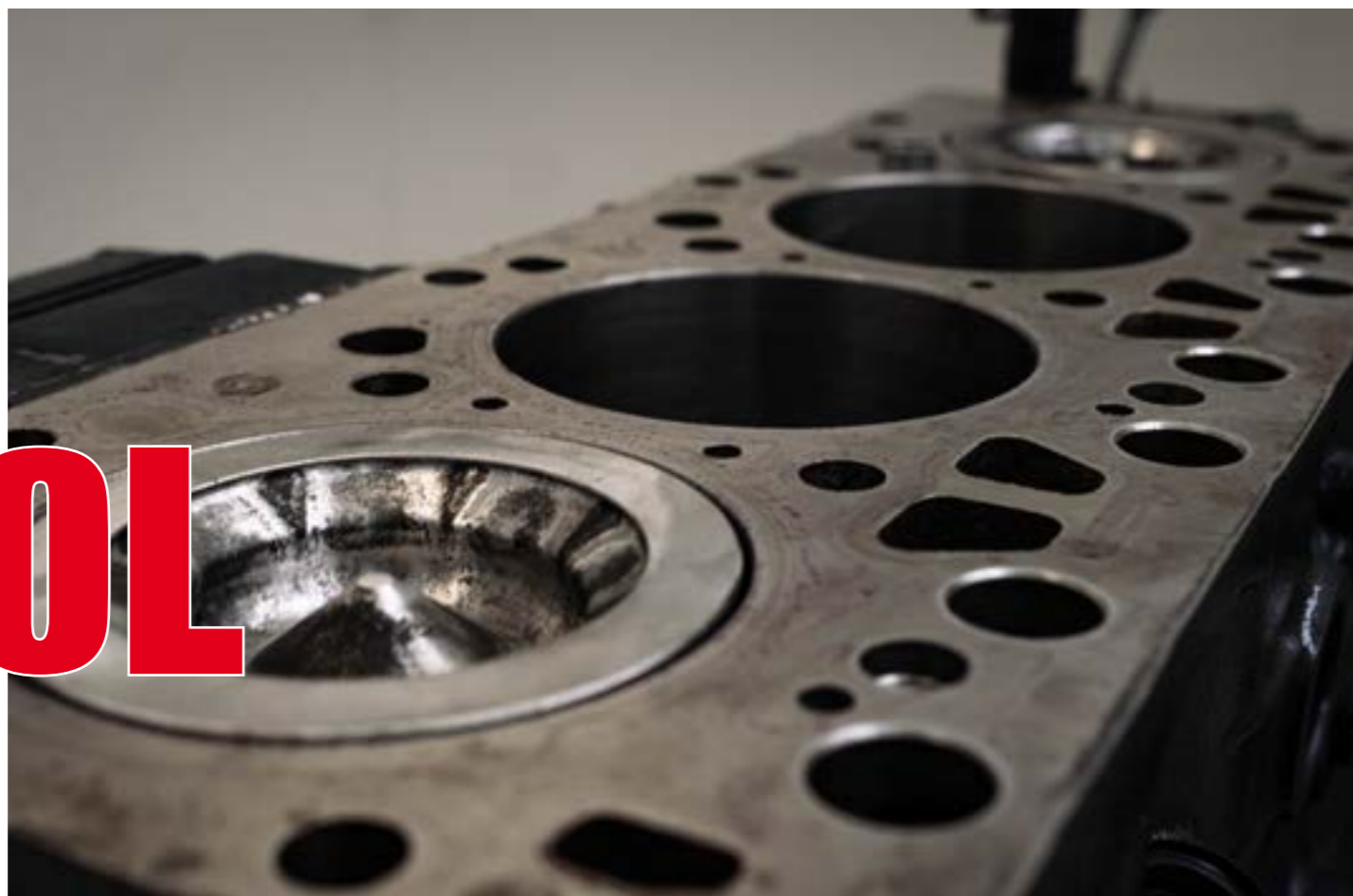


NGV POWERTRAIN

# GAS IS COOL



Its name is NGV Powertrain and it's got a mission: becoming the benchmark for conversion to natural gas. For repowering and first equipment, small and medium OEMs alike, any application whatsoever in any corner of the globe, including for whole vehicles. More on that from **David Caponi** (pictured at page 21), one of the two partners.

