



Technical Article

Stressing of Rubber Conveyor Belts and Its Mathematical Treatment

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Mathematical investigations of belt stresses permit important conclusions which may lead to the improvement of conveyor belting and system design. Manufacturers and users alike are interested in studying and ascertaining as exactly as possible the stressings to which conveyor belts are subjected. Apart from receiving and transporting loads, one of the most important functions of the conveyor belt is the transmission of tension. Consequently tensile strains are the main stressings which are primarily borne by the tension members made of textile or steel cable plies.

The basic principles used in calculating such strains can be traced back to theoretical essays written by Euler in the 18th century. The well-known Eytelwein formula originally published as early as 1808, is still applied today in an unaltered form to conveyor belt calculations. However intensive research work in the conveyor belt sector did not start until this century; this phase culminated in 1942 with the publication of German Standards DIN22101 a relatively early standardization of the calculating method adopted for belt conveyors.

As might be expected this standard above all dealt with determining conveying capacities and input power, but calculating tensile stresses of belts proceeded from simple assumptions in keeping with the latest technological developments

at that time: neither the numerous influences exerted by the design and profile of belt systems nor the possible operating states occurring when starting and stopping them were closely investigated. The lack of knowledge about how certain design features would affect the system was allowed for by incorporating high safety margins.

Since then countless studies have been devoted to investigating frictional forces, phenomena during starting and stopping, and stresses to which conveyor belts are subjected. The current state of the art was reflected recently in the revised edition of DIN 22101. In the following the effects on calculation and construction of conveyor belts are among other topics to be considered.