Dependable, Controllable Rejecting & Diverting

Diverting Challenges

1. Repeatability

Challenge:

Air cylinder time to reach the carton varies by +/- 15 msec. This variability has to be added to the cycle rate of the cylinder. This means carton can be missed or jammed at the eject gate - Creating a mess.

Solution:

SMAC actuators have repeatability of only +/- 1 msec. This is because they use low-friction components and do not have to compensate for seal sticking and wear, accelerated wear, and variations in air pressure.

Diverting Challenges

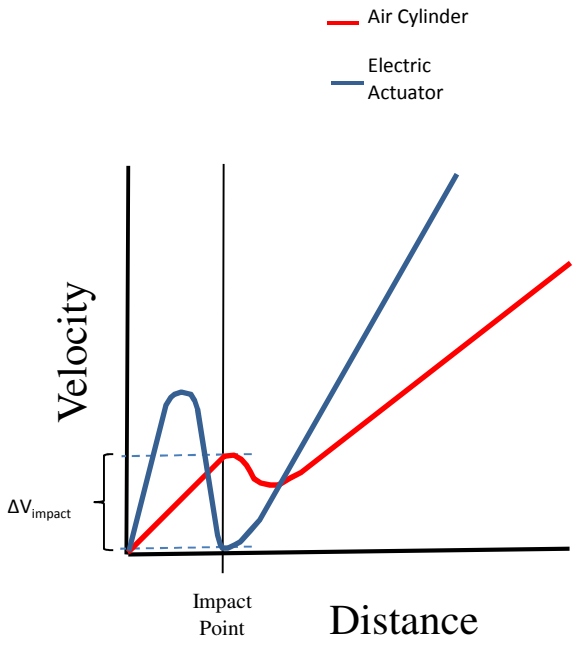
2. Uncontrolled Product Impact

Challenge:

Air cylinder is designed to reach the necessary velocity and stroke at end of cycle to divert the container. No control of resulting velocity at product impact. Air cylinder hits the carton at higher speed for large product can cause product damage, toppling and jamming to smaller ones.

Solution:

SMAC's MCA's velocity, stoke and force are programmable. Velocity profile can be controlled throughout the cycle to minimize impact at time of contact while maximize velocity after impact to achieve diverting.



*** Rudimentary illustration of velocity through impact point and diverting point. This is for illustrative purposes only. The graphs and velocities of various types of actuators, both air cylinders and electric actuators, may vary, even significantly depending on type, technology, design, input energy and other factors.

Diverting Challenges

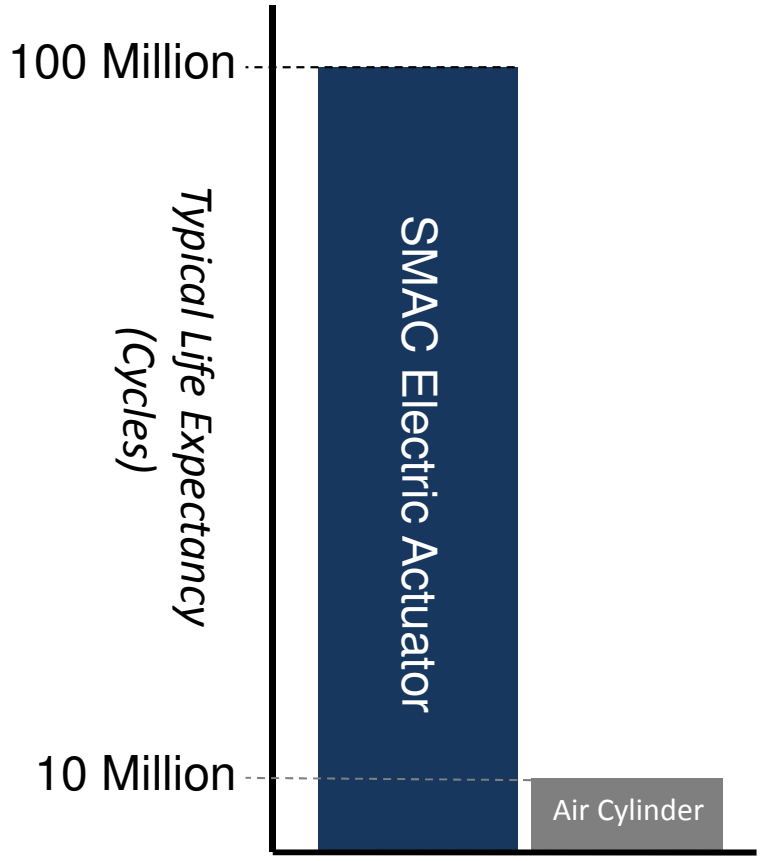
3. Durability

Challenge:

Larger air cylinders mean larger forces at impact against stops at end of each stroke. Larger forces leads to lower life expectancy.

Solution:

SMAC's MCA's velocity, stoke and force are programmable the actuator can be programmed to reduce the velocity at the end of each stroke. Reduced velocity means reduced impact which leads to longer life expectancy



Diverting Challenges

4. Lack of Flexibility

Challenge:

Standard air cylinders are set up for one speed and one force regardless of product. Manual change out or adjustment required for different size and weight products. This requires downtime and increases setup scrap.

Solution:

SMAC actuators can be programed to optimize velocity and force for different types of products. Proper force is applied to move each product type – With precision, pushbutton changeover.

Electric Actuator Diverting

500 ppm Bottle Sorting

Diverting/Reorienting
> 1,620 ppm

Larger container diverting video from SMAC lab

Air Cylinder / Electric Actuator Comparison

Property	Air Cylinder	SMAC Electric Actuator
Repeatability (Typical)	• +/- 15 msec	• +/- 1 msec
Diverting Rates	• Lower – Limited by air pressure, required diverting stroke and impact damage at stops	• Higher – Higher accelerations and programmable velocities at stops. • Programmable velocity, force and stroke
Impact Velocity/Energy	• Set by air pressure • Set by heaviest object in run • Difficult to control separately from diverting velocity	• Programmed deceleration at impact point to minimize impact energy • Higher accelerations and decelerations allow impact point to be achieved quickly
Diverting Velocity/Energy	• Set by air pressure • Set for heaviest object in run	• Programmable • Higher accelerations allow diverting velocity to be achieved quickly even after impact slowdown/stoppage • Can be changed to do lane sorting
Changing Velocities/Energies	• Complicated to do object-to-object • Costly and time consuming to do run-to-run	• Push button changeover run-to-run • Can be compensated for object-to-object with upstream signal
Effects of Changes in Mass	• Set for heaviest object	• Push button changeover run-to-run • Can be compensated for object-to-object with upstream signal
Compensation for object position	• Not available	• Soft Land technology can find edge of object before applying energy
Probability of toppling or damaging object during impact and diverting	• Higher	• Minimal – Programmable velocities
Internal Diverter Damage	• High - High impact energy against stops at end of each stroke	• Low - Programmable deceleration at end of each stroke

Reverse Designing

Reverse engineering existing air cylinder diverter is not reliable in sizing new electric actuator

- Initial over design of air cylinder - Too high a force
- Differences in diverting energy - Different strokes and velocities
- Contingencies for variability of air flow and pressure - Electric actuators use more constant, reliable electricity

SMAC can help you move from old 1950's pneumatic technology with all its drawbacks to state-of-the-art, direct-drive electric technology that is more reliable, faster, easy to setup/use and has lower life cycle costs (LCC)