

Nr. 21
Year 2012

dallara MAGAZINE

PUBLISHED
BY DALLARA

"Periodico regolarmente registrato presso il Tribunale di Parma (n. 16, 03/09/2010)"

THE PURSUIT OF EXCELLENCE

GP2

FROM A DRIVER'S POINT OF VIEW:
PROMISING ITALIAN RACER FABIO ONIDI TELLS
US ABOUT HIS GP2 SERIES DEBUT ABOARD
THE NEW DALLARA, A COMPLETE CAR ABLE
TO BOOST A DRIVER'S TALENT

CRASH TESTS

STRUCTURAL ANALYSIS MANAGER ANDREA GIUBELLINI AND FABIO GRIPPA,
FROM THE COMPOSITES DEPARTMENT, EXPLAIN EVERYTHING ABOUT CRASH TESTING,
ONE OF THE KEY FACTORS IN DESIGNING ROAD AND RACE CARS

ENGINEERS ON THE BLOCKS

A RESEARCH OVER THE MOTIVATIONS OF THE NEW-GENERATION YOUNG ENGINEERS
WORKING FOR DALLARA. A VALUABLE READ FOR ALL THE RECENT GRADUATES WHO WANT
TO MAKE THEIR WAY TO MOTORSPORT



CRASH TESTS

THE ENGINEERS ARE EACH DAY
MORE FOCUSED ON SAFETY,
ON CRASH-TESTING WHETHER
THEY ARE SIMULATED ON A
COMPUTER OR PUT INTO REALITY.
IN ORDER TO INVESTIGATE THIS KIND
OF PROCESS, WE INTERVIEWED TWO
EXPERIENCED DALLARA ENGINEERS:
ANDREA GIUBELLINI, WHO IS
RESPONSIBLE FOR THE
MANUFACTURER'S STRUCTURAL
ANALYSIS AND **FABIO GRIPPA**
FROM THE COMPOSITES
DEPARTMENT, WHO WORKS ON THE
REAL-WORLD CRASH TESTS

WHEN A CRASH TEST CAN SAVE YOUR LIFE

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How important is crash-testing in motorsports today?

Andrea Giubellini: The first kind of crash test was mandated by the rules in the 1985 Formula One championship and it was a frontal one. From that moment on, the different dynamic tests required to homologate the cars have increased and include front, side and rear crashes. It's clear that they are really important because the crash structure must absorb the energy from the impact, reducing the forces echoing themselves on the driver's body. Indirectly, it's also really important to test the elements used to attach the structures to the chassis.

Fabio Grippa: The crash-tests today are really important in order to develop the safety in motorsports. Crash-testing is the only way to effectively test if a



structure has been well engineered, calculated and manufacturer in order to respond to the restrictive limits imposed by the rules. Although a lot can be done in the prior phases, some factors can't still be effectively predicted (for example, the detachment of the front wing from the car's nosecone during an impact) and sometimes an actual impact is the only way to evaluate the situation. The crash tests, together with the static tests completed on the chassis, represents the final test on the structures called to guarantee the driver's survival in case of an impact. The structures typically put through a crash test are three: the nosecone, the rear crash and the side crash structures, respectively used to protect the driver from frontal, rear and side impacts. In addition to that, there are

a lot of static tests that are done on the chassis in order to guarantee safety in case of rolling and impacts with a wheel, a kerb, etc.

How many people are working on this aspect and how are they organized?

A.G.: In our department, one person is in charge of investigating new means of calculating crashes with composite structures, and his task is to transfer the finding to all the other people working in the field, in order to focus on the "production" of structures going to be installed on the cars. I can say that five, six people are currently working on structural analysis are indirectly working in relation to crash-testing development.

F.G.: At least four Dallara departments are involved in planning a crash test. The technical department, which

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design the crash structures according to the limits set by the rulebooks in terms of shape and dimensions, the structural calculus office, which do all the calculations, the composites development office, which define and develop the best process to produce them, and the assembly department that usually prepares the structures for real-life testing.

What is the role of computer simulation?

