

An Evaluation of a One-Step vs. Multi-Step Milling Process for Roller Compacted Ribbon

Shawn Engels , Kody Bellach, Brian Jensen; Freund-Vector Corporation, Marion, IA USA

PURPOSE

The purpose of this study was to evaluate the effectiveness of a two-step milling process vs. a one step milling process for a roller compacted ribbon and to quantify the effect on overall particle size distribution.

METHODS

A Freund-Vector Corporation TFC-520 roller compactor was used to make hard ribbon compacts containing 90% Maltodextrin M-100 (Grain Processing Corporation) and 10% Acetaminophen. 2 KG of these ribbons were then milled through a U-10 Co-Mil (Quadro) using three different grater screen sizes, a .050", .062" and a .125". The first set of ribbons was milled using one pass through each of the screens. A second set of ribbons was milled by passing them through a large or medium screen first, then milling the resulting granules through the smaller screens. The milling time and particle size distributions for each set of screens were recorded.

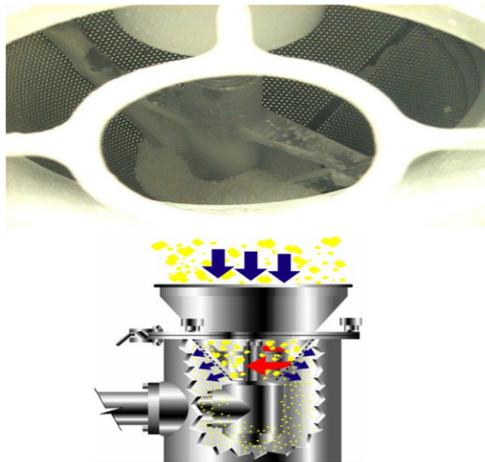
MILLING CONDITIONS

Screen Size	Hole diameter	RPM	Feed Method	Milling Time
Small (S)	.050"	1050	Hand-Feed	15 min
Medium (M)	.062"	1050	Hand-Feed	12.5 min
Large/Small (L/S)	.125"/.050"	1050	Hand-Feed	3 min
Large/Medium (L/M)	.125"/.062"	1050	Hand-Feed	2.2 min
Medium/Small (M/S)	.062"/.050"	1050	Hand-Feed	15 min
Large/Med/Small (L/M/S)	.125"/.062"/.050"	1050	Hand-Feed	4.5 min

EQUIPMENT



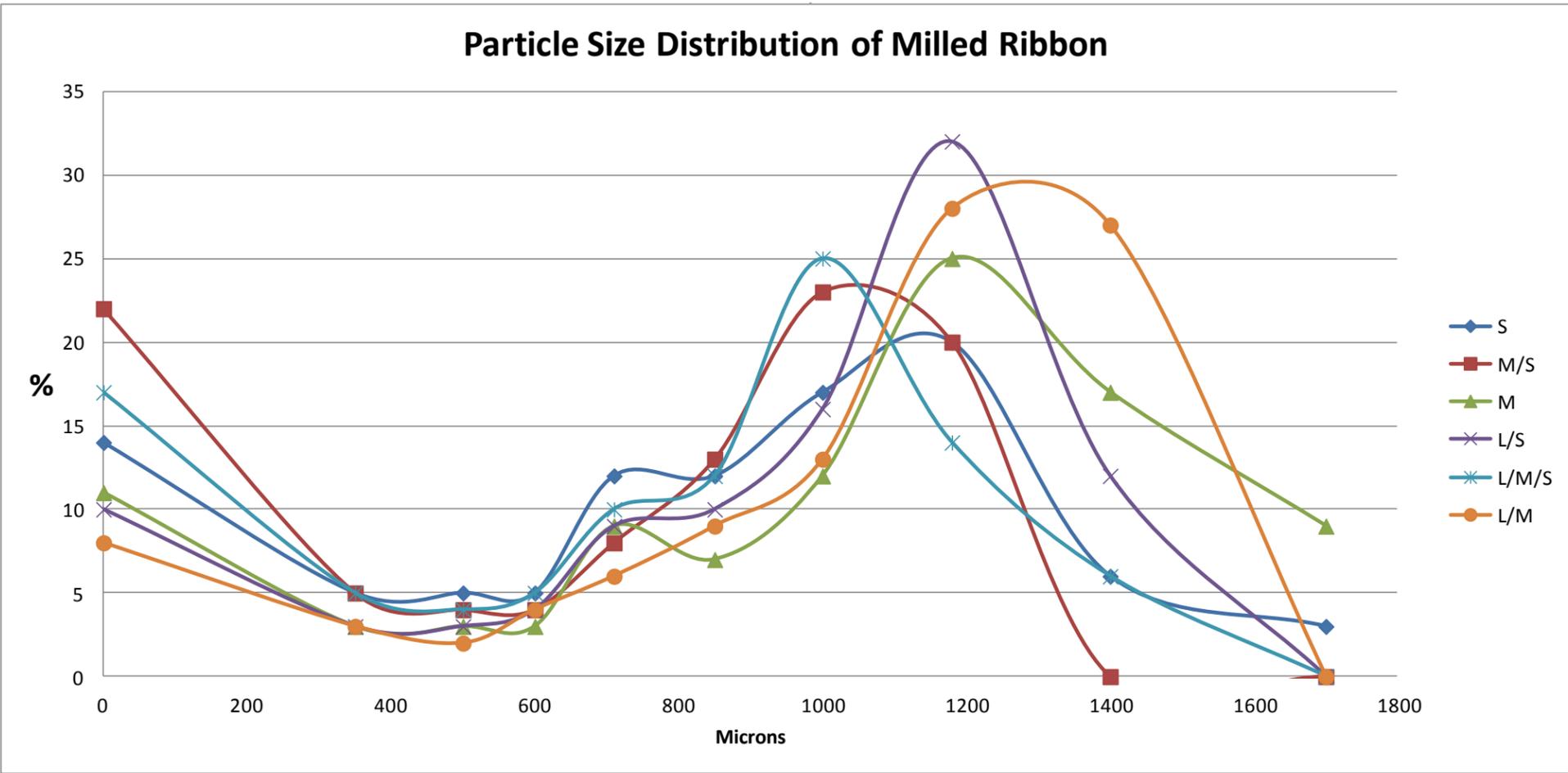
Freund-Vector Corporation
TFC-520 Roller Compactor



Quadro U-10 Co-Mil

RESULTS

PROCESS DATA



Each milling process produced a different PSD and milling time. Passing the ribbon directly through the .050" screen produced 15% fines and the mill was frequently overwhelmed by the volume of ribbon accumulating in the basket causing the process to pause while the mill caught up. Passing through the .125" screen only produced a very wide and large PSD. Milling through the .125" screen prior to milling through either the .062" or the .050" greatly narrowed the PSD and decreased the overall milling time. The narrowest distribution was produced by milling through the .125" screen first followed by the .050" screen. That combination also decreased the fines produced to 8%. Milling through the .062" first, followed by the .050" produced a wide PSD the most fines, at 23%.

CONCLUSIONS

A two step milling process was effective in reducing fines, decreasing milling time and narrowing the overall PSD of the resulting granulation. Passing directly through the .050" screen did not allow for continuous processing, one of the advantages of roller compaction, due to the large dwell time needed for the ribbons to pass through the mill. Passing the ribbons through the .125" followed by the .050" produced the fastest milling time as well as the tightest PSD and low fines for all of the combinations.

