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*When creating masterpieces,
high accuracy and uncompromised expertise are a must.
With our 40 years of experience in CD-profiling solutions,
you can be sure that your processes deliver
the highest paper quality.*

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CD profiling upgrades lift quality, prolong lifecycles of papermaking assets

Mill cases show how improved uniformity and competitive position or lower profiler maintenance costs can be achieved with new or replacement actuators and controls

By **Mark Williamson**, Journalist Engineer

Without question, world-scale commodity paper or board machines built in the last twenty years or so are universally equipped with the most modern CD profiling equipment. However, there is a significant fleet of smaller paper machines – including some specialty grade machines – which may need an upgrade in quality to keep competitive in their niche markets. Rather than an expensive machine rebuild, an upgrade in cross-direction quality profiling is often needed to achieve a step change in quality uniformity from existing production assets such as headboxes, press sections or coaters. This investment decision can extend their productive lifecycles, thus extracting maximum value from the same equipment.



Figure 1. 19 actuators were installed on both the top and bottom sheet sides at Burgo's Sarego mill.

On the other hand, the profilers built into machines of the 1990s are getting a little old. As a result, maintaining their performance becomes increasingly expensive. These legacy profilers are candidates for new actuators to extend their lifecycles without expensive replacement.

Whether extending the life of papermaking equipment or that of profilers, new or replacement profiling actuators and associated controls are a profitable purchase.

Since the solutions involve adapting to a wide variety of papermaking equipment (and, in some cases, existing profilers), a supplier of replacements or upgrades must adopt a flexible approach where some custom and supply-to-fit engineering is required. Some of the case studies presented here illustrate the reasoning behind papermakers' decisions and how improved quality or lower maintenance costs have been achieved.

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CASE STUDY 1

BURGO IMPROVES COATING UNIFORMITY

In a quality-focused case, the Burgo Sarego mill in Italy purchased 38 Tasowheel automatic CD actuators (19 per side) for a twenty-year-old Voith SpeedSizer film coater on the mill's single production line. Previously, the profiles were manually controlled. The 3.36 metre width machine produces 150,000 t/y of coated woodfree grades with grammages from 100 to 200 g/m².

CD PROFILING

Tasowheel has provided more than 200,000 OEM cross-direction actuators and dilution valves to paper machine manufacturers and control system suppliers for over 30 years. Now, they are supplying either standalone CD control systems with actuators, or providing actuators and control system solutions by partnering with local, experienced system integrators. In this case, the partner was the Italian Tecnerga company.

The mill expected to improve both the top and bottom side profiles, and then increase the coating weight. The potential cost savings were an important part of their ROI projections. Burgo was familiar with Tasowheel from a project at their Sora mill: there, Tasowheel had equipped a Valmet coater with new actuators. The interfaces to the existing quality control system and the implementation of the CD control in the existing control system were handled by Tecnerga.

The mill staff report that, after several months, they find a better appreciation of their paper quality from their customers

BETTER THAN GUARANTEED
The project guarantee for coating profile improvement was 30%, but that goal was surpassed substantially by a 50% improvement in 2-sigma CD variation (see Figure 2). This quality improvement allowed a substantial increase in coating weight, thereby giving leverage for a return on investment. The mill staff report that, after several months, they find a better appreciation of their paper quality from their customers. The improved control

