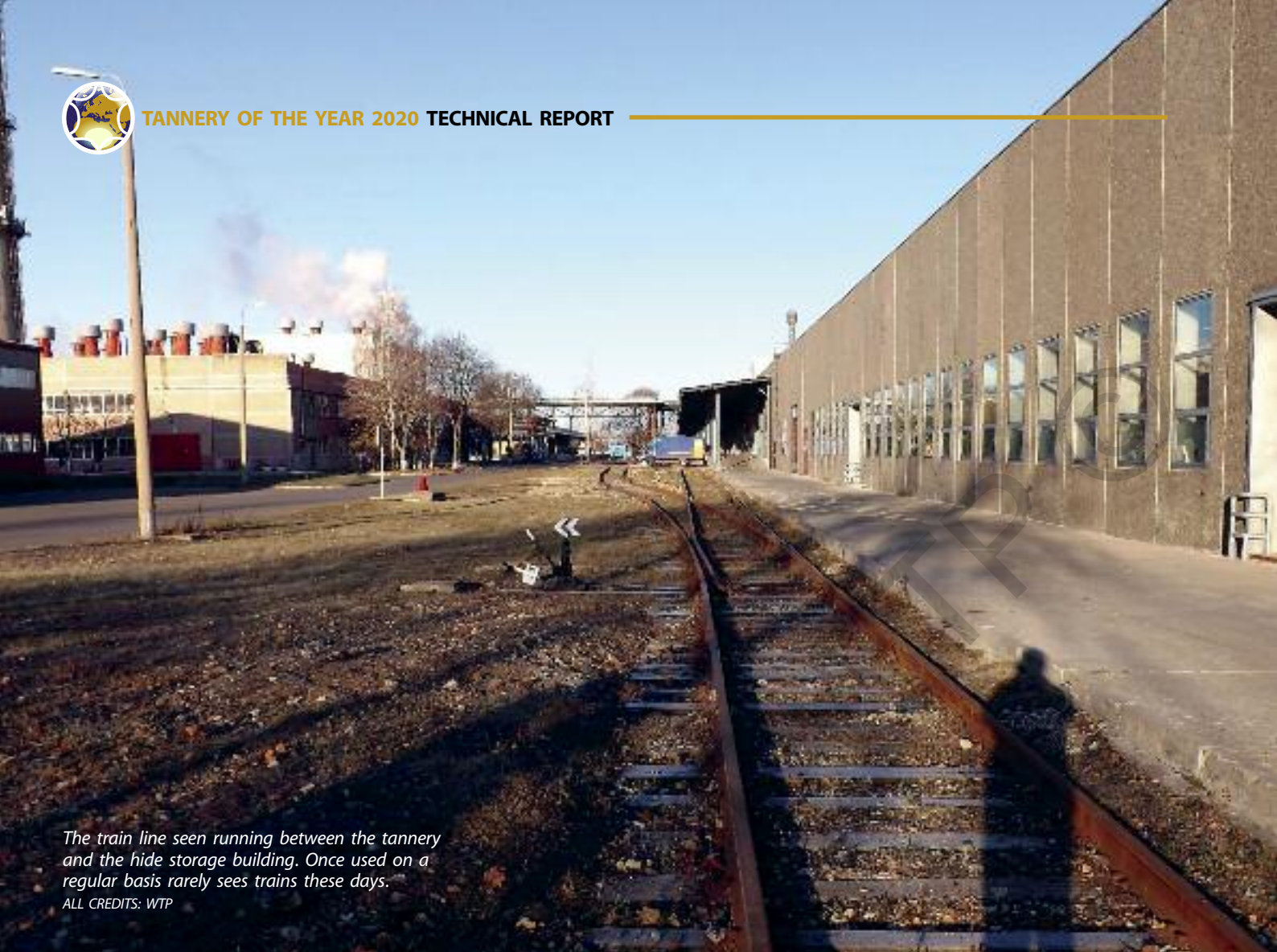




The train line seen running between the tannery and the hide storage building. Once used on a regular basis rarely sees trains these days.

ALL CREDITS: WTP



Russkaya Kozha Technical report

Russkaya Kozha operates from a purpose-built tannery on the outskirts of Ryazan, having moved there in 1990 from close to the centre of the city. With the aid of Italian guidance, the 480,000 square-metre tannery was built over a period of four years. At the time, it was the largest tannery in the world. With a production capability of 5,000 hides per day, the tannery purchases the vast majority of its wet salted hides from domestic sources. As with all processing of raw materials, these are brought in on trucks but there is still evidence of when they were brought by train—a railway track runs into the complex. First impressions are the vastness of the facility, which is split into four distinct parts, these being the administration offices, the tannery itself, the raw hide store and finally the boiler house. There is also a furniture manufacturing operation on site using leather produced by the tannery and the furniture is sold under the group's own brand names.

