A rainbow of colours thanks to mass flow meters

What do a pair of skis, a Smartphone cover and the curtains of your house by the sea have in common? Much more than you might think. Let us find out together with Kiian Digital, the leading Italian company in the field of industrial inks, and Emerson Process Management, technological partner that provided them with the best solution for their process requirements, taking on a challenge where others had thrown the towel

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Kiian Digital is an all Italian success story that summarizes the typical development path of a classical American dream start-up. However, the setting for this story is not a garage, but rather a location that is quite similar in a way.
In 1999, a group of rather obstinate visionaries operating within an established company producing inks for the traditional printing world, set up a small department in a disused area of the premises. Objective: start up the first small scale production of inks to be deployed in the world of digital printing on textiles and other synthetic materials.
The many sceptics, who at first had labelled this adventure as an endeavour without a future, would soon change their minds. Only 6 years later the start-up would break away from the parent group in 2005, becoming an independent company focussed on the whole ink business (not only digital but also traditional) with the support of some investment funds that saw a huge potential.
The rest is history. We all know very well how, in a matter of a few years, digital technologies have pervaded not only our daily lives but also the world of industrial production. In this case, starting from a small improvised lab set up in 1999, Kiian Digital has become a world leader in the production of water-based sublimation inks for digital printing on synthetic materials (mainly polyester) for deployment in the most varied range of applications: automotive, advertising, soft signage, interior decoration, technical clothing, sports equipment, and many more, and of course let us not forget the world of fashion. Operating directly in Italy, where its headquarters are located, in the United States, where it has a second production plant, and in China where it has a branch which is active on both technical and commercial fronts, today Kiian Digital's inks are used to colour textiles and other objects in 90 countries around the world.

1/ A VIEW OF THE KIIAN DIGITAL PLANT IN NOVEDRATE

A wonderful success story which has seen the company progress from the handcrafted production of the first 80 litres of special ink about fifteen years ago to the current production capacity well beyond 1.5 million litres per annum and which are guaranteed by an innovative and unique plant.

A DIFFICULT PUZZLE TO SOLVE… BUT NOT FOR EVERYBODY

Let us take another look at the not too distant past, this time, and go back to 2013, when Kiian Digital launched an ambitious strategic program aimed at supporting another challenging goal: that of increasing exponentially its production in five years, by the end of 2017. Well, it was precisely in the context of this challenge that Kiian Digital and Emerson Process Management met for the first time. Under the coordination of Mr. Umberto Marazzi, the Project Manager, the relevant know-how of Digital Kiian fitted with the expertise of vendors such as Corob and Emerson Process Management.

As underlined by Daniele Busetti, Operations Manager of Kiian's brand new plant in Novedrate (CO), the prerequisite to sustain this growth while continuing to guarantee the best quality had to pass through an equally ambitious project based on a plant equipped with the highest possible degree of automation, in addition to innovative design. Essentially, the challenge that Kiian had to overcome was that of transforming its production from a mostly manual system to a plant that has the capability to automatically dose components directly in the mixer. This had to be done not only without neglecting dosage accuracy, but possibly improving it in order to maintain a degree of error of less than 1% that can guarantee constant quality independently of the amount of ink produced.

A technical challenge that the suppliers of traditional technology, which consisted of dosing systems based on the use of Loading Cells, could not even begin to tackle, so much so that some of them asserted that it would obviously be impossible to implement such a plant using technologies other than systems based on weight measurement. But this was not the case.

It should be noted that Kiian's Italian plant is strategic in two ways. In addition to guaranteeing the production of inks for the European market and part of the Asian market, it is also the centre for the production of the basic product concentrate, the *liqueur d'expedition* - so to speak - which is the result of

3/ THE MICRO MOTION MASS FLOW METERS PROVIDED BY EMERSON PROCESS MANAGEMENT

2/ IN ADDITION TO THE VALUE OF THE MASS FLOW, THE MICRO MOTION FLOW METERS CAN MEASURE VOLUME FLOW, DENSITY, CONCENTRATION AND TEMPERATURE, ALL WITH A UNIQUE INSTRUMENT

Kiian Digital's unique know-how that has been perfected over the years, and which makes its high performance inks appreciated around the world.
In addition, considering that the company's three keywords are *consistency, reliability and quality*, as Monica Cingolani, Kiian Digital's Image & Communication Manager underlines, it is easy to understand how innovation has become the kingpin of Kiian's challenging growth strategy. Indeed, this determines the need for the new plant to be innovative, but also to go beyond and be unique just like Kiian's know-how and the inks that it sells worldwide.
For this reason, but not only for this reason, supplier selection was focused on companies, like Corob and Emerson Process Management, which could guarantee active participation in the project as a partner, collaborating with Kiian's technicians and other suppliers in order to fully achieve the goal. Without giving up.