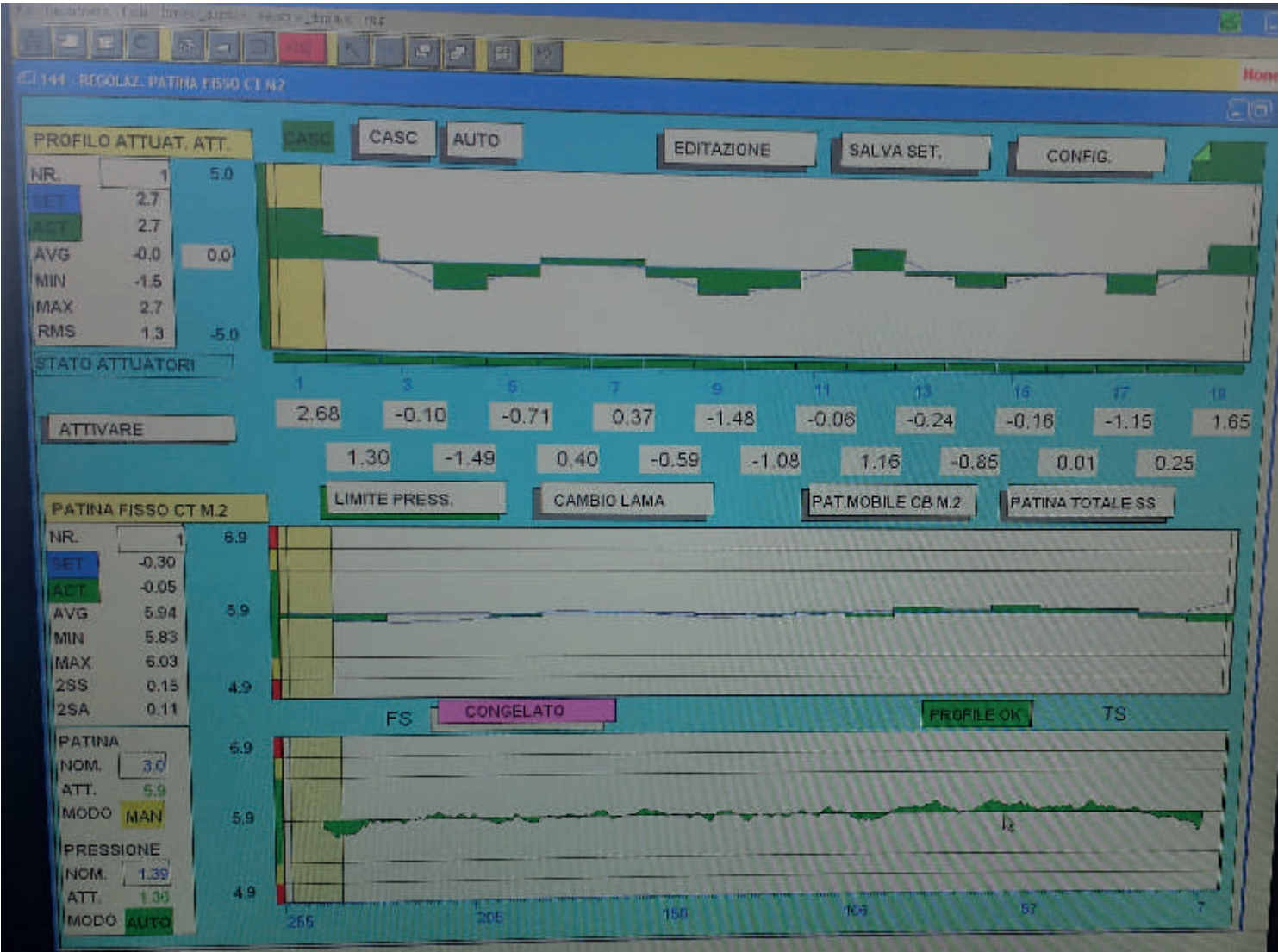
