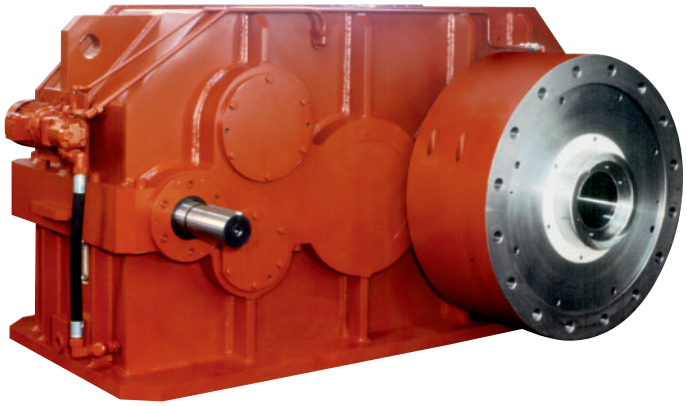
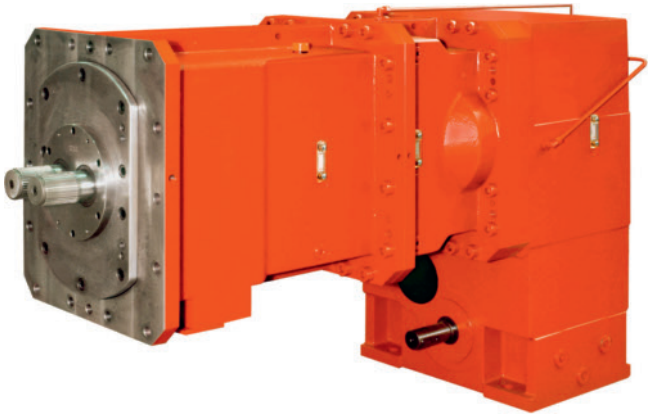
# Devoted to the Extruder Gearbox

**Mechanical Engineering.** While most manufacturers buy cheap parts or move production sites to low-wage countries in order to save costs, supplier of gearboxes Zambello Riduttori srl, chose a different way. ***Kunststoffe*** went to the company's production site to obtain information about their strategy and the market, directly from the management of the enterprise.



**The big gearbox for single screw extruders has a very high ratio between weight and transmittable torque**



**The new gearbox TST-CNR-2H for counter-rotating twin screws extruders is suitable for up to 54 Nm/cm³ torque density**

Zambello, too, had to suffer some minor wounds from the crisis. After several years of growth with the extrusion market, the company had to deal with a decrease of over 40 % in 2009. Meanwhile, the company is back to its old strength and growth, and has reached the level of 2008 again, as was stated by manager Alex Zambello, in charge of marketing at Zambello Riduttori srl in Magnago, Italy. The company was able to cope with the crisis, without reductions in permanent staff. This was possible by working short hours and releasing temporary workers. At the beginning of this year, staff returned to normal working hours.

## Success from Specialization

The company was founded in 1957 by Zevio Zambello, the father of the present managers. From the beginning, Zambello has been concerned with the construction of gearboxes – initially for diverse applications, related to the actual order. The enterprise started to focus systematically on gearboxes between 1985 and 1988. That was the time when they defined their supply program and made the first brochure providing detailed data and standards for extruder applications.

Back then, almost every renown supplier of extruders used to design and produce his own gearboxes, which was inefficient, because of the relatively low numbers of items produced. As a result, they started to seek for suitable suppliers. According to company information, Zambello is one of the first gearbox manufacturers, who developed standards for extruder gearboxes to target this specific market. Today there are roughly 10 important competitors. Alex Zambello recalls: "Our first customers in Germany simply put their own brands on our gearboxes – our emblem was nowhere to be seen. Today this is different. Our gearboxes are an emphasized feature of quality, and machine manufacturers from Asia, in particular, use the original from Italy for their premium products, to further improve qualities. And if a customer hides the origin of his gearboxes, he might be trying to protect his own spare part business." But Zambello is not interested in selling spare parts to the plastics processing industry anyway. 99 % of their customers come from the machine manufacturing sector; the company does not even have the capacity to deal in spare parts. "If we obtain a request from a processor, we can see from the article number the respective customer this component is related to. We then redirect the request to this customer. There are only few exceptions, and these are very small producers. We agreed to take over their spare part business."

In the past, Zambello used to consider the products of German competitors as the gauge for their products. In the meantime, however, the company sees itself in the lead, in technological terms.

No matter if single or twin screw extruder, if extremely small or large, special wishes can also be met: "We offer the right gearbox for nearly any size of screw diameter, and for any type of application: with low, average or high rotational speeds, as well as the respective torques. We are ahead of time here, being able to provide gearboxes that exceed the current limitations to screw loads, in terms of performance and mechanical resistance. And this makes them excellently suited to meet the requirements of the future," states Elio Zambello, member of the board of man-

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**Alex Zambello: "Asian machine manufacturers use the original from Italy for their premium products."**

**Elio Zambello: "We offer the highest torque density currently available for extruders."**

agers, and responsible for technology. "We offer the highest torque density currently available for extruders at the market – for co-rotating and counter-rotating extruders." His brother adds: "33 for co-rotation, and 54 Nm/cm$^3$ for counter-rotation. Our products are 100 % European – concerning material, as well as processing. With these features we perfectly meet European quality requirements."

