Precise rubber compounding to the last gram

‘Drastically reducing the loss potential’

Ruma Rubber in Hoogeveen, Holland, manufactures rubber and specializes in rubber-sheathing of metal cylinders. “This job requires a lot more precision than the customer might think,” said Ruma Rubber plant manager, Mr Korhorn. “This can result in a whole series of consequences, and we have been known at times to come up short with regard to the rubber. That’s why we first precision-measure the cylinder and then make up just the right amount of rubber for the job.”

To the layman rubber is just rubber. But in this business, nothing could be further from the truth. Rubber is naturally a yellowish, flexible substance, yet it is of little use without further processing. This applies to the many industrial applications for which rubber is still manufactured. In practice, the material has to satisfy a large variety of exacting physical requirements. Many applications require rubber formulations that are resistant to damage from heat, water or chemicals. The range at Ruma Rubber extends to around 250 different types or grades, depending on the additives used. Moulded components like caps, bushes, rings and sleeves are manufactured from various rubber grades; however most of the rubber manufactured by Ruma Rubber is used for the rubber-sheathing of steel cylinders.

Blending is precision work

Industrial-grade rubber manufacturing is done on the basis of a set formula. Exact specifications define which additives are to be added to the rubber to make it suitable for a specific application. Blending the raw materials in the yellowish rubber mass is precision work and requires considerable time and experience. “In order to ensure that the compound has uniform consistency,” explains Ruma Rubber’s department head Mr Neutel, “the basic rubber is pressed into a flat slab on a cylinder and the necessary oils and powders are added diagonally and crosswise. A homogenous blend satisfying the final specifications is created by constantly slicing through the rubber and rotating it.”

When profitability is at risk

When a customer’s cylinder needs a new rubber sheathing, he tells Ruma Rubber which specifications the rubber sheathing has to satisfy, what the surface area of the cylinder is, and how thick the rubber sheathing has to be, so that it will last for a couple of years. The surface area multiplied by the thickness of the sheathing gives the sheathing amount and, by applying simple arithmetic and a conversion table, Ruma Rubber knows how much compound of a particular rubber grade is required for a specific cylinder. That sounds easy and actually would be if it weren’t for the fact that the customer’s measurements some-
times leave a lot to be desired. “Applying a new rubber sheathing to a cylinder is done in a single step,” explained Mr Korhorn. “The machine that does this makes a small continuous strip out of the rubber compound which is applied to the steel cylinder like a never-ending spiral. If the rubber runs out before reaching the end of the cylinder, the entire sheathing has to be discarded and we have to start all over again. Extending the strip by fusing it with another strip is not possible, neither is adding more rubber, due to the process employed. The same applies to manufacturing the product for warehousing as most rubber grades ‘spoil’ or vulcanize after a certain amount of time. On the other hand, you don’t want to overdo it by making too much, because then you run the risk of not making a profit. For a long time we relied on the figures we received from the customer. Unfortunately we frequently paid dearly for this as a result.

Sometimes a cylinder just wasn’t properly precision-measured, or the steel core was narrower in diameter than the customer had figured. When you supplement a core like that with rubber in order to obtain the necessary thickness, you don’t realise, until you get down to work, that you need more rubber in order to compensate for the imprecision. This is why you come up short with the amount of rubber. This is made all the worse by the time and money lost and the costly raw materials wasted.”

Weight

The employees at Ruma Rubber are so experienced that many errors are detected at first glance; but not every time. In order to put an end to this risky and frequently costly situation the company decided to no longer rely on the customer’s ‘unerring’ eye. They decided to focus on the changing and difficult-to-gauge raw material consumption. Using the existing arithmetic figures and the resulting volume, the required weight of rubber required can be calculated on the basis of the specific weight of a rubber compound. This weight is an absolute measurement which doesn’t change. So the decision was made to join forces with METTLER TOLEDO in solving this problem. After all, METTLER TOLEDO had been supplying the company with weighing equipment for years, equipment which had served Ruma Rubber well.

Mr Korhorn said: “METTLER TOLEDO’s solution was simple and right on target. They combined pallet scales with a machine which applies the rubber sheathing to the cylinder. The machine runs along the revolving cylinder over a rail. The pallet scale had to be put on a rail too so that it could keep abreast with the machine. A large box is placed on the pallet scale. It contains the computed weight quantity of rubber required to sheathe a particular cylinder, which is fed as a loose strip by the machine screw. The pallet scale actually functions independently of the machine and is connected to a Spider weighing terminal. It is zeroed before starting the sheathing process. During the process rubber disappears from the box and a negative weight appears in the display. This negative weight continuously indicates how much rubber has been consumed. This is crucial information because this way we can always tell how we stand regarding raw materials. This has also resulted in a pleasant side effect – we can tell at a much earlier stage whether our calculations were right and whether enough rubber was provided for the job.”

Complete satisfaction

At the time of this interview, the facility had been in operation for approximately three months, to the complete satisfaction of Mr Neutel and Mr Korhorn. There are no concrete figures available as yet, but it is already evident that Ruma Rubber can easily rubber-sheathe cylinder after cylinder with high-grade rubber, using its own measurements and on the basis of a precision-determined weight.

“We used to have to rely heavily on experience and ran the risk almost every day of cylinders being rejected,” said Mr Neutel. “Now we have much better control of the process thanks to a relatively simple weight application. There are hardly any rejections to speak of any more and we have been able to optimize raw materials consumption because we can precision-manufacture exactly what we need. It’s too early to make any conclusive statements, but this change looks as if it has more than served its purpose.”

During the production process, rubber is removed from a box on the pallet scale and a negative weight is shown in the display. This negative weight continuously shows Ruma Rubber how much rubber has been consumed, so it always knows where it stands with its raw materials.