1 On-machine surface treatment of paper and board with the blade coater

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1.1 The origins of on-machine surface treatment

Literature provides only vague references as to when paper and board first started to be surface-finished on-line. We can only be certain of the real industrial breakthrough, which came with the introduction of the roll coater, based on an invention by Peter Massey. The first commercial installation was commissioned in 1933 at the Consolidated Water Power and Paper Company in Wisconsin Rapids, Wisconsin.

In contrast, literature offers plenty of references to the blade coater’s first applications, the first printed patent specifications dating back to shortly after the turn of the century. The actual invention of the blade-coating system is most frequently attributed to Arthur Ronald Trist, from London, who was awarded US patent number 2,368,176 on 30 January 1945 for his trailing blade puddle type coater (Figure 1.1). This blade coater was first commissioned as an off-machine coater in 1955 and installed on-line in 1958 at the Gulf States Paper Corporation, in Demopolis, Alabama, for the surface treatment of food board.

Two other on-machine blade coaters dating from 1958 are worthy of mention, since they were the first to be equipped with the inverted blade coater (flooded nip coater) and an applicator roll (Figure 1.2). The first was installed by the Gilman Paper Company, in St Mary’s, Georgia, for surface treating food board. The second was Europe’s very first on-line blade coater, commissioned in 1958 by Enso-Gutzeit OY in Kaukopää, Finland, also for surface treating food board.

The inverted blade principle, based on US patents 2,746,877 and 3,097,107 awarded to Rush and R.W. Martinek, respectively, is that found at the heart of all today’s blade-coating systems, although the application method and blade-system function can vary.

1.2 The blade-coating system today

On-line blade coaters do not essentially differ from their off-line counterparts, although some additional equipment may be necessary on
the on-machine coater to safeguard the efficiency of the production line.

Depending on the working-speed, substrate, desired dry coat weight and coating media, the following five application systems can be said to predominate (Figure 1.3):

- the conventional roll-application system;
- the roll-application system with infeed profile;
- the short-dwell coater;
- fountain applicators;
- the applicator nozzle with premetering unit.