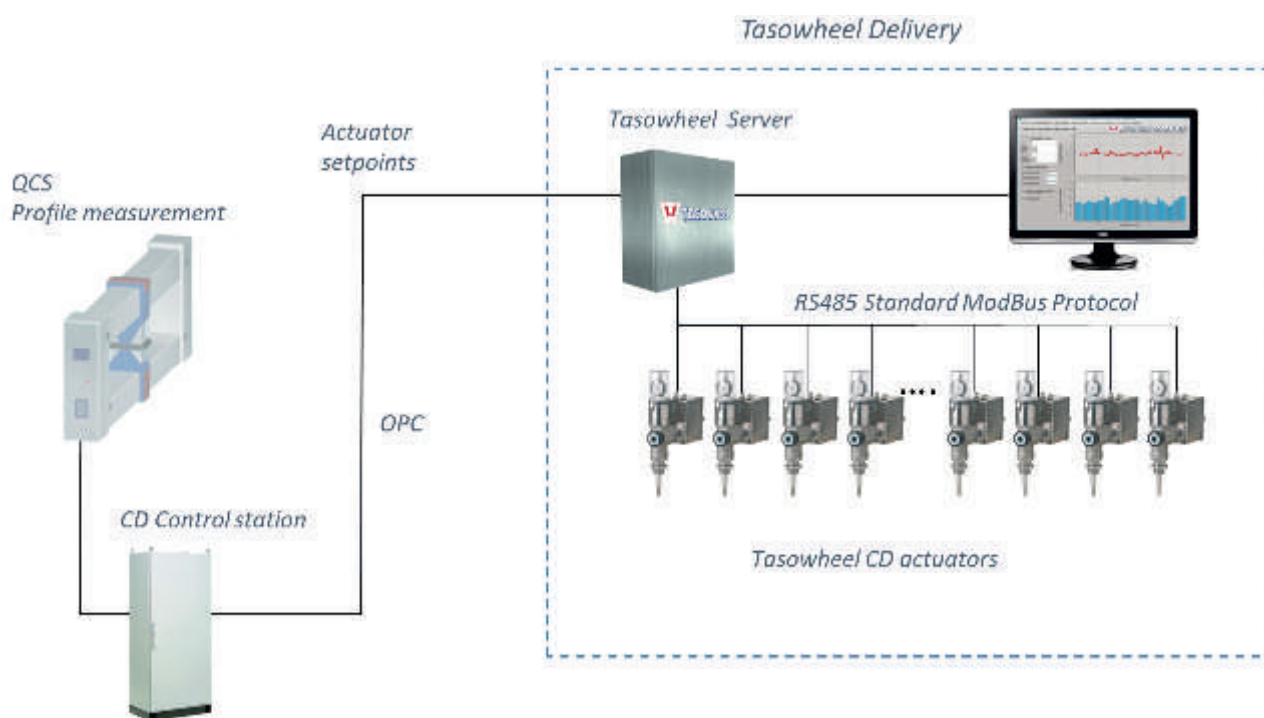