Some ten years ago, Zambello also started to build gearboxes for injection molding machines, but this market proved much more difficult, and efforts in this area are thus less intensive at present. Alex Zambello says: "Some years ago, gearboxes were considered a thing of the past in injection molding, and companies switched over to direct drives. Today, however, we obtain requests for our gearboxes again, mainly from Europe and Far East."

## Markets and their Importance

With its 80 % share, the plastics and rubber industry represents Zambello's main market. The company also supplies companies from the food sector (10–15 %) as well as soap production industry (5–10 %).

According to regions, the major export market is Germany, because this is the market with the highest demands in terms of technology. Zambello eventually entered this market by starting business with a renown enterprise in Bavaria, roughly ten years ago. Since that time, the Italian gearbox supplier has featured growth rates of between 15 and 20 %, annually. Greater China (China + Taiwan) is important too, with its share in exports of 20 %, as well as North America with its 10 %; the market in Italy remains a stable basis, at 35 to 40 %.

The company currently manufactures 500 gearboxes a month, with this figure due to double over the years to come. However, the model size plays a part here, too. The company claims that they used →

A new hall in Lendinara is completely dedicated to CNC machining centers for processing the castings

to produce higher numbers in the past, although of smaller sizes.

In the business year 2008, Zambello's 104 employees achieved a EUR 27 million turnover. Like virtually all companies of this sector that are unlisted, these figures are not published for 2009.

## Competing with the Torque Motor

Only in a very small sector of the market, Zambello takes the challenge of competing with the torque motor. According to the company, at rotational speeds over 300 rotations per minute, a torque motor is only slightly more expensive than a gearbox, thus representing a real alternative. Even though a classical gearbox's efficiency is approx. 5 % below that of direct drives, the price difference is considered as the determining factor at the market.

Even though, according to Elio Zambello, this motor is in fact an innovation, it includes no decisive benefit for extruder applications. "In this case, we do not need positioning accuracy like in machine tools; neither do we see a need to act with respect of noise emissions. No doubt cheap exports from Asia are extremely loud, but our gearboxes are produced so precisely, they are free of noise, even in case of high power consumption. Our gearwheels were produced specially for extruder gearboxes, and they feature extraordinarily precise finish grind" explains Alessandro Feller, head of export marketing at Zambello. "Attending a trade show, you might get the impression that the torque motor's share in the market is at least 60 %. If you talk to extruder producers, though, you will find out that this share is 5 %, at most."

## Economic Serial Production at the Lendinara Works

The new production site of Zambello is situated in the Rovigo region in Italy, and comprises three halls. They are equipped in a way that provides for short distances between the units, according to the stages of manufacturing, and are designed to manufacture large numbers of small and medium size gearboxes.

In one of the halls, the blanks are sawn off and gearwheels are milled, in another, the gearbox casing is processed, and in the third hall, the gearwheels are finished. This is also where assembly takes place. The degree of automation in gearbox production is constantly growing. Round steels, for instance, are sorted according to diameters, and, in a fully automatic process, are taken to one of the saw stations, which operate around the clock, fully automatically.

The new fully automated CNC cutting machines for mass producing gears is fast, flexible and integrated with an automatic robot system

Vertical integration is close to 100 %. Merely heat treatment is left to an external service provider. The purchase department is mainly concerned with buying steel semi-finished products and unfinished cast casings, which come from local suppliers. Machine tools at the production site are of the latest generation, which enables Zambello to economically produce even complex geometries, which are frequently required in gearbox production, at the utmost precision. The machines are replaced after five years of operation, on average.

To Elio Zambello, the only way to provide for the high qualities of their gearboxes, is to produce the entire product at their own works. Eventually, the gearbox is only one component of a plastics processing machine, which is a closed precision system in itself.

One of the challenges to be faced is times of delivery growing shorter and shorter. This is why Zambello does not only need a large storage room for their raw materials, but also customer-related stocks with standard components. Here the company stores 40,000 components for more than 1,000 gearboxes ready for assembly. Usual times of delivery are thus four to six weeks. The largest variety can be found in gearbox casings. For them, Zambello uses special post-processing stations with large tool magazines that also work overnight – fully automatically and without operator. ERP software helps control all processes in an optimum way, and utilize resources efficiently.

After assembly, each gearbox is filled with oil, and submitted to a 4-hour test run. Working conditions on an extruder, considering torque, can be simulated here. Moreover, noise emission and temperature are examined too. In case of good results, the gearbox is varnished.

One of the most expensive machines of the enterprise is not used for production purposes: It merely serves for quality assurance. Here, the first item of each lot is examined as to its dimensional accuracy.

The family business constantly invests its profits to improve infrastructure and technology, and to buy state-of-the-art machine tools, thus reaching a high level of efficiency and international competitiveness. ■

**Gerhard Gotzmann**



 