A FLEXIBLE, ROBUST AND RELIABLE SOLUTION

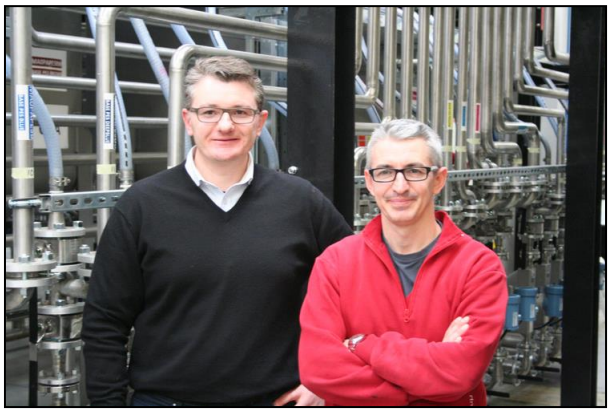
The solution to the puzzle mentioned above was found using Micro Motion mass flow meters provided by Emerson Process Management, in response to the failed attempts and objections raised by suppliers in relation to the feasibility of the system that Kiian Digital wanted to adopt.
Based on the Coriolis principle, which is the physical phenomenon (named after the French physicist who studied it) generated by the effect of an apparent force on a body that is moving in a uniformly rotating reference system, Micro Motion mass flow meters can register a series of accurate measurements directly in line. In addition to the mass flow rate, Micro Motion meters can also measure volume flow rate, density, concentration and temperature using the same equipment.
Totally independent of the type of fluid being measured (liquid, gas, mud, etc.), the factory environment and/or the type of process under control (chemical, food, pharmaceutical, etc.), the mass flow meters prove to be the most flexible, robust and reliable solution for the most disparate measurement requirements as they can be installed anywhere without any need to constrain the flow

4/ A DETAIL OF THE DOSING SYSTEM WITH AN ARRAY OF MASS FLOW METERS

rate, or the straight line pipe geometry that they connect to, or to resort to complicated installation methods (the devices are flanged units) or regular calibration as there is no parameter drift.
Clearly, the possibility to make direct in line measurements drastically improves process times: indeed, thanks to a mass flow meter, you can perform in one cycle operations that previously required two separate processing phases, gravimetric dosage and injection of products into the mixer, thus increasing productivity and availability of the industrial plants.
And that is not all. The principle on which the mass flow meter is based is such that error in measurement is independent of the amount of product going through. This is a feature that, in contrast with weighing systems based on loading cells, guarantees constant accuracy and repeatability irrespective of the amount of fluid measured, be it a few litres or hundreds of hectolitres.
It is thanks to this feature that Kiian has adopted a very advantageous expedient that has rendered plant architecture extremely flexible. Each one of the 50 mass flow meters supplied by Emerson can in fact feed two different dosage production lines: a fully automated one dedicated to large batches, and another which is inappropriately called the manual production line, for the semi-automated production of small batches or samples. This perfect repeatability afforded by the flow meters guarantees that quality remains constant whatever the quantity of ink produced, be it on one production line or the other.

OTHER ADVANTAGES OF MASS FLOW RATE

Micro Motion mass flow meters do not have any moving parts and as a result they do not require any special maintenance: once they have been calibrated, they can guarantee perfect repeatability of measurements (±0.050% of the flow rate). This is in contrast with traditional gravimetric systems that require both periodic calibration of the load cells and the availability of several tools, because their accuracy is a function of the weighing range for which they were designed.
Micro Motion mass flow meters provide flow rate readings with an accuracy between 0.10% and 0.20%. The solution proposed by Emerson Process Management has therefore not only maintained constant and repeatable quality over time independently of the single characteristics of the production lots, but it has also enabled the management of batches within tolerance parameters that are far more stringent than those required by Kiian (by an order of magnitude).
From a production methodology that was prevalently manual, where product dosage was carried out using gravimetric systems and where containers were handled manually, the new plant has therefore enabled Kiian to move on to a completely different production paradigm.
All the phases of the process, from the collection of raw materials, to dosage in the mixers and on to the transfer of the product into containers, are carried out automatically using piping systems and control tools that operate in line, enabling uniform quality over the production of batches that are no longer subject to variability due to the human factor. As underlined by Davide Tomelleri, the manager in charge of plant maintenance and general services, the method reduces the number of variables involved and, in the event of production non-conformance, in a highly automated system such as the one installed by Kiian in Novedrate, traceability allows for focused backtracking to identify the cause and apply solutions without any uncertainty.



5/ FROM LEFT: DANIELE BUSETTI, OPERATION MANAGER, AND DAVID TOMELLERI, MAINTENANCE AND GENERAL SERVICE OF DIGITAL KIIAN PLANT IN NOVEDRATE

EXCELLENCE ALWAYS LEADS TO SUCCESS

6/ A BOTTLE OF KIIAN DIGITAL INK FOR DIGITAL PRINTING ON FABRICS AND SYNTHETICS

The implementation phase of the new plant in Novedrate involved opening a global building site (for building restructuring, systems installations, warehouse set up, etc.) from July to October 2014. There were approximately 100 people who worked on a daily basis for a total of 62,000 man hours which has led to the installation of 47,000 kg of steelwork, positioning of 43 km of cables for the transmission of data and electrical power in the plant, positioning of 35 km of cables for the rest of the site, the connection of approximately 850 devices to the automation system such as flange valves and instruments (including 50 Micro Motion Mass Flow Meters supplied by Emerson) and installation of more than 200 measurement instruments. All of this, in addition to a gradual move of machinery, production equipment and warehouse materials from the old plant, located a few kilometres away, to the new plant before shutdown, guaranteed production continuity.

Thanks to the flexibility afforded by the automation and its architecture, today, only a few months after reaching full production capacity, the company can fully meet the objectives of its five year strategic plan, and can even go beyond the required production capacity.

An exciting and unique success not only for Kiian Digital, a leading world class Italian company, but also for Emerson Process Management, which has proven to be a fundamental partner supplying unique solutions and competencies such as their excellence in mass flow rate measurement.

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