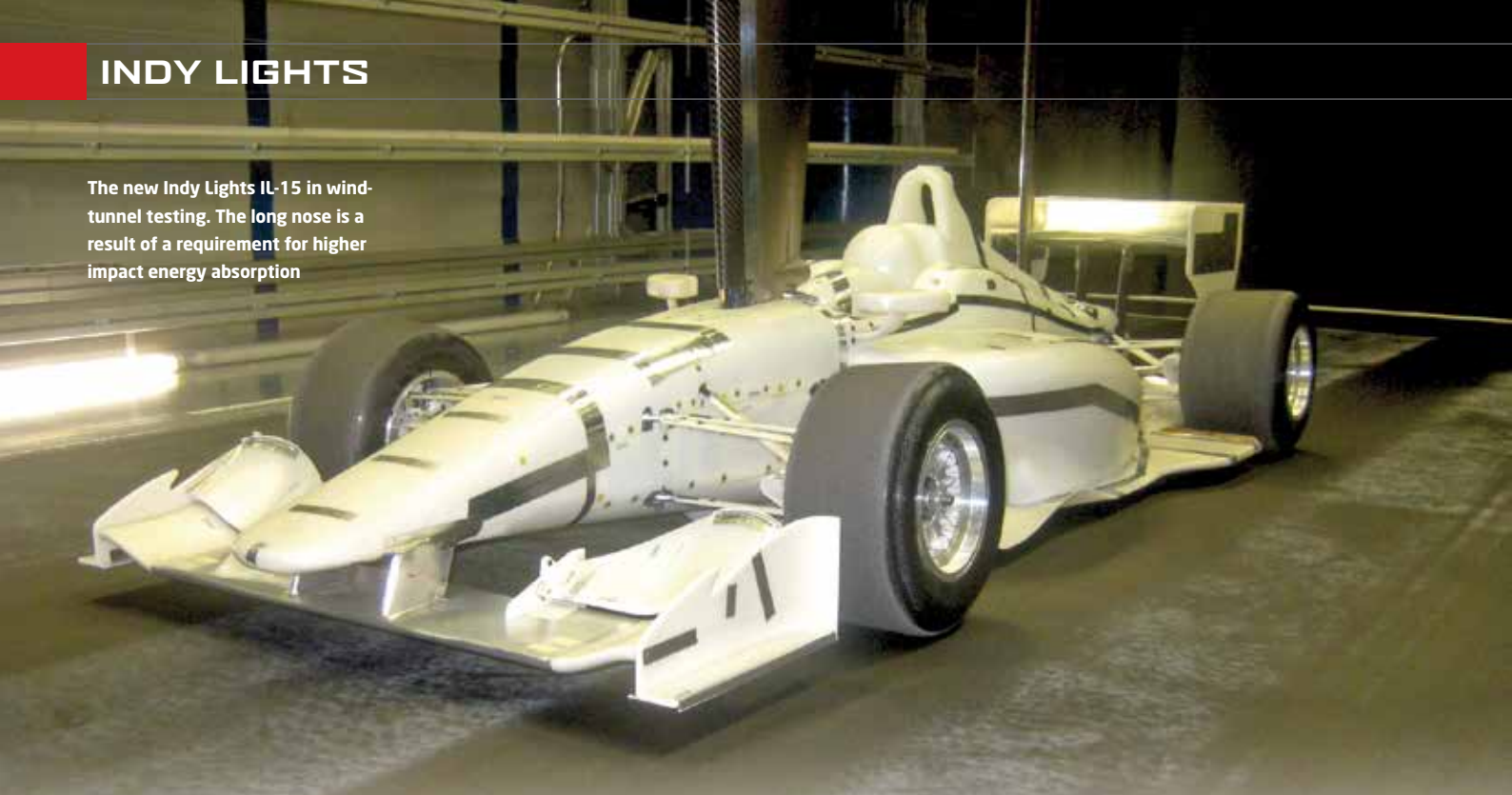


The new Indy Lights IL-15 in wind-tunnel testing. The long nose is a result of a requirement for higher impact energy absorption

Lights get lighter

Replacing the antiquated 2002 Indy Lights design, the new IL-15 from Dallara is a leaner blend of modern European and Indy Car technology

BY IAN WAGSTAFF

The next generation of Indy Lights car, the IL-15, was unveiled behind the Indianapolis Motor Speedway's Pagoda on the Friday before this year's Indy 500. It was none to soon. Earlier that day a mere eleven cars had contested the Freedom 100, the formula's flagship event.