Manufacture and processing:

Unlike many tanners who purchase a specific hide weight range, Russkaya Kozha purchases material from many different sources and does not specify a particular weight range. As a consequence of the wide-ranging raw material types, the tannery takes a cluster-like approach to its operations because not all hide types are suited to all the finished leathers it seeks to make. On receipt, the hides go through a de-salting process, through a slatted tumble drum prior to sorting and grading. At this stage they are inspected for damage, mostly holes, but also cuts and instances of poor flay, stamped to identify the grade and then segregated into weight categories for the various leather productions – they also separate out the ox and cow hides.

A certain proportion of the hides is sent for immediate processing with the remainder being re-salted, and stored safely for later use, and the routine for this is computer-controlled. The raw stock it



holds allows for up to two months' production; depending on demand this roughly equates to 1,000 tonnes of salted hides. More recently, the requirement for larger hides with better quality has led to the import of hides from around the world but this still only accounts for around 1-2% of the total. That said, the improvement in animal husbandry within the country is leading to better quality being seen. The tannery has recently started to work small skins, too, with a capacity of 5,000 sheepskins per week. The majority of these are brought in from Australia and New Zealand but there is also a proportion of domestic skins used – both double face and full grain leathers are produced from these. All the hides and skins are stored in a separate building from the tannery.

The tannery itself is divided into zones where the various processes are carried out. The pre-inspected and weighed hides are loaded into one of the 60 wooden liming drums, all 3.5m x 4.0m with a capacity of five tonnes, using a mechanical grabber and firstly soaked to rehydrate and remove the remaining salt. They undergo a traditional hair burn unhairing system followed by liming and, depending on customer demand, will go for either chrome or chrome-free tanning. Currently this stands at a 90:10 split. In all cases, the drum processes are carried out in elevated drums, positioned back-to-back with mezzanine access down the middle. Chemical additions and water dosing are done from a centralised location using a computerised waterfeed system with the ability to also dose certain liquid chemicals. The remaining chemicals are manually added to the drums via the central access floor.

The hides are fleshed by means of an elevated throughfeed fleshing machine where the limed hides, having been dropped into a hopper from the lime drums, are transferred to the operatives via an automated clip-and-chain system. After fleshing, if required, the hides are lime split with the grains going for inspection and tanning. The limed splits are sent away for protein recovery.

The chrome waste liquors go for recycling. The recycled chrome, blended with fresh chrome, is utilised in the tanning process in the proportion of 25%.

The chrome tanning process operates with 45 Hüni drums. After splitting, the hides are sided and shaved to different substances. They are also trimmed of extraneous material, made easier for the operative by a simple raised revolving table, allowing the sides to be turned with minimal effort. The substance of finished leathers depends on the size of the hide and customer requirements. The size and quality of hides determine a finished article: full grain, corrected, suede and others.

At present about 90% of production is for shoe and boot upper leathers, with the remainder going for upholstery (furniture and aviation) with a small amount for garment, fashion suede and industrial gloving. Future plans are in place to decrease the boot and shoe leathers and increase the upholstery leather production.

The wet blues sides or hides are then transferred by box hopper to the dye drums. Previously done in traditional wooden drums, there is evidence of recent investment here—in the dyehouse there are 46 Italprogetti polypropylene drums, all measuring 3.2m x 2.0m with a 1.5–2.0 tonne capacity, again arranged back-to-back in an elevated position. The processes are understandably varied. Production is then taken through the drying operation. Having been samm-set, drying is initially by vacuum followed by toggling frames or elevated pole conveyors. Depending on leather type, softening is carried out with throughfeed vibratory staking machines and the



Proprietary leather chemicals are brought in from major suppliers in Europe and the rest of the world and held in well organised stock rooms. In general, approximately one month's stock is held at any one time allowing for transportation issues.



Hide inspection and grading identification on purpose-built lighting stages. It was noticeable that the hides were quite small but looked clean of dung suggesting good animal husbandry. The grade stamp is noted in the adjoining small office and entered on the computer system.



One of the banks of Hüni tanning drums all safely protected by optical 'magic eye' safety guards that isolate power, stopping the drum should personnel get too close to the drum whilst it is revolving.