## NGV, the early days.

Let's leap back in time. NGV is firmly rooted in Reggio Emilia, Italy. Back in the 90s it was split into two separate entities: NGV Bus – dealer of MAN, Solaris, Van Hool and a few DAF applications – and NGV Gas; this latter drew on previous experiences from the 70s and dealt mainly with repowering.

**As one may easily infer from the name, repowering with NG.** Precisely. The company transformed circulating diesel-powered vehicles – buses and trucks – into vehicles running on alternative fuel such as

Here's the mission: becoming the partner of small and medium vehicle manufacturers worldwide wishing to convert their diesel engines to gas. We're still in the ICE galaxy, then all applications, none ruled out

methane. Being a worldwide player, NGV Gas was attractive first and foremost price-wise; secondarily, also in terms of exhaust gas reduction. Huge credit for this mission goes to my partner Luca Iori – who created it alongside his father.

## As that was, by all means, an innovative way of working.

Not a speck of doubt about that. At the Reggio Emilia plant they used to set up a prototype demonstrator based on a customer-sent diesel engine that was dismantled and altered to run on natural gas in the workshop. Secondly, they added the relevant manuals and technical datasheets in the customer's native language. Once the preliminary development stages were done with, NGV Gas staff was

sent at the customer's site to teach its workers how to operate the transformation. To name an example, some 20,000 Ashok Leyland buses were converted this way at Indian plants.

## Like some kind of flying doctors?

We could call them flying teachers. Customers were very satisfied with the fact they were actually importing know-how and producing locally. As for NGV Gas, that's how it managed to stay small-sized: all it had to do was sending small teams of people mastering that know-how around the world; there was no need to set up its own manufacturing lines requiring the huge investments that are typical of our sector.

## What's changed since then?

## NOT JUST SHORT NAMES. 4E AND NGV

As clearly pointed out by David Caponi, these two entities complement each other. We've asked 4e-Consulting's founder **Paolo Patroncini** to expand on this.

«This partnership stems from our longtime business cooperation with NGV. What's more, David Caponi and I were also colleagues at VM Motori. I can confirm our way of working is very similar to that of their engineering department. We, on our part, contribute our know-how on the simulation of conversion to gas of diesel engines, and on its design. Speaking of on-road applications, we've worked jointly with Yuchai on truck engines, especially the 6-cylinder. Transposing these engines to a bus setting is just part of our DNA».

## Who's the one who takes the ball first, you or NGV?

«No doubt it's NGV Powertrain that picks up the ball and listens to customers needing a conversion or an engine on demand. Then it's 4e-Consulting that runs with it, including working from a clean slate, depending on time to market. In the past we used the test benches at their labs».

David Caponi, NGV Powertrain: «In January 2021, the Shareholder's Meeting amended NGV Powertrain's article of incorporation for it to have the possibility to develop and sell innovative vehicles.»

We made some investments, including to hire specialized technicians – about fifteen – and renovating our development centre structurally, after which we targeted the new-build market: no longer just repowering, then, but newly manufactured gas engines under the NGV Powertrain brand. We buy diesel cylinder blocks from engine manufacturers under multiyear agreements, we carry out the conversion to gas and the homologation and then we resell them, sometimes directly to the dealers' network of the manufacturers themselves. We supply small to medium orders, about a hundred units a year. Such small numbers may be tricky to big companies, while to us they are an opportunity. Having set up a highly agile international network

is certainly of help. Only one year since its birth, 80% of the company's turnover comes from abroad.

## What drove you to reach beyond national borders?

The employment record of the founders – myself and Luca Iori. After years spent at Piaggio, General Electric Nuovo Pignone, and VM Motori, in 2005 I was hired by Iveco Motors, right on the eve of FIAT Powertrain's birth. That is when my journey across the group began. First, I led the development of NEF Tier 3 engines for Case New Holland, for both agricultural and earth moving machinery. Those were the days when Cummins engines started being replaced, especially on Case New Holland's units.