However close the racing, such a small field of cars looks lost in the Brickyard's vast spaces. Last season's contest saw perhaps the most dramatic finish of any motor race while this year's 40-lapper saw Gabby Chaves' lack of regard for history when he pipped Sir Jack Brabham's grandson, Matthew, on the line. The cars, though, are now geriatric and a replacement is long overdue. After a false dawn, it's finally here, masterminded by Dallara project manager/chief designer, Antonio Montanari.

The IL-15 underlines the growing dependence on Dallara by Indy Car with final assembly taking place at the Italian company's factory on Main Street, a proverbial stone's throw from the IMS. It also reflects the company's head of R&D and US racing Andrea Toso's thinking with regard to the US scene, which he observes is culturally different to that in Europe. It continues his thinking with regard to such as the avoidance of interlocking wheels but with the lessons of the DW-12 Indy Car (or IR-12 as it is more correctly known internally at Dallara) taken into consideration, there is some difference in the result.

Montanari was chief designer on the Indy Car, as well as the new Indy Lights car. Evaluating the DW-12's performance over the last couple of years has enabled his team to make what have been described as incremental improvements.

Unlike the DW-12, the front wings of the 1400lb, carbon composite chassis, IL-15 are wider than the bodywork so that no part of the front wheels is exposed in a nose to tail collision. This, says Toso, means that he did not have to repeat the controversial rear bumpers of the current Indy Car. Increased under-wing width in front of the rear wheels also reduces wheel-to-wheel contact. 'We have a different solution but basically the idea is the same,' says Toso. Other safety features include full-length anti-intrusion panels and a lengthened nose for energy absorption. The interior cockpit hip panel padding is produced from extremely durable EPP (expanded polypropylene) foam, a different product from EPS (expanded polystyrene) and generally regarded to have better multiple hit performance as it is not permanently deformed in an impact. A considerable amount of time was spent on sled testing to identify EPP as the best product to use. The thickness is three inches behind and 1.5 inches under the driver.

There is more structure around the driver's head, which gives the IL-15 more of a European look

Another feature is the energy absorbing side pod inlet structure. The entrance to the radiator inlet duct is a separate structure and on the display car has been bonded on. The intention is for the front portion of the pod to provide an additional energy absorbing structure, bolted to the side of the monocoque on the actual race cars. This adds to the traditional feature of the side-mounted radiators being energy absorbing devices.

The headrest profile has been slightly updated from the DW-12, reflecting current FIA thinking. There is more structure around the driver's head, the monocoque having been raised in this area, which gives the IL-15 more of a European look.

There is, though, much of the DW-12 in the Lights car, 'more than you can see,' remarks Toso. The cockpit is one example, it being possible to take the seat from one and put it in the other.

Top: Suspension geometry and components are designed to be adaptable to road tracks and ovals Above: It's hoped that the 'sexier' IL-15 cars will attract new teams to the Indy Lights series

Other examples include the bulkheads, the oil tank behind the monocoque and the anti-wheel locking features on the side of the car. The two cars have the same wheel base and almost the same track width yet with the less bulky side pods and the absence of rear bumper, the IL-15 does look smaller. (The length is 192 inches, the width 75 inches.) The body of the display car show at the launch and then moved to the foyer of the Dallara factory is said to be correct in shape if not necessarily in construction, although is has been built using production tooling.

