



CRP Motorsport Case study

On Track with Rapid Manufacturing at Red Bull F1

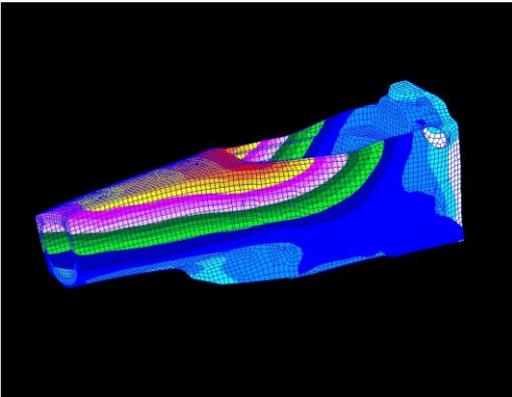
Written by: **Ing. Livia Cevolini**, CRP Marketing and Sales Director in collaboration with **Mr. Steve Nevey**, Red Bull Racing Business Development Manager.

At the TCT 2006 Conference Mr. Steve Nevey, Red Bull Racing Business Development Manager, has taken part with references to WINDFORM® XT use in Red Bull Racing. Here is the report.

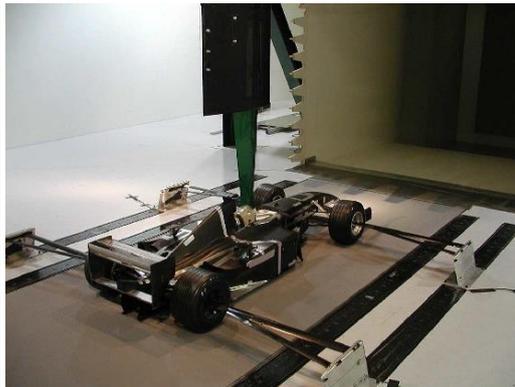
After a brief introduction on RBR business, Steve qualified with "nice words" the partnership with CRP and in particular cooperation between RBR aerodynamic Dept. and CRP RP Dept. There are still some needs to be satisfied, but CRP will do his best to make this job too as soon as possible.

In brief, after underlining the main challenges they have to face every day, that are Most effect use of time, As many design iterations as possible, Focus on ROI and Best spend for limited resources, he focused on aerodynamics area. There are 3 main following steps to develop the car performance:

1) CFD and FEM



2) wind tunnel test



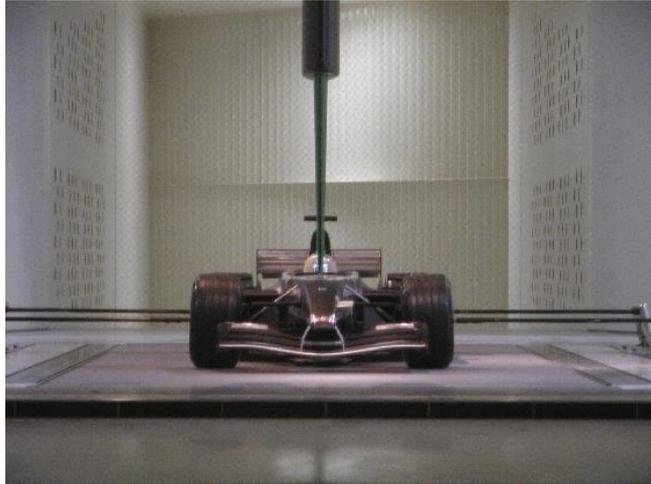
3) race car test

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Wind tunnel model development during last 10 years:



- Aim is to test as many iterations as possible
- Bottleneck was model shop physically making parts (long time and high costs)
- SLA with clear resin had been used for wind tunnel the first time 6 years ago
- Parts were brittle and unstable: the available resins were too weak.
- About 4 years ago Ceramic filled SLA had been tested: higher mechanical properties, but still very fragile, photo and humidity sensitive, heavy parts.
- 1 year ago: Metal plated SLA, increased mechanical properties but very high weight
- Since few years ago SLS with WINDFORM materials, and last year 'till nowadays high usage of WINDFORM XT.



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WINDFORM materials are used both for wind tunnel model and for the racing car, but one of the key parts that still has some problems for RP processes is the brake air intake: close to the wheel upright, it cools the brake system in order to allow a good and continuous brake performance.



SLA materials had been tested but the mechanical properties required were too high: the duct broke just outside the pit lane, at the first track bump.

WINDFORM XT resulted perfect during the test on track, mechanical properties were fine and it never broke. But the problem is the temperature: until mechanics blow cold air inside the duct, when the car is back to the pit lane box, and during the track laps, the duct works perfectly.

But after the warm up lap, on the race day, while cars are waiting for the green light, on the starting grid, with no possibility to blow cold air inside, the temperatures increase too much and the Nylon base (base of WINDFORM XT too) collapses.

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So the request now for those parts is a high-temperature material, that still is not available on the market. In the meantime F1 teams will have to continue to use carbon laminated and moulds for them.

On the other side there are many "cold" parts made by WINDFORM XT on the F1 car that have no problem at all and can race all the GP weekend.



Next step required by F1 teams is the direct metal deposition or sintering, in order to design parts without manufacturing constraints; make quick design modifications during the season, such as to change the suspension fittings on wheel uprights to improve vehicle dynamic performance or add ribs to increase stiffness and reliability; part repairs.



Of course main requirement is the direct sintering of composite metals or very high performance alloys.

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