A.G.: In Dallara we've been analyzing the passive crash components for many years, I'm talking about the chassis supporting the nosecone and the lateral cones. Over this time we developed a robust way of calculating things and identified optimized solutions to analyze and define the lamination. This enables us to create structures that not only pass the crash test with flying colors but are also light and performance-oriented once on the car. In the last few years we started to concentrate on the simulation of proper composite crash structures. It's a borderline and really complex activity because we're talking about many physical reactions tough to describe and depending on the speed, the geometry, the kind of material used. In addition to that we're talking about materials in which we have three different directions, all with a different behavior, and the structures are multi-material ones. There's no need to say that the problems we're facing aren't easy to approach. In order to conduct these studies in a more efficient way, we started to co-operate with some specialized laboratories. Altair, the software house that provides us with the calculation software, has been deeply interested in the question and we started a successful co-operation with them.

F.G.: The simulation today has a key

role in how a test is performed because it allows to build structures able to perform in the real world in the same way that was expected. With the less complicated structures, the simulation is so reliable that the crash-tests are conducted directly in front of the officials without prior testing.

Does simulation bring room for a further developments?

A.G.: There are a lot of frontiers that can be opened by simulation. For example, the ability to represent crashes with composite materials opens the road, in the automotive field, to the use of composites where aluminium was used before, while in racing we can push beyond in studying the shape of the nose as we can analyze the possible interaction of two cars during a contact.

Are the tests conducted in the Dallara facilities?

F.G.: The Dallara factory is provided with an R&D department where we do all the static tests on the chassis (roll bar deflection and push-off tests are the most common), in addition to some crash tests on smaller components (steering columns etc). The tests on the crash-absorbing structures are generally conducted outside in specific laboratories that are specifically accredited and certified. In order to complete a frontal impact test we need an environment longer than 50 meters with sophisticated launch and data acquisition systems. Due to the high cost, it's not financially viable to develop an internal laboratory.

Can you take us through the steps of a crash test from when the parameters are set to the moment when the conclusions are drawn?

F.G.: Usually it all start from the aerodynamics department as they define the crash structure or at least

the volume that they are expected to fit in. This phase features a tight co-operation with the crash test specialist that study the possible outcome of a crash involving a specific shape. At that point, the technical department design the component and the tools needed to build it. Then we move to the crash test simulation where we define the basic parameters of the structure (thickness of the sidewalls, number, size and orientation of the carbon skins and so on, etc.). We define the production procedures for the structure that we need to build. In practice, three days before the date scheduled for the crash test, we start to assemble the chassis with all the needed parts. We mount the fuel tank, the safety harness, the battery, the fire extinguisher and all the other components that can have a role in a crash. Then we start with the first static tests (typically to prevent the detachment of the structures from the chassis in the event of a crash) and move to the laboratory certified for the selected test. Right after the test, we evaluate the deceleration curves to analyze if the limits set by the rules are met, and we also analyze the videos that have been recorded. The crash is a matter of a few tenths of a second, and an high-speed video is needed to see what happened in each moment in order to evaluate the structure's performance.

Who decides what are the standards to be met?

A.G.: It's usually the technical rulebook which defines the types of crash tests to overcome and the specific requirements. More advice can come from the Dallara experience in terms of engineering and production in order to find a solution that can not only pass a crash test but also be functionally optimized (aero, weights, cost...).



Do you believe that the current standards are sufficient for all the racing series or there are cases that should require tougher tests?

A.G.: Each racing series has its own history and its own specs in addition to the fact that there are specific commissions which define the safety standards. Currently, among the racecars produced, the GP2, GP3 and World Series by Renault ones follow the same rules of Formula 1. The IndyCar doesn't have lateral cones, but in calculating the size of the chassis a chance for that kind of impact has also been considered. In addition to that, this series requires the same nosecone to undertake two consecutive crashes with different parameters to be homologated. The F.3 and Formulino cars have good front and rear crash structures but no



lateral structures. The Grand Am series has lateral and rear protection while the frontal impact protection relies on some of the car's front components. I know it might sound obvious, but we can't afford to ignore every single possibility we have to improve safety.