Figure 2. Coating (patina) profiles have been improved by 50% at the Burgo mill.



The paper mill did not consider a new headbox since the existing one provided good formation, so they relied on the profile control solution to improve the quality uniformity.

Figure 3. The Swiss Quality Paper installation.

over coating profiles and quality has also added to machine productivity in the form of faster grade changes and reduction of processing waste.

CASE STUDY 2

REJUVENATED HEADBOX

While Burgo targeted an improved performance of the coating stations, a specialty paper mill upgraded the grammage profile control capability of an older, manually-controlled open headbox by installing slice profile control actuators. The project included a link to an existing scanner and a new profile control system provided by a local partner. The old manual slice actuators were replaced by Tasowheel Forte-25010 high force motorised actuators. This actuator was selected because of the rigid slice lip construction. The actuator provides up to 35kN linear force, which was an optimal solution to ensure sufficient bending power of the lip and good CD control results.

The focus of the project, commissioned in January, 2017, was to meet end-

user quality needs and establish a high-level competitive position in the company's niche market. The paper mill did not consider a new headbox since the existing one provided good

formation, so they relied on the profile control solution to improve the quality uniformity.

Cross-direction weight variation has

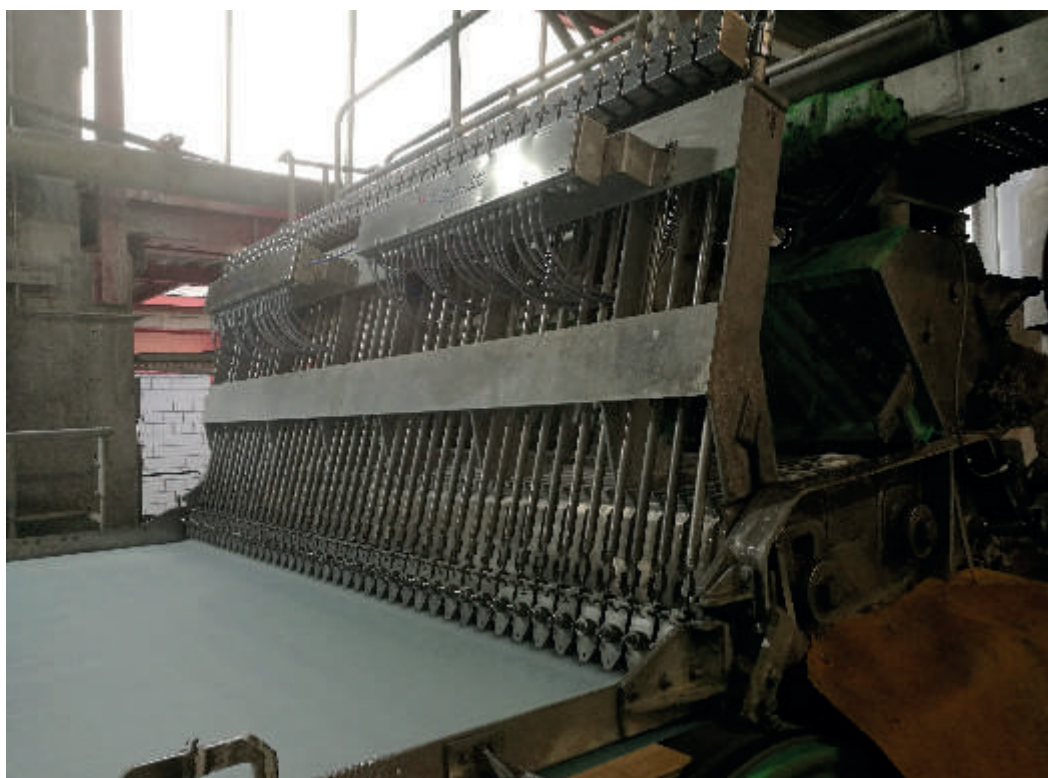


Figure 4. Swiss Quality Paper's PM3 slice actuators.



Figure 5. Original steam profiler actuators.

been reduced by over 50%. Profile 2-sigmas are as low as 0.6% - considerably better than the typical industry benchmark of 1% for CD control performance. CD grammage improvements often have a “knock-on” impact on downstream process operations, and this case is no exception. Before the CD weight control, the control range of the calender was limited, but it became more controllable afterwards, leading to improved caliper and surface finish profiles. Quality rejects are down by 10%.

CASE STUDY 3

IMPROVING RELIABILITY, CUTTING LOSSES

While some papermakers have seen the benefits of moving from manual

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to automatic control, others may need to tackle profiler reliability problems that come with age. Also, a supply of spare parts to keep them running may be hard to find. For example, Swiss Quality Paper in Balsthal, Switzerland recently started up a replacement cross-direction slice actuator system on PM3, with 42 motorised actuators and control cards supplied by Tasowheel Systems. As shown in Figures 3 and 4, the system server interfaces to the existing QCS system through an OPC link. The 23,000 t/y PM3 produces specialty papers for adhesive tapes in different colours and shades, fine paper for cigarette filters and hygiene papers.

The new actuators replaced aging

twenty-year-old actuators, originally supplied with the headbox in 1996. They were no longer operating trouble-free and were causing production losses. The start-up in January 2018 was successful in solving the profiling problems whilst also eliminating the production losses. Mill personnel estimate the return on investment will have a payback period of twelve months.

CASE STUDY 4

DILUTION VALVE PLUGGING ELIMINATED

In some upgrade cases, less is more. For example, Papier und Kartonfabrik Varel in northern Germany wanted to improve CD profiling by upgrading from manual to automated dilution control on board machine KM3. This was part of a headbox modernisation project. The dilution valves are now flushed automatically in groups, which helps to prevent congestion. With plugging in the valves eliminated, production breaks have been reduced. The improved profile control makes the stacking of the sheets on pallets better. That, in turn, is beneficial for transportation. By installing only what was needed, Varel was able to save on costs and also space.

