Raytek
A Fluke Company

APPLICATION BRIEF
Vinyl Calendaring

Major Benefits

- **Higher Quality, More Consistent Product**
- **Reduced Scrap Rate**
- **Unprecedented Control of Process**
- **Quick Characterization of New Products**

DESCRIPTION OF APPLICATION

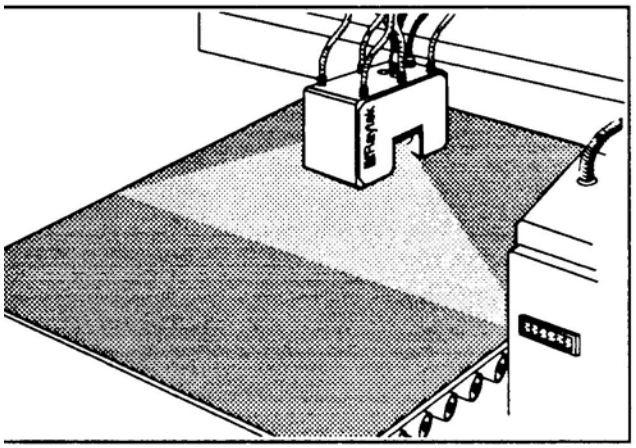
Vast quantities of resilient flooring products are manufactured around the world for use in homes and commercial buildings. Wide varieties of materials, thicknesses, durabilities, textures, colors, and printed patterns are produced in either roll or cut form (squares, for example). Vinyl is the most common base material; it can be used alone, with fillers such as limestone, with mineral-fiber felt, cellulose, or asphalt backings, and with various wear and gloss coatings.

Control of the temperature profile is critical as the web product passes through various process steps:

Calendering
Roll coating
Embossing
Printing
Drying ovens after coating or printing
Punch Press

One large manufacturer of flooring products produces vinyl composition tile using the following process:

1. Mixing (vinyl, limestone, other ingredients)
2. Milling
3. Sheeting (a 1.1 m (42") web is formed)
4. Proprietary coatings
5. Multiple calender roll steps for sizing/thickness reduction
6. Final surface finish calendering
7. Punch press (produces final 30 cm (12") square tiles from web)



PROBLEM

It was generally accepted that the temperature profile of the web affected nearly every step of the process including gauge consistency, surface finish, coating thickness and property and dimensional stability, as well as energy usage and other quality attributes. However, the systems in place did not offer adequate monitoring or control capabilities. Additionally, problems were being experienced with the squareness and dimensional stability of finished tiles, which were known to depend upon the temperatures at which the final calendering and punching took place. At the punching step, 30 cm (12") square tiles are cut continuously, three-across, from the moving 1.1 m (42") web. The cutting must take place at 34-36°C (93-97°F), in order to achieve the correct final dimensions, taking cooling shrinkage into account. Furthermore, the temperature profile, determined largely by the final calendering step where the web is about 163°C (325°F), must be uniform in order to prevent distortion of the squareness of the tiles upon cooling.

Initially, infrared point thermometers were installed on traversing mechanisms above the web for monitoring. This provided some information with which to make adjustments, but the engineers wanted a comprehensive solution.

RAYTEK SOLUTION

Install two MP50 line scanners on the process: one before the last calender stack, and one before the punch press. Use the MP50 based ES100 software system, which is designed to monitor and alarm for continuous web processes. The system scans the temperature cross-profiles of their process.

The ES100 system even allows the process to incorporate closed-loop control of their sectors, using either the MP50's three analog outputs or the ES100 system zone outputs for each of the separate heater controlled zones.

BENEFITS

Process Engineers are able to see the complete temperature profile of the web at each of the two most critical points of the line, enabling them to make precise adjustments to equipment settings. This scanned information is automatically evaluated for changes or problems in their process. The end results have been the following:

- Reduced scrap rate
- Higher quality of finished tiles, in terms of consistency of dimensions and finish
- Optimized energy usage
- A much-improved ability to characterize and control the effects of process changes on temperature profile.

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