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Compaction properties of dry granulated powders based on Drucker-Prager Cap model

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ABSTRACT:

Dry granulation by roll compaction is a process of size enlargement used to produce granules with a good flowability for further die compaction process. To gain in the understanding of how granulated powders behave during die compaction and why they exhibit different behaviors different from those showed by the feed powder, the main material parameters proposed in Drucker-Prager Cap (DPC) model, were determined for MCC101 powder and two granule sizes obtained from roll-compacted ribbons. For that, the standard procedure calibration of DPC was used.

Results showed that all the material properties are density-dependent and the properties of feed powder are higher than those of granulated powder. Moreover, the yield hardening function showed a decrease with the increase of the granule size, which highlighted that the granules of MCC 101 exhibit a softer work hardening than feed powders. Overall, the granules have smaller yield surface than the feed powder. Particularly, it was found, for both granule sizes and the MCC 101 powder, an overlapping of shear failure line at high relative density. Nevertheless, at low density, the cohesion was affected by the roll compaction of MCC 101, but no variation was observed for the internal friction angle. The obtained results are in agreement with the literature, where the granules were prepared from mini-tablets rather than from roll-compaction. However some discrepancies were highlighted.

KEYWORDS: *roll compaction, granules, die compaction, Drucker-Prager Cap (DPC) model*

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