CASE STUDY 5

STEAM PROFILER UPGRADED

During the latter part of 1990s the market for steam profilers was at its peak, but many of those original investments are now starting to show their age. Some actuators are failing at an accelerated rate and the cost of maintenance is getting high. Tasowheel now offers a solution for those ageing profilers to bring their performance and reliability up to an expected standard. Most importantly for papermakers, a retrofit actuator



Figure 6. *New Tasowheel STA-1015 actuators.*

solution extends the service life of older profilers and reduces the cost of maintenance. Moreover, the retrofit with new, improved actuators can be done at a considerably lower cost than a complete rebuild of older actuators.

A major European newsprint manufacturer has seen the benefits. A steam profiler, installed in 1999, was showing its age and many of the actuators were failing regularly in the high temperature environment. Their replacement was a maintenance burden every six months when the profiler was taken out and overhauled. The 114 obsolete actuators were replaced in-situ with new bolt-on actuators that had been designed to perform reliably at high temperatures. The new Tasowheel STA-1015 can

replace old model electromechanical steambox actuators types (EMA15, EMA1000 and STC900). The customer noted that the new actuators fitted perfectly with the same, originally-installed connections and gaskets.

OVERHAULS EXTENDED

The customer reports that the replacement cost was considerably less than alternative solutions since no original-design replacement actuator was available. Overhaul of the entire old actuator set was possible but would have required considerable downtime, manpower and lost production.

With the reliability problem solved, the mill staff extended the steam profiler

overhaul cycle to two years from the previous six months. This means lower maintenance costs and a longer lifetime with better reliability for the profiler.

CASE STUDY 6

ZONE-BY-ZONE

While some papermakers opt for a one-shot replacement of all actuators, some have replaced them gradually, thereby spreading the costs over a longer period. In the Zone-by-Zone method, CD profiling actuators and dilution valves can be replaced individually or many at a time. This flexible solution allows pulp and papermakers to gradually modernise their system and only replace what is necessary and when. This can extend the lifetime of the CD profiling system and help keep their budgets in check.

Papel Aralar, a manufacturer of specialty paper in Amezketa, Spain, decided to take adopt this strategy whilst renewing the old CD actuators and dilution valves in one of their machines. As is common nowadays, the original spare parts were no longer available; furthermore, renovation was not practical and more costly. As a first step, two new actuators and valves were installed. After testing the new actuators under real circumstances for a couple of months, the customer ordered a change of the next 25 actuators to be made at the turn of the next year.

This gradual approach is also suited to situations where the electronics need updating but the mechanics of the actuators are still in good shape. An electronic upgrade can sometimes satisfy both need and budget!

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**GETTING THE MOST FROM YOUR
PROCESS**

Tasowheel provides specialist recommendations and close customer cooperation for CD profile optimization, upgrades and modernizations. A comprehensive delivery option for a CD control system modernization includes valves and actuators as well as CD profile control systems, including interface to the existing QCS system.



CD CONTROL SYSTEM

Tasowheel CD control solutions are key to reaching and maintaining optimal profiles and control. These goals can be achieved regardless of individual operator skills, which offers more time for other tasks. A successful CD profile means optimization of raw materials and energy, improved process reliability and higher product quality.

Features	Benefits
Automated CD profile control.	Better profile stability 24/7.
Reel summary report.	Key to continued performance improvements.
Automatic profile mapping ensures accurate control in different process situations and varying grades.	Leads to better paper quality.
Graphical views such as color maps.	Allows the operator to get an easy to understand and quick overview of the entire CD profile.

ACTUATOR CONTROL STATION

The Tasowheel actuator control station is a graphic operator interface for optimal actuator control and communication to the QCS. This provides seamless control and offers the possibility to extend the existing QCS system.

Features	Benefits
Raw measurement profiles or control set points from QCS via standard and open interfaces such as OPC or serial link.	Enables an integrated control circuit and communication with any quality control systems.
Rapidly distributes the correct cross-directional control set points to actuators.	Minimizes process disturbances and ensures a very flat cross profile.
Active bending limit follow-up on slice control applications.	Prevents slice lip damage, also in manual use.
Monitors actuator condition and enables easy online diagnostics.	Better runnability and reduced maintenance costs.