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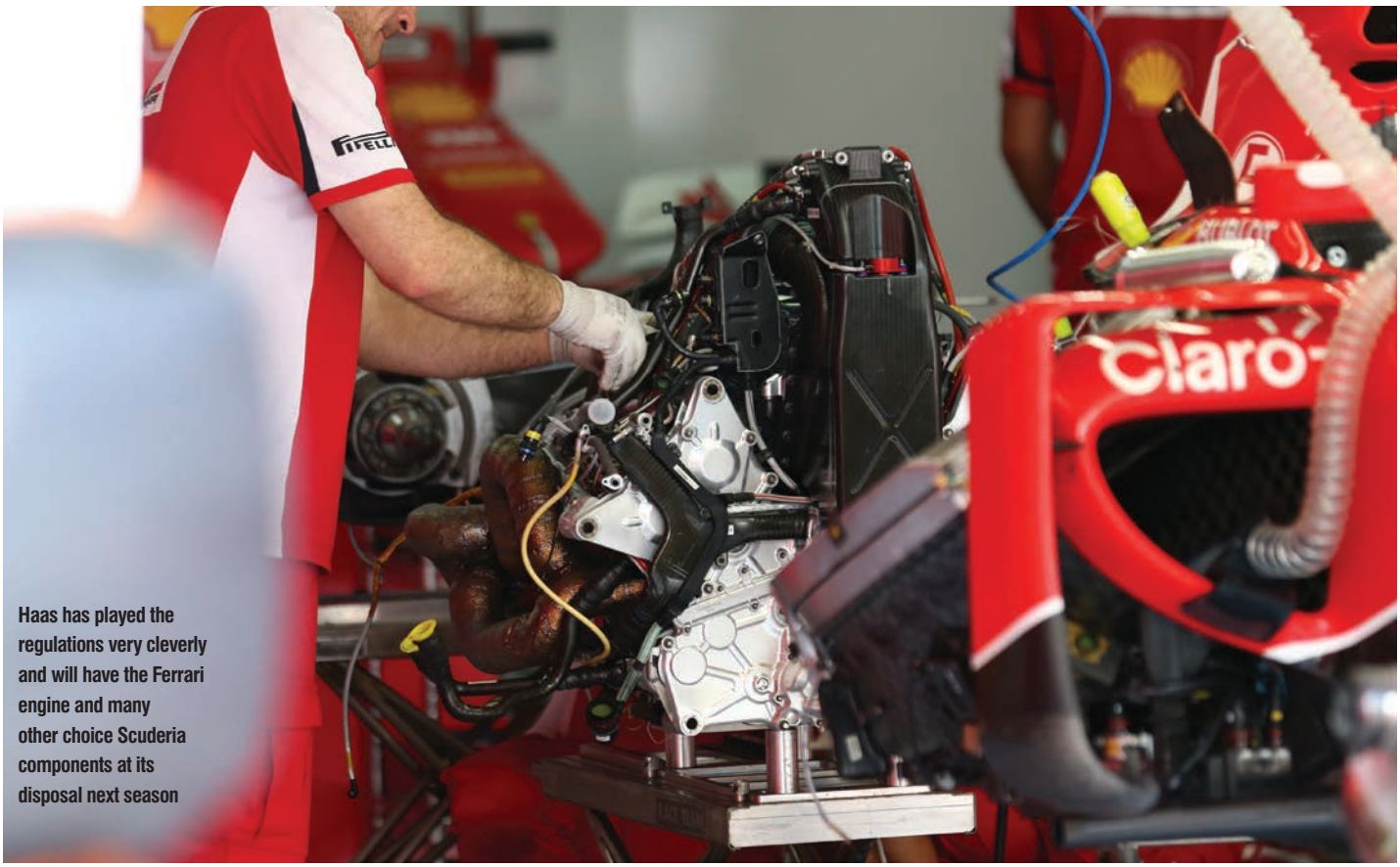

Haas has played the regulations very cleverly and will have the Ferrari engine and many other choice Scuderia components at its disposal next season

Racecar visited the facility a large new 5-axis machine was being installed, a prototype specifically designed for the team. In another area a large machine shop kitted out with the latest Haas CNC equipment was working on car parts and pit equipment. It is complemented by the equally well-equipped machine shop next door at Stewart-Haas Racing.