The accredited laboratory – currently set up for testing the tannery process wastewater at various stages in the clean-up operation. The laboratory has full facilities for physical and chemical testing and performs its own flammability testing.



Through feed sampling of the wet blue is immediately followed by further measurement and grading. One person enters the information on a computer system providing live data.



Throughout the tannery, visual examples of defaults are highlighted on "walls of shame" and the pictures show what needs to be avoided, what has caused it and what to do if it is encountered. These types of boards are used for internal training and can be updated quite easily.

use of dry milling drums. Other than the conventional drums, two of the 20 are of octagonal design which are currently being trialled to assess the differing properties they may offer.

In the finishing zone, banks of Barnini automatic finishing lines and Gemata roller coaters stand side by side. The set-up allows for full finishing or, by use of removeable conveyor, a partial operation. In a sealed room off to one side, Gemata has supplied a purpose-made machine for patent leather manufacture and, unlike the rest of the tannery, this sealed-off room has no forced air heating in order to keep dust and particulate matter to a minimum – essential where patent leathers are concerned.

After the various roller and spray-coat processes, the leathers can be embossed and plated through roller presses or O-presses before final inspection, trimming, measuring and dispatch. Where the leathers are destined will dictate their packaging, with domestic sales being rolled and plastic wrapped whilst export leathers are palletised and, in most cases, colour coded with different packaging. To account for customer demand a strategic stock is stored and dispatched when required.

The small number of sheepskins are processed in a separate part of the tannery employing raised paddles and small hide processors. Most of the skins are made as double face and used in footwear as well as fashion leathers.

The tannery has a fully functioning pilot plant for all aspects of leather manufacture for development and trial work and has a busy diary whereby chemical suppliers take regular slots to trial new products. It also allows the technicians to train and learn more about the processes being implemented.

Throughout the processing, the parameters are closely monitored in the accredited laboratory. Whether this is testing the wastewaters from the effluent treatment plant prior to discharge to the municipal sewer or physical and chemical testing of the leathers produced. The company also offers its laboratory service to other tanneries and users and has very strong links with TFL, who set up the laboratory. Quality is also of paramount importance with visuals boards visible in most departments relating to what issues must be avoided.



One of the two six-metre-deep 120m³ wastewater holding tanks. The system was designed and installed by Italprogetti and occupies a space close to the far end wall of the tannery, closer to the main effluent treatment plant. There is very little smell in the whole area and the owners are rightfully proud of the investment.



Waste management:

Their aim at the start was “Waste to Revenue”. This is clear around the plant. All solid wastes in one form or another complement this mission:

- Wet salted trimmings sold for gelatine production.
- Limed fleshings rendered for fat.
- Wet blue trimmings sold for further use.
- Shavings sold for animal feed.
- Salt from hides used for road deicing.

They also actively look to sell any other wastes that might be useable to others, including waste pallets, wool and even polypropylene and polyethylene bags.

Reuse and recycling:

From the initial soaking and liming operation, the wastewaters are sent to the water recycling plant—a \$1 million investment. First, the liming floats are filtered then collected in an equalisation tank and after that repumped at constant flow to a settling basin, where settleable and floating solids are separated and removed. For the avoidance of odours, not only are all the handling tanks covered but they are continuously purged by a centrifugal fan. The sucked airflow is conveyed in a wet vertical scrubber with two vertical treatment steps (oxidative-alkaline and acidic) for the maximum removal of the molecules that can generate unpleasant odours.

Chrome liquors are segregated and sent to the chrome recycling plant. After filtering and precipitation, a series of four filter presses dewater the sludge and the chrome ‘cake’ is then ground up and acidified and held in 50m³ tanks ready for reuse.

Energy and water:

Process water for the tannery is drawn from both municipal supply and from the company's own wells.

All of the steam generated for production is by gas-fired boilers and the electricity is provided by the national grid. ⚡



The processing of sheepskins, approximately 5,000 per week, in a newly constructed area within the tannery. Although separate to where the hides are processed, the waste waters are treated together with the soak liquors being reused after primary treatment.



One of the many Barnini 12-gun oscillating automatic spray machines in a full finishing line set up for one of the boot upper leather productions.



One of the four 100-plate filter presses used for precipitated chrome sludge cake production. The cake is hoppered into a macerator prior to acidification.



25 tonnes of limed fleshings are treated every day and from this approximately 90 tonnes per month of industrial fat is produced and sold for use in soaps, cosmetics and animal feeds. The resultant waste cake is used for fertiliser whilst the water goes back through the effluent treatment plant. This is also an excellent reuse of barrels that contained the processing chemicals.