F.G.: The current testing requirements are usually extremely high, and guarantee the complete driver's safety even in really serious crash. I believe that in the future more efforts should be concentrated in providing more protection for the driver's head. It's the only body part which is completely exposed, we should think to what happened to Massa at Budapest in 2009, when a spring coming from the car he had in front hit him with serious injuries as the consequence.

How expensive is it to organize a crash test?

F.G.: It's difficult to estimate the cost of a crash test because it's tied to a lot of calculations and engineering works that can't be identified clearly. If we include the organization of the test, the tools needed, the cost of the test itself, the transfer and the cost of the structures that are destroyed in the impact, the total bill is approximately ranging from 20.000 to 30.000 Euros.

Does a crash test reflect perfectly what can happen in case of an accident or does it just give some generic indications?

F.G.: The crash structures are tested in a really different environment than they will find on-track. First of all you only test the chassis with the crash structures and just the accessories that

“It’s usually the technical rulebook which define the types of crash tests to overcome and the specific requirements. More advice can come from the Dallara experience in terms of engineering and production in order to find a solution that can not only pass a crash test but also be functionally optimized (aero, weights, cost...).”

“Sid Watkins, the famous FIA doctor, remembered how in the first years of Formula One, one crash out of ten resulted in death or permanent injuries. Now that number is one on 300”

might have an influence on the results. In addition to that, all the tests are held at about 50, 60 kilometers per hour which are lower speed compared to what we can see on-track. It has to be said that a 50-km/h impact against a solid barrier equals a 250/300-km/h impact against a mobile barrier (the type that we can usually find on a racetrack). History told us that the crash tests reflect the situations that can be found on-track pretty well. In crashes like Kovalainen's at Barcelona in 2008 or Kubica's impact at Montreal the crash structures worked perfectly despite the impacts happened at speeds over 200 km/h.

Will there be a day when the tests will only be done using simulation?

F.G.: No, because although the calculation systems are each day more precise and reliable, crash-testing is key to evaluate how the crash structure behaves. The rules are so restrictive that it just takes a little for a structure to pass or miss the test. In addition to that, in simulations the crash structure is considered to be without defects, and a real test is just needed to avoid missing a test due to an error in the production process.

Can you give us an example of how safety progressed thanks to a crash test?

A.G.: Sid Watkins, the famous FIA doctor, remembered how in the first years of Formula One, one crash out of ten resulted in death or permanent injuries. Now that number is one on 300. Some examples are Kubica's crash at Montreal, Firman with the Jordan in Hungary and Wayne Boyd with the Formula 3 at Macau. All of them didn't leave them with permanent consequences despite how scary they've been. A lot of cars race each weekend

around the world, with a lot of crashes. Fortunately, only a few of them have grave consequences.

F.G.: Several years ago a crash test was made between the nose of a racecar and the chassis of another. It came out that the nosecones were so rigid (to absorb the needed energy) that they could have penetrated the side and hit the driver. Following to that test, in Formula One and in many other championship, the use of 6-mm ballistic anti-intrusion panels was mandated for the sides of the chassis. Our impression is that many drivers today have been saved with that innovation despite some scary crashes.

What about roadcars? Their crash tests are more or less stringent?

A.G.: It's a complex topic that would deserved more time to be analyzed. I won't speak about more or less stringent parameters. There are different problems to solve despite the goals are the same for both kinds of cars: the safety of the people inside the car and the safety of who crash into it from the outside.

F.G.: The crash tests for roadcars are completely different than in racecars. For roadcars, the crash test is extremely strict and is conducted with a complete car, evaluating the accelerations in different points of it, the impacts between the occupants and the internal components, the efficiency of the passive safety equipment (air-bags, pretensioners, etc.). For the racing cars, only the crash structure and the survival cells are tested, and less parameters are evaluated (basically only the accelerations and the force peaks). Plus, the nature of the test itself is different as in racecars it's only the

energy-absorbing structure that has to crash, not the chassis, while in roadcars the chassis can break if that brings no danger for the occupants. If the question is "is a racecar safer than a road car?" the answer is: both of them are designed to be as safe as possible in their typical range of use.

