



Filipe Cerdeira (Driveline), Francisco Fernandes and Duarte Sanfins (FCC), and Álvaro Vilar Moreira (Driveline), the mentors of this project



The position of the new gearbox selector was looked into, in order to bring about ergonomics of use

Driveline Proving the worth of regearing

While replacing a manual with an automatic transmission is no easy task, Driveline still took up the challenge. Now functioning trouble-free for a year and a half, customer satisfaction is proof positive that this concept can get off the ground.

TEXT JOSÉ MACÁRIO PHOTOS JOSÉ BISPO

FCC Environment's "Warm Earth Subsidiary," which collects unsorted urban waste in the area of Mirandela, contained a vehicle fleet that included an Iveco Stralis, which was required to undergo repairs to its manual gearbox every 40,000 kilometers. While many solutions have been attempted by the manufacturer, no single definitive solution has ever been arrived at, thus calling for constant repairs and even, on one occasion, its replacement, as reported to TURBO OFICINA PESADOS by Duarte Sanfins, the head of this subsidiary. This manager acknowledges that the service these vehicles have to undergo is quite demanding, as, on average, a garbage collection vehicle makes 300 to 400 stops per shift; however, the approximately 10,000 euros spent on each repair job was

unaffordable for this subsidiary under the Spanish multinational. This is where Driveline becomes part of the equation. Since this company, which is based in Terrugem and specializes in automatic transmissions, already worked with other FCC Environment subsidiaries, it was called upon to provide a solution to this problem. The submitted project involved replacing the manual gearbox with an automatic transmission; according to Duarte Sanfins, this comprised quite a huge risk, but which was weighted: "We estimated the vehicle's useful life and calculated how many more gearboxes we would have to replace during that period, based on the current rate, along with its cost. We compared this to what Driveline suggested, taking into account the three-year warranty proposed for this service."

FCC Environment manager says he is satisfied with the result: "It was clearly a successful investment. We haven't had any problems, and the servicing has been good. We had only one problem: the vehicle didn't have any power. The problem wasn't the gearbox, but still, Driveline resolved the issue." Also in financial terms, this was the right decision, in the opinion of Duarte Sanfins: "Without a doubt, we saved money with this, even without considering other things that this project enabled us to achieve, such as savings in diesel fuel or the fact that now we are able to work two shifts with this vehicle, which is something we were unable to do. The project cost 20,000 euros, which is 5,000 less than the two-and-a-half gearboxes we expected to replace during the rest of the vehicle's useful life."

STEP BY STEP

The project appeared to be highly complex, as pointed out by Álvaro Vilar Moreira, one of the Driveline managers: "This was the worst-case scenario, since the vehicles operated over many hours, in a very rugged topography. Still, this was good for the project. We tested the limits of this concept." That's why, prior to taking up the challenge, Driveline looked into what was being asked, by deciding which gearbox we would need to mount on the vehicle in question. To such end, we considered the vehicle's power, the maximum incline with which it needs to operate, the weight, the wheel diameter and the drive shaft, among others. Deep down, according to Filipe Cerdeira, another Driveline manager, "this is about combining the gearbox and the differential with the existing engine." The



The gearbox cooling system was designed and executed at Driveline's facilities

chosen gearbox was an Allison 3000, a brand the Terrugem-based company has specialized in.

After creating the project, Driveline removed the manual gearbox and, in its place, mounted an empty model transmission, in order to perform measurements for the drive shaft and other components that had to be modified. Next, it was time to remove the remaining manual gearbox peripherals, such as the clutch disk, the pedal and selector stick shift. The differential was opened and was given a new torque conversion ratio, so as not to over-modify the vehicle's performance.

Once we determined the necessary adapting plates and disks for connecting the new gearbox to the engine, it was time to make or order them. The engine flywheel, for instance, was modified by Driveline at the latter's facilities, and later calibrated by a specialized company.

