

Clever computer control cuts energy waste

There is a disproportionate energy waste from leather finishing, which has prompted Italian finishing plant specialist Gemata to take a close look at the equipment involved, together with its operation.

By their very nature spray finishing lines, with their various electric drives along with the deposited product drying requirement, consume a great deal of energy. Unfortunately the very concept of such systems is inherently energy-inefficient, resulting in a high rate of waste of thermal and electrical input.

Nevertheless, Gemata has been able to develop a computer-managed control system capable of saving up to a quarter of the electrical load and nearly half of the installed thermal energy, all without fundamentally modifying the machinery or the process. This is to say that neither leather quality nor line throughput rate is in any way adversely affected.

The newer but now long-established roll coater leather finishing technique also needs to be brought into the frame. In itself, the adoption of roll coater finishing lines of course has led to changed or improved leather quality, as well as to higher productivity of the process, but it also substantially reduces wasted energy. The Energy Saving Computer management program can also play a further role when applied with finishing lines based on roll coating machinery.

In this context we can report on another finishing process recently introduced by the Gemata company rationalising colour and top coating by employing roll coaters. In addition to labour saving and higher throughput capacity, compared with the traditional spray method used for the purpose, very substantial reductions of inputs across the board are indicated by the company. Summarising these, usage of finishing products shows a reduction of 60%, electric power consumption is reduced by 70%, compressed air requirement is 95% less and washing water usage drops by 75%. Discharge of

contaminated effluent is completely eliminated, hence zero scrubbing and treatment costs.

Noteworthy is the reduced noise emanating from this production line compared with spray lines. From a leather quality point of view the frequently experienced dust problem with spray lines is also eliminated.

A brief insight into the computer managed control system explains how such

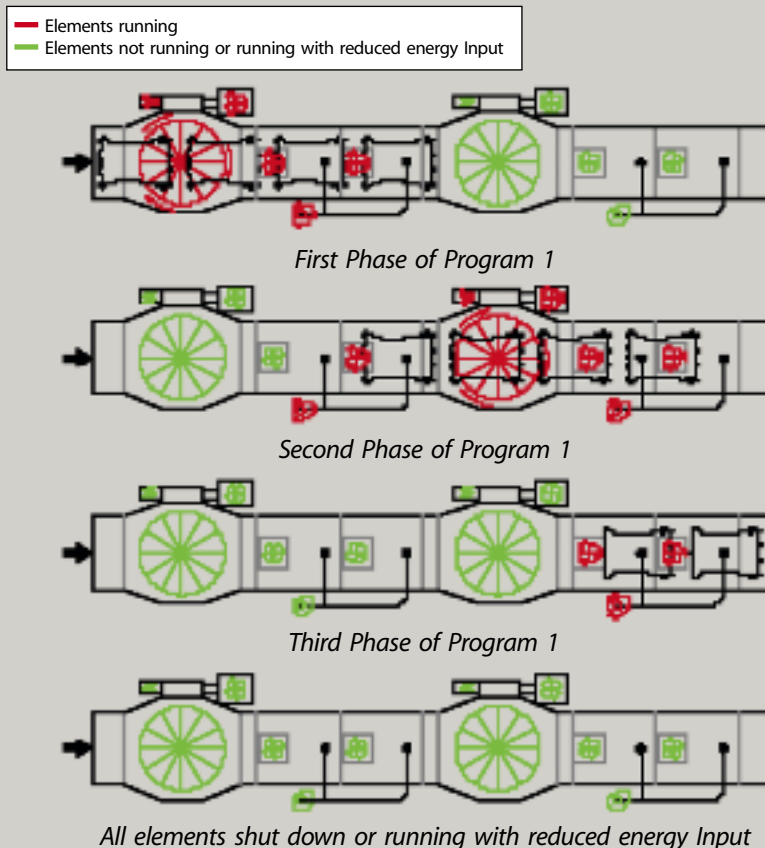
high levels of energy savings are achieved on spray lines.

There are two main programs that the line operator may select, one used where the line stoppage event is of short duration and the other catering for a longer interruption of the process.

Program 1

When dealing with a short stoppage, the program switches to inverter-controlled

Panel 1: Schematic of the Spray Line Energy Saving System





carousel rotation and stops the water curtain pumps of the first spray cabin of the line. The first gas or steam heated dryers are maintained at operating temperature as set.

Drying tunnel fans driven by pole-change-type electric motors are switched to lower speed, other types of motors are also switched to lower speed by means of inverters for minimum absorbed power. Exhaust fans and the heat recovery system of the drying tunnel airflow are stopped. The remaining spray cabins and drying tunnels are then sequentially stopped. The chiller cell continues to be normally operated.

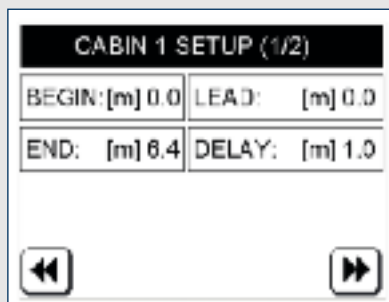
This is shown in *Panel 1* schematically by the diagrams.

Program 2

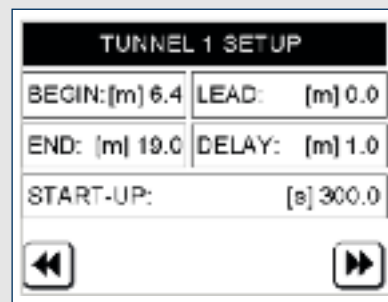
After the last leather piece has left the line, and a longer interruption of the process occurs, all functions of the first spray cabin are stopped. Gas heated dryers only keep pilot lights in standby mode. Steam heated dryers have their modulating valves closed, shutting off steam. Pole-change-type electric fan and chiller motors are switched to lower speeds; other types of motors are also switched to lower speed by means of inverters for minimum absorbed power. The conveyor belt is stopped, as long as the string scraper unit remains stationary.

To re-start the line the operator activates the reset button located at the leather feed-in station, changing from Program 2 to Program 1; the chiller unit starts first and gas-fired tunnel burners are commanded to restore the set temperature; steam-heated tunnel modulating valves would be

Panel 2: Computer displays



Example of computer display of programmed initial and final position – also lead and delay timing.



Example of computer display of element timing.

Panel 3: A breakdown of energy savings

Electric power - Program 1	25%
Electric power - Program 2	12%
Thermal energy - Program 1	43%
Thermal energy - Program 2	3.8%

(Figures supplied by Gemata)

commanded to re-admit steam in order to reach the set temperature. The first spray cabin carousel starts rotation and, when the first leather arrives, scrubbers, water curtain pumps and tunnel ventilation are sequentially reactivated. Exhaust and heat recovery are also reactivated. The remaining carousels start rotation. A “wake-up cabin” is provided at each spray cabin to re-start scrubbers, water curtain pumps and

carousels to enable the line operator to test all required elements before commencing the work cycle. Normal line operation is then resumed.

A diagram of an efficient exhaust scrubber can be found in *World Leather* August/September 2008, page 57. The heat recovery system is explained in a diagram published in *World Leather* December/January 2008/2009, page 44. *TMM*

Panel 4: Inverter Controls



Inverter Controls of Exhaust Fans

Inverter Controls of Airflow

Inverter Controls of Conveyor