What's the best reward for your job?

A.G.: Of course it's successfully predicting the car's behaviour, finding a correspondence between what was calculated and the real test is a great satisfaction. However, nothing can compare with the gratitude of a driver who survives a crash. That happened with Indy 500 winner Kenny Brack. After an horrendous crash in Texas, he said: I am convinced that it was thanks to Dallara's innovation and safety thinking that I lived to race another day.

Stefano Semeraro



«A COMPLETE MACHINE»

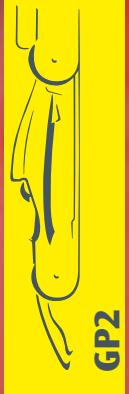
THE NEW GP2 SERIES DALLARA IS THE STATE OF THE ART IN SINGLE-MAKE RACING.
FABIO ONIDI, WHO MADE HIS DEBUT THIS SEASON WITH THE SCUDERIA COLONI TEAM,
EXPLAINED THE MAIN HIGHLIGHTS OF THE CAR FROM A DRIVER'S POINT OF VIEW



After a great career that propelled him to race and win in many categories, from Formula BMW to the Euroseries 3000 and the F.3000 Italia Series (he ended up as the runner-up in 2008), and after two seasons in AutoGP, the Milan-based 24-year-old Fabio Onidi has finally found his way to the GP2 Series as he races a Dallara racecar fielded by the Coloni team. In a series that is both an accomplishment and a stepping stone, the shy and promising Italian shared his thoughts over his new "office". →







You finally made your GP2 debut, what do you expect from racing in this championship?

"Surely I'm extremely happy to be in GP2. I had been trying for several years, now I found the right budget to do it and I can say it's a really demanding category, with a bunch of great drivers. A category where experience counts a lot but I race with a great team like Coloni and I think I have all the best possible chances to do well. In the first three races we faced some issues but now we're improving, finding the right pace. We'll be able to do well in the next few races".

What are the car's strongest points in terms of driving?

"It's a really powerful car, demanding and complete. In the past years I raced in Formula BMW, Formula Renault, AutoGp, tested in the World Series, and this is the most complete racecar I've ever driven. It is incredibly rewarding for a driver and it teaches you a lot. It can also become incredibly helpful when approaching Formula 1".

What is the feature that suits your driving style the most?

"It gives me positive feelings in almost all compartments. It has great brakes, I like the engine's torque curve and more than that it's a car that must be driven clean, without overreacting. Usually I have a pretty delicate driving style and I found myself really well-suited".

Is it easy to set-up?

"Not at all, it's a little more complicated but that's right. I think that with some good technicians a great balance is definitely achievable".

If you could suggest an improvement to the Dallara engineers what would it be?

"Maybe I would like an even more aero efficiency".

Are you and your team satisfied of the assistance provided by Dallara?

"From my perspective, yes, completely. And since I never heard any kind of complaints I'm convinced that the

team is very satisfied too, also concerning the spare parts".

Are you looking forward to make your way to Formula 1 or you have alternative projects?

"My dream is definitely to get to Formula 1. Everybody knows how little chances are available though, especially seen how Italian drivers are considered there".

How can you explain the lack of Italian drivers in Formula 1?

"I have been asking myself why. I don't think that Italy is lacking good drivers, not by any chance. For us is definitely bad. Maybe we gave ourselves a bad name, or there's not enough interest. It's also due to the lack of institutional support. The German manufacturers give a great support to their drivers. We have Ferrari, but they don't seem interested in having an Italian driver in Formula 1".

Massimo Costa



«A GROUND-BREAKING

AN INTERESTING RESEARCH AMONG WHO DECIDED TO WORK WITH THE VARANO-BASED FACTORY IN MOTORSPORTS TO DISCOVER WHAT THE NEW GENERATIONS ARE EXPECTING FROM THE ITALIAN INDUSTRY.