Afterwards, the new gearbox was connected to the engine and the cooling system was created. The pipes that lead water from the engine to the internal cooler were all designed and mounted by Driveline; the same was true with the wiring connecting the components to the vehicle's CAN line. After these were installed, as well, we needed to find a safe, moisture-free space for the electronic control unit, which ended up being accommodated underneath the vehicle's passenger seat.

With the new gearbox now in place, we needed to measure the distance between the gearbox outlet flange and the differential outlet, in order to make the new drive shaft, considering the specifications accepted by Allison so that no component is damaged. Finally, we also needed to perform some "cutting and sewing" in the cabin, so as to fill the spaces left empty by the removed components and to ergonomically adapt the new components in

the passenger compartment, such as occurred, in this case, with the gearbox selector.

With everything in its proper place, all we needed to do was set the parameterizations, so as to enable communication with the engine, dashboard and power takeoff, and systems now controlled by the gearbox. Álvaro Vilar Moreira exemplifies as follows: "If I were to apply the brakes, the truck would use the exhaust brake, regardless of rotation. But not now. Now, the gearbox checks which is the most effective during in the truck's operation. At that time, it tells the engine if it needs to activate the exhaust brake or the mountain brake and how such activation shall take place: whether by applying the brake or by lifting the foot off of the accelerator. All this has been parameterized in accordance with the customer's instructions."

The integration of systems enabled every signal to be visible on the dashboard, as well as recognition of every malfunction code. "We do not keep the information for us. If the customer is Iveco, they recognize the codes from the electronic control unit. We play by the rules and that's how we feel it ought to be," concluded Álvaro Vilar Moreira.

PROOF OF CONCEPT

For the Terrugem-based company, the decision to embrace this project was easy. As Álvaro Vilar Moreira says, it wasn't for financial reasons that Driveline took hold of this challenge. While the chief reason had to do with the engineering challenge that the project entailed, also important for the decision was the fact that this is an opportunity to prove the concept before customers who quite regularly inquired with Driveline regarding this service: "It's one thing to say we'll do something; proving it is another altogether," states the manager.

Filipe Cerdeira adds that this is a way of differentiating the company's position in the market, proving that Driveline is, first and foremost, an engineering company. Even though they have not had the chance to undertake a similar project, this does not worry the two managers, who prefer to see this project mature for a little longer, thus enabling it to prove itself and generating data that could be of interest to potential customers, such as the number of malfunctions – fortunately close to nil, up to now – or the amounts involved in maintenance, for example. Despite having taken a little while longer than originally expected, the two entities involved highlight that the process took place at a good clip, and in a spirit of honest and frank dialogue, thus enabling the project to include a few functions requested by FCC, with a new operating system for the Chelsea 859 power takeoff, now automatically activated as soon as the vehicle is shifted into neutral. This new operating system, declares Filipe Cerdeira, lessens some of the responsibility on the driver: "It is no longer the driver who turns the power takeoff on and off. While the fact that this occurs automatically reduces the likelihood of human error, it also makes for easier work, thus increasing the satisfaction of those performing said work; in turn, this factor also ends up contributing toward a greater productivity index.

TURBO OFICINA PESADOS had a chance not only to test, in loco, the greater ease with which we can operate a vehicle equipped with an automatic transmission compared to a manual gearbox, but also to understand the opinion of those who work with these vehicles on a daily basis. António José Ferreira, 39 anos, an FCC Environment employee for 14 years, corroborates our impressions: "I don't want anything else. As long as I can drive this one, I don't want to drive any other." This driver, who also operates vehicle equipped with manual gearbox, reveals that the new solution makes his work quite a bit easier, allowing for comfortable service and swifter tasks. And he concludes: "I'm happy with the company's choices."

For both managers at Driveline, seeing a project like this take shape and being brought about is very rewarding. But the greatest reward, as pointed out by Filipe Cerdeira, involves seeing how drivers, on the delivery date did not think of using this new truck, then changed their mind: "This is proof positive of a job well done." 🌀

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