'The guys in the machine shop are primarily working on parts for the wind tunnel model' Steiner says. 'I think about 50 per cent of the parts on the model are made here, all the metal components, while all the SLA [3D printing] parts are done at Dallara. [In 2016] we will make 100 per cent of the scale model parts here, but right now Dallara has eight SLA machines and we are waiting to install our first. We made the pit equipment here and filled a shipping container with it all. We make all that kind of stuff here, USA is the home of fabrication. Making this stuff in the USA is much cheaper than in Europe. It takes about two days to ship the parts from here to Dallara so we know that something that if you were doing in Europe would take four days, we would take five instead as it takes two days rather than one to ship. But we know that and factor that into the production schedules.'

In the plush design offices on the first floor of the new factory much of the space is unoccupied, but will rapidly fill as the team grows. 'We have about 20 people in the CFD group at the moment by [2016] that will be about 20, right now the main engineering work we are doing here in Kannapolis is the CFD. I think we have about four Phds in the CFD group at the moment' Steiner claims. The group of CFD engineers are disarmingly young, many of them relatively recent graduates, but this is something Steiner sees as an advantage. 'We do have a lot of young guys in the team, but for CFD especially there are no old guys who know the cutting edge technology. These guys are scientists really and therefore it's a good thing to have the CFD here, they don't need the big Formula 1 experience they just need to be clever people that know how to use computers and understand physics.

Young talent

'We have bright people here from good universities, we think actually it's better to have them here so we keep them out of the mainstream of CFD in F1, and we are doing some very interesting and different things in that area. I expect we will reach the maximum allowed next season, we are doing some heavy stuff already. At the moment we can do what we like, the usage restrictions do not apply until next year so we are doing a lot of stuff.'

Here the links with the NASCAR team start to become apparent, while the engineers do not work on both, an experienced engineer from Stewart Haas is playing a key role. 'That CFD group is run by Matt Borland, who was the technical director at the Stewart Haas NASCAR team for a long time, he is responsible for managing the knowledge transfer between the two. Technical approaches and methodologies things like that,' Steiner explains.

The CFD cluster used by Haas F1 is not located in the USA and this highlights how misfortune for some can be good fortune for others. The collapse of the Marussia team in late 2014 came just at the right time for Haas F1 which was not only looking for a cluster but a European base of operations for the racing team, the near demise of the then Russian-branded Manor operation gave Haas both of the things he was looking for. He acquired the former Marussia HQ in Banbury and some of the equipment within.

'The designers and the wind tunnel programme are in Italy and the race team is in England. We have the CFD engineers here in the USA but the cluster is at Banbury. Marussia had quite a good cluster, quite new as they had to replace it about nine months before the team collapsed. It was very difficult to take out the cluster and re-install it somewhere so

To say the 2016 Haas is a Dallara would not be correct. This project is very definitely being run by the Haas engineers

Complete vehicle system simulation

Using physical modelling tools to simulate the complete vehicle leads to a better understanding of the system behaviour and interactions enabling system level optimisation.

As the complexity of today's vehicles increases due to hybridisation, more advanced driver assistance systems and many other active systems it becomes increasingly important to be able to simulate how the complete vehicle system behaves and interacts. Using simulation from the start of the project enables design decisions to be influenced and optimal system solutions to be found.

As the complete vehicle system covers many different domains including mechanics, electrical, thermal, fluid and control we need to use system level modelling and simulation tools that can create predictive models covering all of these domains.

Dymola is a multi-domain modelling and simulation tool that uses the Modelica modelling language to describe the behaviour of components, devices and systems. This capability is encapsulated into a wide range of application libraries covering engines, powertrains, batteries, electric drives, vehicle dynamics, thermal management and human comfort.

Using Dymola, Claytex has produced complete vehicle system models for studying engines, drivelines, vehicle dynamics, thermal management, hybrid technologies and body systems. These have been applied extensively in Formula 1, NASCAR and IndyCar enabling the teams to evaluate and optimise new technologies and ideas before arriving at the track. In motorsport these models are deployed in the design office, integrated into the trackside tools and telemetry systems and used for HiL and DiL testing.