A MUST READ FOR THE NEWLY-GRADUATED AND STUDENTS THAT ARE LOOKING FORWARD TO FIND A JOB IN THE FIELD



G CHOICE»

The economic crisis, which five years on from the "Lehman Brothers" failure, has not yet been resolved. The future still seems very grim and Italy in most respects seems a country for old men, as young people's unemployment rate rose to 30%, about 10 or 15 percent over the OECD average. Despite all the issues, there are still companies like Dallara that believe in young people, hiring fresh graduates, giving them sense of responsibility. Because only their fresh-minded approach can lead to innovation, new ideas, motivation, enthusiasm. Actually, many Nobel prize winners were younger than 35. We spoke with two young, 28-year-old Dallara engineers about the crisis, the job market and their perspectives. Marcello Alfieri from Parma, is being working for Dallara for the last three years, while Giacomo Campione, from Palermo, has joined one year ago.

How did you meet Dallara. It was a choice or just fate? What pushed you towards the motorsports industry?

Marcello Alfieri (M.A.): My father passed on his passion for motorsport since I was a kid and, living in Parma, I always kept learning about all the wins scored by Dallara. The ambition of being working in the automotive

field for a living brought me to choose a technical-scientific path for my studies since high school. Then I decided to continue here at the University of Parma despite the fact that there wasn't a specific course related to cars. Together with some friends, we put together a Formula SAE team to increase our knowledge. It's been a choice based on my passion for motorsports, then of course the proximity also had its part in it.

Giacomo Campione (G.C.): In my case it's been a mix of both things. When I graduated I wanted to follow my passions and work in the automotive field, but I did not send my application directly to Dallara. Let's say that I've been scouted around the web while I was almost accepting another position. When I had to decide, I opted for the Varano-based factory due to its fascinating history and heritage, the type of job that was offered me and because it would have been one of the few chances to work in the motorsports arena, which is difficult to reach from other paths. Motorsports mean technology, innovation, dedication, passion, competition and deep relations that you can build with people. It's difficult to find all these things in a work environment.



What kind of prospectives can be offered to a young, fresh-graduate by Dallara?

M.A.: Dallara is a cutting-edge company in many ways, and has contact and cooperations with all the most important automotive companies in Italy and beyond. This aspect enables young people at their first work experience to get in touch with new environments and step up professionally. I believe that these two aspects are key in the first years at work when you learn to work in a team and establish relations with the outside world.

G.C.: Yes if I'm here is because I think that the prospectives are good and high-quality. Of course, that depends on the personal tastes and abilities but as a first job, for a young guy at his first work experience, I think it's really good. The company, thanks to its small dimensions, allows you to work on some really interesting projects since the beginning and get a complete global vision. That leads to a really quick learning curve. In addition to that, you can get in touch with high-profile professionals that you can learn from every day.

Do you consider Dallara a place to settle for an entire career or it might become a step in a more complex experience?

M.A.: I think that having a complex working experience means facing new tasks every day, having always something to learn from the people and what is around us, facing new challenges and try to overcome them. I've been working for Dallara for the last three year and I never ran out of new challenges,

motivations and rewards. Also, I'm deeply rooted to the area I live in and I don't know if I could move on without it. I think that Dallara can be a career-long arrival point because I believe we'll never run out of new challenges and ways to improve ourselves.

G.C.: This question is tough to answer even after years and years of a career. The factors in play are many and most of them not dependent on the will of the person in question. So I can't answer. Of course, if I decided to go for this experience it is because I deeply believe that it can satisfy and reward me with new all-around challenges. Until now, it has always been so.

What kind of position do you cover? How demanding is your job?

M.A.: I work in the R&D department. Specifically I work in the development of the vehicle models for the driving simulator.

G.C.: I work in the design department, precisely in the technical office. The basic assignment is to design, using a solid modeling software, the various components and sub-assemblies of the car that I'm assigned. I need to figure out the conditions around them, define the shape, the dimensions, thinking about the production and assembly and verifying the correct assembly once they are produced. The parallel work is the realizing production designs and compiling the documents necessary for the production departments. In addition to a large part of individual

work you need, with all type of components, to keep talking to the other departments of the company. I find this aspect pretty exciting and useful.

