14 EXAMPLES OF PLASTIC FIXING PROBLEMS SOLVED

14.1 *Santa Claus validate TWINPLAST*

In Spain, the Christmas period traditionally ends with the arrival of Santa Claus in december. In modern times, they bring gifts to the children.

A prestigious Spanish toy manufacturer had a serious problem with the three wise men, which was finally solved by a CELO technician.

Their newest toy for the Christmas festivities was a one-metre high tractor, where a child could sit comfortably and pedal around. The chassis was blow-moulded. Accessories such as exhaust, bumpers, rear view mirrors etc..., were mounted on the chassis using self-tapping screws. The problem was that when Santa Claus, opened the box and pulled the tractor out by the bumper, the bumper came out but the tractor stayed in the box.

A CELO technician recommended a 4.5 X 19 TWINPLAST screw, achieving stronger assembly for the blow-moulded plastic and Santa Claus never had any more problems taking the tractor from the box.

14.2 *Prematurely aged screwdriver points*

A production manager at a small home appliances factory called us on one occasion to complain about the lack of quality of the Philips head screwdrivers that we had supplied them with. When our technician arrived at the factory, he discovered that the problem was far more serious than it initially seemed: a line operator commented that it was necessary to change the screwdriver head after 800 screws! In parallel, our technician observed that the operator needed to make an enormous effort to insert the self-tapping screw into the plastic body that by the way, seemed very hard. They commented, without wishing to over dramatise, that the operators suffered from tendonitis or even had people off sick for the same reason.

To solve the problem the operators were dipping the screws in oil before insertion, without obtaining satisfactory results. Our technician offered the company's technical department the possibility of carrying out a study to get to the root of the problem.

The plastic they were using was polyamide with a 30% fibreglass charge. A REMFORM® screw with a Torx® head was recommended. The insertion torque was reduced to ergonomically acceptable levels and operator productivity increased.

By the way, the Philips screw driver points were the correct type

14.3 Plastics "fried" with oil

A photocopier and printer toner manufacturer used 2.9 X 13 mm self-tapping screws to fix plaques to the chassis. When they automated assembly, they realised that some screws were loose (badly fixed) and others with the thread stripped (even worse, as there was no hold).

An initial analysis revealed that there was a lot of variation in the internal diameter (between 2.4 and 2.63 mm) in the screw housing. As the plastic was fairly hard, a high tightening torque was required to insert screws into small diameter holes and this tightening torque was virtually the same as the thread stripping torque in larger holes. Ensuring equal hole diameter was nearly impossible due to the complexity of the mould and the differences in contraction at different points.

Design modification in a multinational is at times work for the "Mission Impossible" team. The engineers at the multinational used a very reasonable, immediate and cheap solution: lubricate the screws to reduce the drive torque; this hardly had any effect on the thread stripping torque. The solution worked well but some months later, they realised that the plastic boss, where the screws were housed, were breaking.

A CELO engineer had similar problems a few years earlier. Lubricants tend to weaken certain kinds of plastics, especially areas submitted to tension. As the problem was very serious (the company had to recall many toner cartridges from the market), a design change in the screw was accepted. A 2.9 X 10 mm PLASTITE® 48-2 screw was proposed that principally reduces the drive torque thanks to its Trilobular™ shape and increases thread stripping torque thanks to its twin thread. It is certainly the ideal screw for fixing where a lot of variation in hole diameter exists. A simple solution, without oil or other condiments!!!

Figure 50
A boss split due to using lubricants to ease insertion.

14.4 Screws used like nails? What for?

One of our major clients makes built-in junction boxes for walls. The boxes are injected plastic and each has 4 screws for placing the cover. Our client had a continual production process with injection and latter screw insertion. As production increased, the robot became saturated with work and was producing 2 boxes (8 screws) every 4 seconds.

The manager was preparing to buy a new automatic insertion line at a cost of €150,000 and the problem, as always in factories, was where to put it for lack of space.

One of our technicians suggested a revolutionary idea, Instead of screwing in the screws why not nail them in? Using a Trilobular™ PUSHTITE® II screw avoided conventional insertion and saved a precious 1.5 seconds on each operation. Our client saved money on buying a new line and all the typical installation, maintenance, operator training problems and also a lot of valuable space.

14.- Examples of plastic fixing problems solved

14.5 Are purchasing managers well paid?

They could be better paid if they could not only reduce prices but also reduce costs.

The head of purchasing at a company that manufactures temperature controls, who we have excellent relations with, insisted that we had to reduce the price of our 2.2 X 9.5 mm and 2.9 X 13 mm self-tapping screws (they bought 500,000 and 25,000 respectively). After several months insisting, a CELO sales representative arrived at a compromise: reducing the price in exchange for a tour of the factory one morning. Our sales representative saw what he suspected, they were using the 2.2 X 9.5 mm screws to hold the cover in place and the 2.9 X 13 mm screws for those that stripped the thread. At the end of the production line, they checked the fixing and were reprocessing up to 10% of the parts!

He proposed to change the screw type to 2.3 X 10 mm CELOPLAST screw. The thread stripping problem was solved; the quality checks and reprocessing disappeared. Thanks to the CELOPLAST screws that reduced assembly costs equivalent to twice the value of their annual screw purchases.

CELO complied with its compromise to reduce the prices of its self-tapping screws. Unfortunately the head of purchasing never bought self-tapping screws again and benefited from the huge cost reduction they achieved by changing screw type.

14.6 Audio tapes offer!

An audio tape manufacturer had to make an offer to a distribution company and needed to reduce costs to maintain margins. Given that the assembly line was automatic, he thought that the alternative was to ask his suppliers to reduce prices. He obviously asked CELO that supplied a special screw for plastic.