Toso points out the IL-15's simplicity. Unlike the current Indy Lights car but in similar fashion to the Indy Car, the same suspension, uprights and drive shafts can be used for road courses and ovals. This means a low amount of labour is required, as is a reduction of inventory.

Andersen Promotions, which now runs the whole of the Mazda Road to Indy programme, has been responsible for deciding on the suppliers, former IndyCar vice-president of competition, Tony Cotman having headed the bid and design and process. Included amongst the component manufacturers involved are Performance Friction, supplying the cast iron brakes, and Tilton for the carbon clutch. Motegi will manufacture the aluminium wheels with techno-mesh design, Cooper Tires will provide the tyres, the dampers are from Dynamics, and Life Racing will make the paddle shift. Cosworth sales director Kirsty Andrew, points out that the Northampton company will be responsible for the steering wheel and display, the data logger unit, the loom, power distribution unit and chassis sensor kit. The dampers and springs are carry-over items from the existing formula. The six-speed semi-automatic gearbox is also basically the same Ricardo unit as found in the old Indy Lights car, with the teams being able to retain most of the internals, including ratios. The engine is from another British supplier, AER. The search has been on to find a backer for the engine and although none has yet been announced, Dan Andersen, a former team owner and the founder of USF2000, confirmed that it will be badged. As Toso points out, 'a proven engine was required that would last a whole season without a rebuild.' There does seem to be a focus on using tried and tested components.

'NICE BUT CHEAP'

A new supplier to Indy Lights indicates the increasing links between Indy Car and Indy Lights machinery. Oxfordshire-based SS Tube Technology systems supplied exhaust systems to 29 of this year's starters in the Indianapolis 500, but has had no previous Indy Lights business. SS Tube's Indianapolis-based US representative Michael Desautels already had a relationship with Cotman through his Indy Car work and it was on his advice that he approached Andersen. Running turbo exhaust systems can work out to be extremely costly unless done well and thus top level Inconel has been specified.

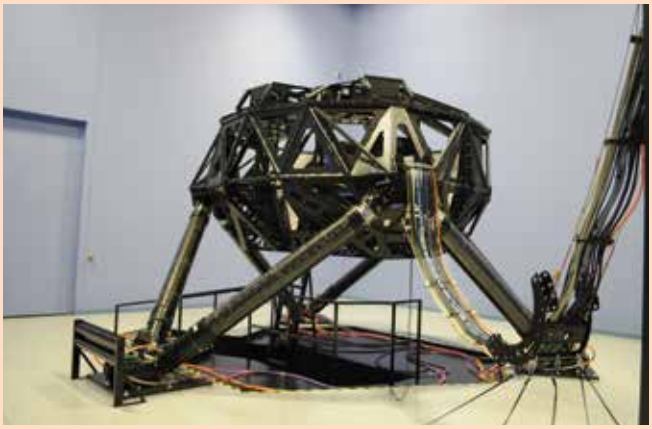
THE NEW DALLARA SIMULATOR

About a month before this year's Indy 500, Dallara began operation of a driving simulator with Moog motion platform at its factory on Main Street, Indianapolis. This is similar, apart from a few software updates, to the one installed in 2010 at the company's Varano de'Melegari, Italy headquarters. According to Vincent Grilli-Meunier, who is responsible for the Indianapolis simulator, there is at least one customer in the US who also wants to use the Varano-based one and it is important that they are almost the same.

The US simulator is, not surprisingly, aimed at use by the Indy Car teams and therefore has a DW-12 chassis mounted inside. The next development will be for it to be used by customers of the new Indy Lights IL-15. 'We want to allow customers to be able to drive the car before it is available to them,' says Grilli-Meunier.

The simulator consists of a 4-metre OD motion platform, the DW-12 cockpit with full driver controls, active seat belts, 180-degree video screen, Dolby surround audio system and sound and heat generators. Sixty-inch struts move the platform to simulate on-track motion based on laser scan tack profile and vehicle model inputs. The motion, audio and video are all controlled by Dallara-developed software. Because high lateral g forces need to be replicated, the platform needs to be able to move a considerable distance. The Indianapolis simulator is limited to 2g peak acceleration.