What is the most important thing for someone attempting to start a career?

Being in a solid company open to innovation, the fact of being open to the international markets, the chance of balancing the work with the personal commitments or good pay?

M.A.: I think that for a young, fresh graduate the first few years at work are key. That's why solidity and innovation are necessary to make your job exciting and long-lasting. The last two things are important too, but afterwards.

G.C.: They are all really desirable aspects but a lot depends on the type of works. In general, I think that the most important thing is finding a company in which you're able to do what you love and what makes you happy. By the way, we spend most part of our lives working! In my field, being in an highly-innovative environment is key in order to keep the pace with the technology advancements, and being open to foreign market is really important too because we are in a big global market and not doing so would mean losing valuable occasions. Of course, being in a solid company, especially with the current economic outlook, always helps.

Are you concerned with the current economic downturn in Italy?

M.A.: Of course, but I'm more concerned by the fact that there are no solutions



**Marcello
Alfieri
with Tony
Kanaan**



**Giacomo
Campione**



available. In these type of moments, there's no need to complain, we must solve the problems.

G.C.: It would be weird not to be at least a little concerned. unfortunately, the crisis is touching everybody and, in addition to the problems we have now, it will rebound on our future. That's the most concerning thing we should be thinking about. Indeed, I'm not particularly concerned for the situation in Italy or for my future rather than for the world economic scenarios that keep coming to light and seem each day more grim. We are living in a deeply unfair world and the situation might just not improve.

What has been the most valuable/interesting experience you made since working for Dallara?

M.A.: To talk about a single aspect would definitely be reductive. The most important thing I see in Dallara every day is the flexibility, the capacity of quickly adapting to the requests of the market and customers. Since I've been working for Dallara I saw many different projects come to light and each time I'm surprised with their final outcome.

G.C.: I've just been here for a year but so far everything has been new and useful. From the job rotation done in the first month, which enabled me to merge with the company's processes, to the talks and teachings received from my managers and more experienced colleagues and the latest designs

produced in the technical department. The most particular and useful thing that Dallara offers is the chance to mature a global vision of the projects and the cars we work on, and particularly having the chance to see the designed components finally assembled and tested. It's something that really helps to grow up and learn at a fast pace that would be impossible to achieve in other ways.

Would you like to have a working experience abroad?

M.A.: Of course, having a good international working experience is incredibly important, not only from a personal standpoint but also for the company which receives a valuable know-how from different realities. I really like Italy though so it will be difficult for me to move abroad indefinitely.

G.C.: Yes, I think that being in touch with new cultures, way of living, thinking and working are always really valuable for the personal and professional growth of an individual. I always traveled a lot and not only for vacation; while at the University I spent one year studying in Spain thanks to the Erasmus project. And on top of that, honestly, considering how easy is to travel by plane today, the distances have been shortened and you're always a few hours away from home.

At what age do you think someone can cover an high-responsibility role in a company like Dallara?

M.A.: Certainly, experience is important but the main thing is the ability to cover a position of responsibility.

G.C.: Being one of the youngest hires and having no big knowledge of the company's past, I believe I'm not the right person to answer this question. If I look around though, I see many young people covering high-profile roles so I would say there isn't a standard age for that. Of course you need a solid preparation behind and it can be acquired only with time and a lot of work, but for some positions maybe it's even more important to have strong interpersonal skills, resource management, mental flexibility. It's tough to work on these aspects, they are mostly natural skills.

How well do you fare on racecars and/or roadcars?

M.A.: I like racecars and driving on the mountain roads but sometimes my friends tend to suffer from, ehm, motion sickness. I still have to understand if the problem resides in my driving style or in the mountain road itself.

G.C.: I think I'm pretty ok behind the wheel, I got that feeling from my over-eighties aunts when I was carrying them around. Jokes apart, I'm not a racer but I feel OK. Unfortunately I never had the chance to drive a racecar so I don't have any indication.

Maybe that will be the next Dallara experience?

Alessandro Santini

On the road since 1972.



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