Abstract

The fiber-cement industry faces critical operational bottlenecks in the longitudinal and transverse cutting of wet webs due to the low durability of conventional tungsten carbide (WC) circular blades. Since these lines operate continuously and as part of an integrated process, any interruption for tool replacement and regrinding disrupts the production flow, resulting in raw material losses, high setup costs, reduced OEE (Overall Equipment Effectiveness), and the need for a maintenance team dedicated exclusively to this daily operational routine. Furthermore, due to the low toughness of these conventional alloys, the discs become susceptible to premature breakage and shattering, exposing operators to mechanical and safety risks. To address these limitations and ensure the continuous operation of the plant, the Leitz EvolutionCut® tool was developed—a circular disc with a diameter of 300 mm, consisting of a base body made of high-toughness, hardened 80CrV2 steel with polycrystalline diamond (PCD) inserts radially fixed by brazing and sharpened with high dimensional precision, with a maximum radial runout of 0.04 and a maximum axial runout of 0.06 mm. Due to the high hardness (9,000 HV Vickers) and resulting wear resistance of PCD, this technology has demonstrated, in continuous production lines, a work life increase of more than 60 times per operating cycle compared to traditional carbide discs. With its extended cutting cycle, the PCD disc maintains consistent quality along the edges of the cut fabric, without the formation of burrs. Additionally, the tool can withstand between 6 and 8 regrinding cycles, substantially spreading out the initial investment over its total service life and maximizing the technical and financial viability of the solution, with a direct ratio of 18 carbide discs to 1 PCD disc. Results at industrial scale demonstrate the definitive elimination of failures due to breakage or chipping, dimensional stability of the sheet cut, and a significant reduction in line stoppages for setup—from 540 stoppages with the conventional model to just 8 setups with EvolutionCut®—offering lower maintenance costs, stable cut quality, and a rapid return on investment (payback in less than 6 months). As a result, companies that adopt this technology gain a significant competitive advantage through a reduction in the final product cost and a reduction in operating expenses of approximately 76%, in addition to maximum reliability and stability in the production process.