SPEEDBOOST OF LEADING INFRARED SENSOR COMPANY EXERGEN, IMPACTING THE OUTPUT OF A PUBLICLY HELD, INDUSTRIAL MANUFACTURING COMPANY

Who
A publicly held, international manufacturer and marketer whose products help customers increase productivity and performance and include high-performance labels, signs, safety devices, printing systems and software. The company is well over 100 years old and has a diverse customer base in electronics, telecommunications, manufacturing, electrical, construction, medical, aerospace and a variety of other industries. With well over 5,000 employees and a revenue nicely positioned above $1 billion, they are ALWAYS looking in how they can improve productivity and performance.

Status
This company contacted CleverIR with the request to increase the printing and drying speed of their flexographic press with four printing stations. The press runs 2 to 3 shifts per day, 5 days per week. The flexographic press is used to print Solid Colored ToughStripe Tape.

Initially the press didn't use any form of IR sensors to measure and control the UV drying process. As the manufacturer set out to increase not only the printing but also the drying speed by recording live web temperature data, they started with installing 4 Exergen IR temperature sensors. The sensors are directed at the web after the ink has been (UV) cured which allows them to measure the fluid temperature input and web temperature output yielding visibility of which temperatures result in properly cured UV ink at the speed they demanded.

Challenge
The newly purchased flexo press did not reach the full speed capacity, as UV inks were not fully curing at press speeds required. The challenge was how to optimize speed while assuring print quality. They implemented a "chill" roll system with heated fluid which solved the speed issue, but there were uncertainties regarding the optimal temperature. Initially the press didn't use any form of IR sensors to measure and control the UV drying process. As the manufacturer set out to increase not only the printing but also the drying speed by recording live web temperature data, they were looking for an accurate, small temperature sensor assisting them to control this process and achieve the speeds they required. So the request was clear: how can CleverIR help them optimize the output of their printing systems by employing Exergen's IRt/c.3X-J-140F/60C sensor. We were intrigued and immediately brought forward Exergen's speed-boost program.

The Speed Boost System is a productivity enhancing concept which, by optimizing and properly controlling process temperatures, can dramatically increase production speed while assuring high product quality. The key is the controlled application of heat at various points in the process at rates balancing the desired requirements of increasing speed of prints and drying. A key concept of the speedboost program is implementing a pre-heat of the substrate before ink is applied. The preheat results in a faster drying and curing process, increasing drying speed. In many printing applications, drying the substrate is the speed limiting step in the whole printing process, and by increasing drying speed the total printing speed is 'boosted'.

Besides the general objective of increasing speed, they posed several specific questions:
1. The importance of the distance from the sensor to the web. The sensors are about 1.5" from the web. Should they change that? What is the best distance?
2. The sensors are pointed at the part of the web as it removes itself from a temperature-controlled roller. Should the sensors be pointed at the web in a different location?
3. Currently, they are not using an air-purge system to keep the sensors clean. The sensor comes with air purge. Should the sensors have air flowing through them?
4. Do the sensors require preventative maintenance of any kind?

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1. Our customers get the best results by putting the sensor as close as possible. It all depends on how wide the web is and how small of a spot you want to measure. The closer you can mount a sensor to the target, the smaller the chance of measurement errors by surrounding heat sources.
2. The location of the sensor is essential in increasing speed with the speedboost program. Sensor should be mounted at the substrate after a heating step: this can either be a heated roller, or a drying step (in this case a UV curing lamp but could be any type of drying in printing applications). This to acquire real time information of the effect of the heating step on the substrate.
3. The use of the air purge is very beneficial. If there is any moisture, dust, oil in the air, it will collect itself on the lens of the sensor which will affect the measurement in a negative way. The air purge will ensure a clean lens.
4. To have a clear view, your clean the glasses or your glasses. In an industrial environment, this becomes almost mandatory. It is highly recommended to clean the lens with isopropyl alcohol on a Q tip swab.

The process
As a result of these answers and a few Zoom meetings, we started with Exergen's IRt/c.3X-J-140F/60C sensors by directing the sensors at the web after the ink has been (UV) cured. This allows them to measure the fluid ink temperature input and web temperature output generating reliable data of which temperatures result in properly cured UV ink at the speed they demanded.

They now had some time to validate whether increasing to 120 feet per minute (formerly 100 fpm) is sustainable when they use a preheat in their system. Print station 1 was used purely as preheat and substrate temperatures were monitored at increasing printing speeds.
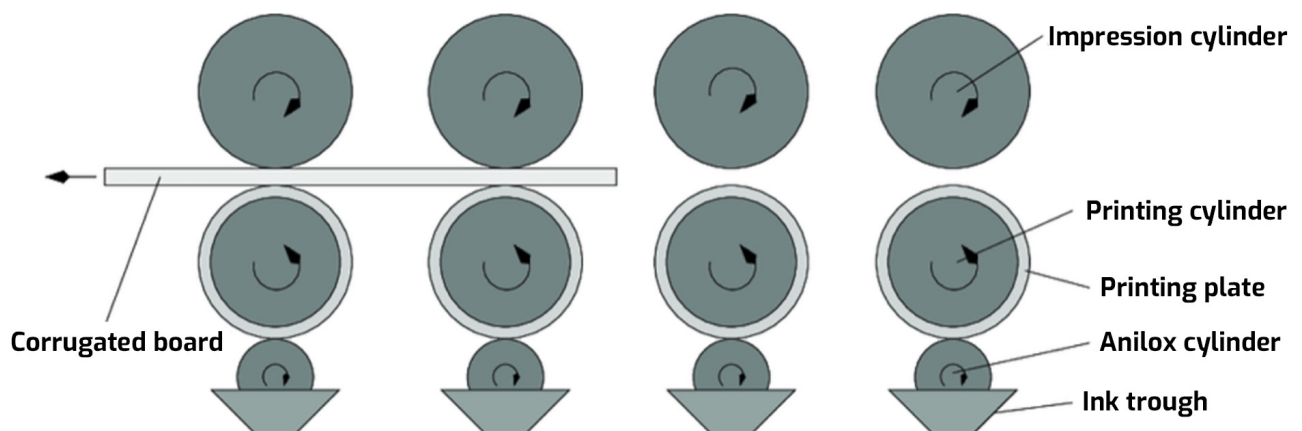
They reviewed the data when increasing from 100 to 120 fpm. Exergen's sensors relayed no fluctuation in web temperature as the speed increased, meaning they can expect the same product performance when manufacturing at 120 fpm. This was more than excellent news for their production team. At their current demand, the 20 fpm increase yields about 15 free labor hours (2 shifts) each month.

Final outcome
Using Exergen's sensors and the data they report, allow them to be even more efficient when it comes to the amount of human and electrical energy required to produce high performance floor tapes. The increased efficiency also supports their lean manufacturing principles which enables on top of the earlier mentioned advantages, to diversify their product offering as they spend less time on each product while maintaining industry leading quality and performance.

Regardless of color, they can continue to maximize speed based on the data shown by Exergen's sensors. Their data dissection has clearly shown them what temperatures they need to meet to maintain product performance and pass quality tests.
Their last final comment was:

"Credit to Exergen's/ CleverIR's product quality for the high performance. It is greatly appreciated."

Corrugated board

Impression cylinder

Printing cylinder

Printing plate

Anilox cylinder

Ink trough

A flexo printing press with four printing stations

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