116.0** | **-1.63** | **1.87** | **-0.96** | **0.65** |
| lap 3 | 00.53.120 | 986.3 | 2874 | 12818 | 38.2 | 114.8 | -1.54 | 1.57 | -0.93 | 0.72 |
| lap 2 | 00.56.580 | 981.7 | 3059 | 12092 | 35.2 | 107.1 | -1.43 | 1.59 | -0.78 | 0.65 |

**Figure 8**: Race Studio Analysis – channels report window – racers comparison

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