The client was surprised to find that instead of receiving a good offer he was offered an alternative screw: a Trilobular™ PUSHTITE® II screw.

Just by changing to a Trilobular™ PUSHTITE® II screw type, assembly time reduced and productivity increased by 500% (from 100 tapes/h to 500 tapes/h).

No matter how much CELO had reduced the previous screw prices, they would never have compared to the economic advantages offered by the Trilobular™ PUSHTITE® II screw regarding production cost reduction. They accepted our client's offer.

Unfortunately, CD's are free of screws!!!

14.7 Changing form metal to plastic parts without thinking about the screw

A water pump manufacturer developed a new model made from plastic with a fibreglass charge. Their technical department decided to base their development on an earlier model made from die cast aluminium. The advantages were obvious: the fibreglass plastic had similar resistance, was non-corrosive and above all, was a lot cheaper to inject. The final model was developed with tin inserts and held by an M5 screw.

When the project arrived to production, they realised that using inserts increased injection time greatly and consequently costs. Moreover, the screw loosened due to the vibration making pump air-tightness impossible.

The case arrived to the CELO technical department. The proposed solution was a 5 mm REMFROM® screw. However, we had serious doubts about suitability as the design depth was limited to 7 mm (1.5d), where the recommended was 2.5 to 3 nominal diameter.

Our laboratory tests showed that pull out resistance was greater than the screw / insert option, even greater than a metric screw thread inserted into aluminium. The vibrational loosening problems were solved with the special REMFORM® screw thread in conjunction with an over-dimensioned screw head.

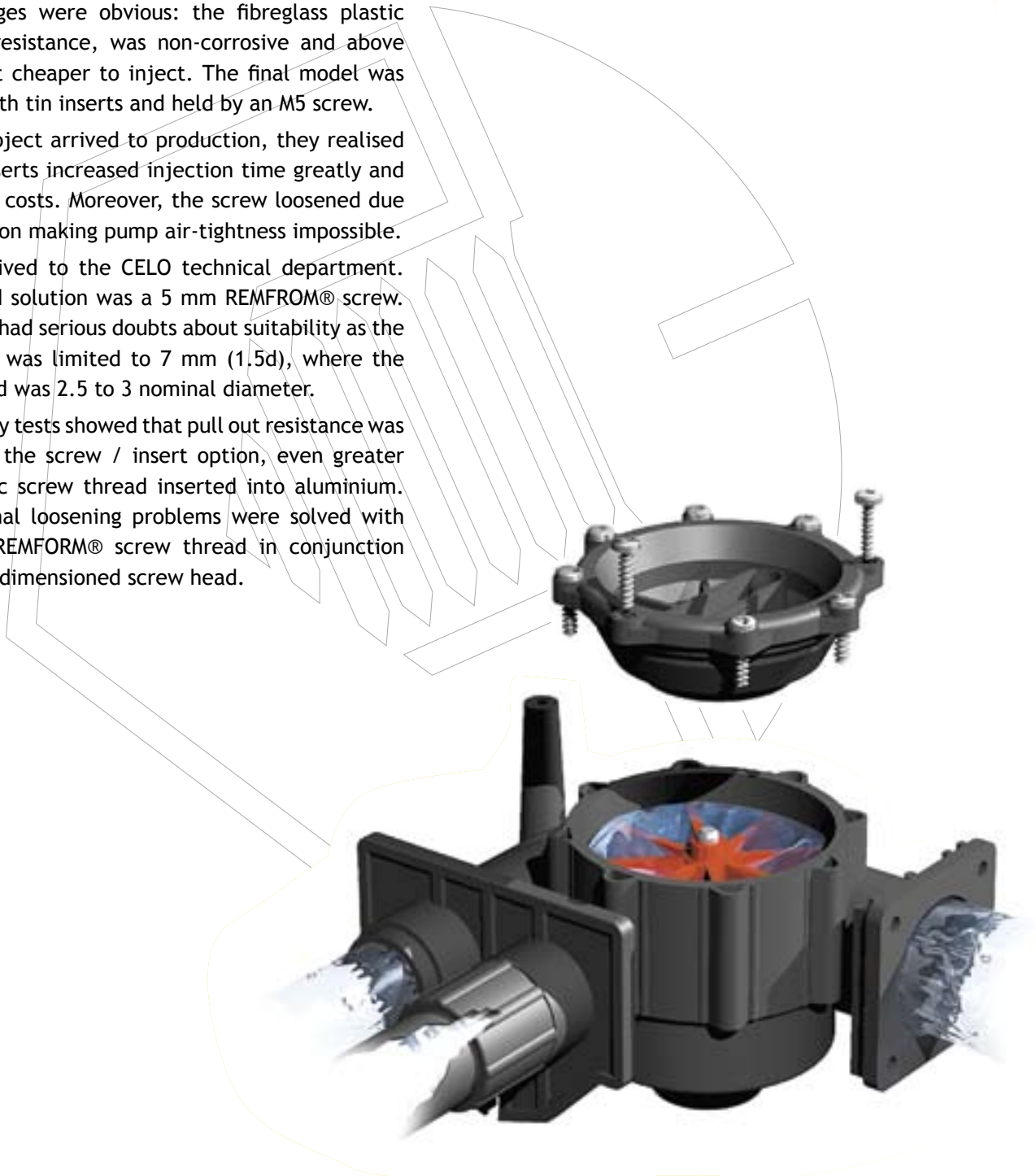

Figure 51
Screw distribution in the water pump made from plastic charged with fibreglass.