Mechanical Modifications to a Vibratory Tablet Feeder
Craig Livingston Andrew Snodgrass Jordan Weinstein Aaron Winn

Mission Statement
The purpose of the project is to design cost-effective mechanical modifications to an existing vibratory tablet feeder that increase throughput by 10%.

Current System
Three Stages
1. Tablets advance, inspection check ~ 600 ms
2. Thorough inspection ~ 27 ms
3. Tablets are loaded into package ~ 600 ms

Subsystems
1. Rumble Plate – moves tablets
2. Track Cover – guides tablets into lanes
3. Puffer – breaks up clumps with air
4. Channel Plate – guides tablets to package
5. Camera Inspection System
6. Base Plate
7. 1D-4 Linear Drive

Stage Time Breakdown

Problems Areas
Problems
• Tablets Clump and Feed at ad Angle
• Irregular Tablet Advance and Lane Starvation

Target Metrics
1. Feed Rate – 250 tablets in ≤ 1.60 s
2. Stage Times – Average ≤ 0.360 ms
3. Feed Angle – less than 2°
4. Contamination – no visible dust buildup
5. Feed Uniformity – no ‘starved’ lanes

Concept
Modified Air Systems

Modified Track Cover
• Holes drilled through plate to shallow channels milled underneath
• Channels provide low velocity air along feed edges of plate to alleviate clumping
• Divider between lanes comes to sharp point to deter jamming

Modified Puffer
• Puffs air in feed direction to assist tablets with forward motion in lanes
• Puffs air in opposite direction of feed to break up clumps
• Supplies air to modified track cover
• Runs on 80psi

Cost and Implementation
Prototype
Material and Machining $78.64
Implementation
Material and Machining $6,000.00
Design Modification and Testing $9,000.00
TOTAL COST $15,078.64

Validation and Results
Test and DoE
• Varied air pressure, amplitude, puff interval, and feed angle
• Tested 250 tablets at a time
• Tests designed to show that modified system functions better under production conditions (non-zero feed angle)

Graphical Comparison - Original vs. Modified

Results
• Air system most effective under non-ideal conditions (non-zero feed angle)
• New system completely alleviates clumping
• New system performs with less variability
• Lanes feed evenly

Overall Tablet Throughput Improved by 30-40%

Acknowledgements
The team would like to thank Dr. Wilkins for his advisement, Jim, Peter, Tim, and Dean of Dade Behring for their support and patience, and Steve Beard for his help in the shop.