
First experiences with web break prediction

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One of the greatest challenges in paper manufacturing is to achieve break free production. The possibilities of the developments in the age of Industry 4.0 with the help of large amounts of data and complex neural networks make it possible to meet this challenge.

The occurrence of a paper break at any point in time is considered unavoidable. In a first step towards a break free production it is necessary to limit the time of a break and to evaluate the risk of a break in the near future. In addition to the pure risk assessment of an imminent break, however, in a second step it must be possible to avoid the break by initiating corrective steps.

The work with mathematical models for break prediction has shown that breaks can be divided into two categories:

1. breaks with direct causes e.g. failure of the retention agent pump
2. breaks with indirect causes, e.g. crease run in the dryer section due to changed drying/shrinkage behaviour as a result of variations in freeness.

Experience has shown that the first category represents only a small proportion of the total breaks and cannot currently be predicted using complex data analyses due to missing or unrecognizable patterns.

The second category represents breaks that can be described as "process conditions that promote breaks". These can be predicted from the data with varying degrees of accuracy depending on the process conditions.

In practice, therefore, the second category will be used to predict and prevent breaks. Recognizing a break in advance means understanding the mechanism that leads to the break and deriving it reliably from the online data. In such cases, a suitable countermeasure can then be initiated in good time. Thus, the core of break prediction is not the precise temporal announcement of a break, but the avoidance of breaks by timely recognition of break-relevant, unfavourable process conditions and their elimination before the break occurs.