Later on I was appointed head of testing, then in 2008 I was in charge of diesel engine design for passenger cars made in Mirafiori as well as for industrial vehicles from the plant of via Puglia. The next step was when Paolo Emanuele Ferrero, my line manager at the time, asked me to strengthen our presence in China. And so it was that I found myself leading Fiat Powertrain's technical centre in Shanghai, where I took over for Mr Pino D'Agostino, none other than the man in charge of Ferrari engines at the times of Schumacher. He was soon to retire, and by taking over his position I could see the birth of SFH and the other Chinese entities of the Group. I then resumed my position as head of engineering, while in 2014 I was

appointed Manager of the Engine Development Platforms by Giovanni Bartoli, who was FPT's CEO at the time. After all of which I spent three years in global engine sales for the on-road applications segment.

#### And now...

We are dealing with a number of customers to which we have been recommended, in many cases by the same manufacturing companies we cooperate with. That's the context of our collaboration with 4e-Consulting. We complement each other. They have the resources for and know-how on hybrid and basic engineering activities for diesel engines; our team, instead, has roots in engineering for vehicle applications, which means the finished product.

We have set up this cooperation because we make quite a nice work team, one that's complete and integrated.

#### What about electrification and alternative fuels in general?

The agreements we've signed include the conversion to gas of a truck from a well-known manufacturer for the Eastern European market. Specifically, we're tasked with transforming the truck into a demonstrator running on liquified natural gas.

A second project targets a hybrid propeller to repower a well-known bus brand for the German market. We'll replace the bus's diesel engine with a hybrid powertrain made up of a small size engine (3 L) and an

electric generator. The gas engine is very close to fixed-point operation, and it recharges the batteries as if it was a range extender. The downsizing is remarkable, from a 7/8L diesel engine to a 3L gas unit. Other projects worth mentioning include a typical garbage collector, in Spain, again with a compressed gas fuelled engine; and the conversion to gas of a 4-cylinder, 4.5L engine – jointly with 4e-Consulting – for a street-sweeper manufacturer. We're also involved in a number of still confidential projects targeting natural gas engines for road and rail vehicles.

As for the future, we've made connections with a few big companies operating in Italy to develop hydrogen-fuelled internal combustion engines.

#### Is there anything you lack?

Currently we do not have a plant of our own, so we lack the production lines.

For this reason, we have ongoing contacts with various Italian companies, as we have given absolute priority to the importance of having a complete national supply chain.

#### So you lacked the opportunity to take care of the process from beginning to end, didn't you? How do you see yourself working at full stretch?

We have a dream: becoming a trusted partner of all the world's small manufacturers of vehicles and moving machinery, stationary engines or boats.

We intend to specialize in low vol-

## 4E CONSULTING AND EU'S GREEN DEAL

«We've been asked to participate in feed mixer projects for the Northern European market. Oftentimes requests are focusing on hybrids, which allows to avoid massive layout redesign. We've set up a demo, a series hybrid with range extender, versatile architecture; more specifically, it's a dumper. The project's key feature is the electrification of hydraulic components. The software is a simulator we developed ourselves. We use to test the loads and determine the power range that's best suited for the required autonomy. The 19 May 2020 deadline had been set for 'zero pollution' projects. 4e participated in a call for applications on a centre for the development of lithium batteries for mobile industrial applications. We signed a supply agreement with a battery manufacturer boasting 20 GWh of energy generated and stored in lithium iron phosphate batteries, that are best suited for off-road: inherently safe, their heat release is gradual and they enjoy a profitable second life, i.e. as storage units. Our mission is to design batteries that are tailored to the application to avoid overly fast charge-discharge cycles».

Paolo Patroncini, 4e Consulting: «When I worked at VM Motori some 15 years ago, I collaborated with the University of Modena in converting a VM engine to gas.»

umes and applications with a strong engineering nature, such as special vehicles, boats like hovercrafts and small-scale coastal fishing boats. Anything requiring strong customization.

If our clients turned to most manufacturers for specific engine equipment in small quantities, they almost certainly would get no answer. Instead, we take this kind of OEM's by the hand.

We're talking about special vehicles. To date, we've been commissioned a couple of rather big projects, the first by an Italian company, and the second by a Swiss one: both are asking for urban vehicles.

On top of which, we've just completed the homologation of a Mercedes bus in Romania.