A public launch of the facility, with about 250 guests, took place on the Thursday before this year's Indianapolis 500. Andrea Toso, Dallara's head of research and development and US racing business, was also presented with the 48th annual BorgWarner Louis Schwitzer Award for the simulator. Presented by the SAE, this recognises individuals for innovation and engineering excellence in race car design associated with the Indy 500.



Speaking at the launch, Gian Paolo Dallara, president and founder of his eponymous company, remarked; 'when you design a new car, you put into it all the knowledge gained on previous cars. Mr Cotman and Mr Andersen said they wanted it "nice but cheap"!'

Andersen reckons that Dallara has achieved this aim. 'It is clear to me that they can build both beauty and quality into their cars while keeping the costs in line.'

Cotman says that what was wanted was something 'lighter, faster and sexier. Dallara listened to what we wanted.' He also says that in designing the IL-15, much was learnt from accidents that have occurred with the DW-12.

Although this is the first time that his company has worked with Andersen Promotions, Dallara sees the IL-15 as possibly just one more step along the road to Indy Car domination. He dropped a large hint when he then said, 'It is important for us to do the whole chain [of formulae]. If you want a smaller car, Mr Andersen, we are ready to do it.'

There are rumours that the bottom two rungs of the Mazda Road to Indy ladder, USF2000 and Star Mazda, could be combined and there is no doubt that this is business Dallara covets. 'If the relationship is good, I think [Andersen] will consider our cars, we already make smaller ones,' adds Toso who obviously relishes his work in the US.

In trying to increase the relevance of Indy Lights and make the Mazda Road to Indy akin to a soccer league with promotion, Andersen Promotions will be awarding a three race Indy Car contract to the 2015 champion, which will include a drive in what will be the 100th Indianapolis 500. A world wide advertising campaign, advising would-be competitors of this, will shortly be underway.

The car shown at Indianapolis was merely a display vehicle, with the prototype scheduled for a shake down at Dallara's headquarters in Varano de'Melegari near Parma, Italy before testing later in the summer with GP2 driver Conor Daly and 2012 Indy Lights champion Tristan Vautier at Mid Ohio, the Indianapolis road course and the Milwaukee Mile before both drivers try it out on the full Indianapolis oval. 'We are also working on getting a couple of current Indy Car drivers (to test it in September),' adds Cotman.

AER-P63 ENGINE

The engine chosen by Andersen Promotions meets, according to Dallara's Andrea Toso, a number of basic requirements. It is simple, proven, lightweight and low cost. Costs had to be comparable to the existing car.

The all-aluminium fully-stressed (although braces alongside the engine to join the front of the bell housing with the rear of the monocoque are being evaluated), 2.0-litre, turbocharged, four-cylinder unit from Basildon-based Advanced Engine Research, known as the AER-P63, is based on the efficient AER P-70 which was used in LMP2 with Mazda MZR-R badging. Its output is 450hp plus 50hp for push-to-pass. At 230 pounds dry-crated, it meets the criteria for lightness. Features include carbon plenum, carbon inlet runner and trumpets as well as drive-by-wire throttle control. The AER features Life Racing developed engine electronics with full active-knock control, ignition-angle learning, advanced boost control and integrated gear-shift strategies.

Supplying the power unit for a feeder series is nothing new to AER, for, as its managing director Mike Lancaster points out, it already produces engines for the Formula 1 feeder GP3 series. Lancaster also states that the P63 has been 'designed to be flexible for future changes and to be reliable and cost effective.'

The installation is said to make it easy to maintain. Its modern engine electronics combined with turbocharging mean that it is in line with current motor sport thinking as Formula One and various LMP prototypes upgrade to smaller, turbocharged engines. It also matches the trends of the road car manufacturers.