



## **BENEFITS of Electric Actuation on Tray / Bottle Sealing Machines:**

### **QUALITY, SPEED, REDUCED NOISE, ACCOUNTABILITY:**

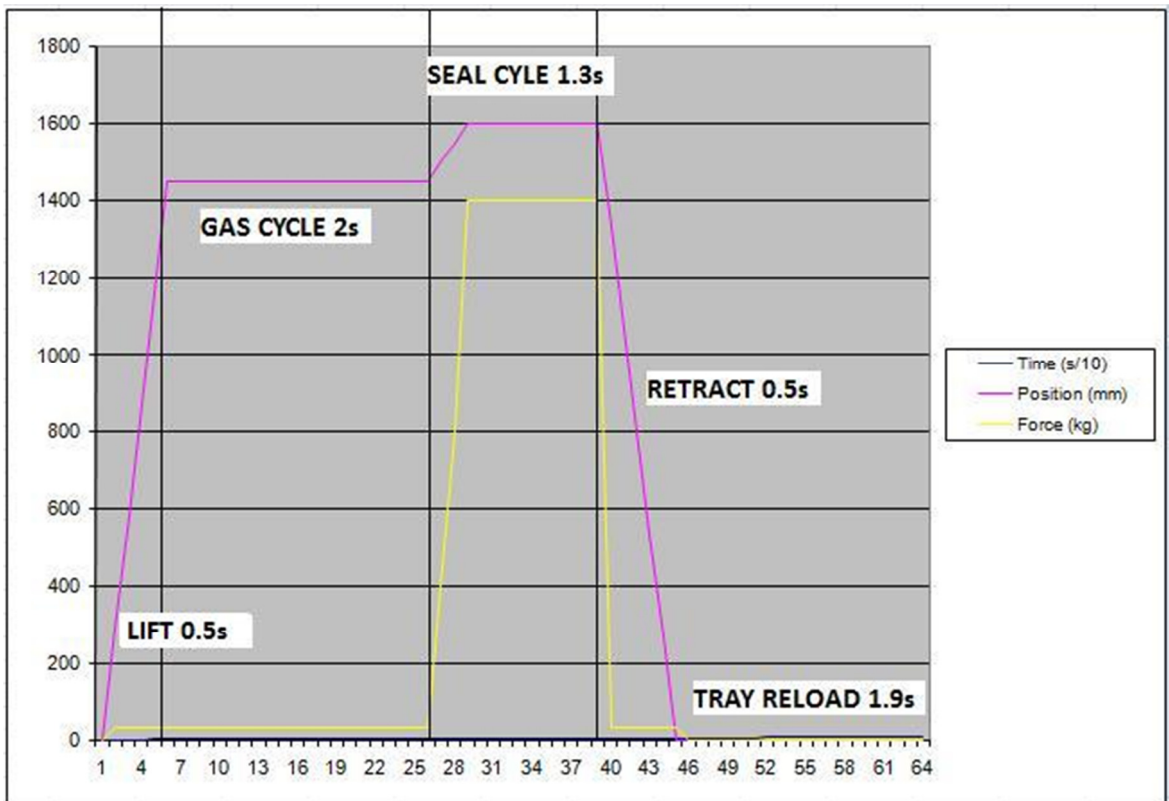
- 1) **REPEATABLE SEALING** - The sealing force is consistent and repeatable since the servo electric motor can apply the same force every time. The electric system is not susceptible to air pressure dips on the supply lines when other machines are working. This means that the quality / repeatability of sealing will improve. Less risk of complaints from customers. Unique Selling point (USP) vs. Competitors for new contracts.
- 2) **ACCURATE POSITIONING** - It is possible to data-log the sealing cycle so that there is an accurate record of the sealing history and how much force was applied and that positional set-points were achieved. Servo systems are extremely accurate in terms of positioning ( $\mu\text{m}$ ). Pneumatic systems are very difficult to position due to air not being a solid medium, seal sticktion and overshoot.
- 3) **IMPROVED CYCLE RATES** - The sealing force can be higher than that of a pneumatic system 1000-2000kg as required and applied more quickly. This means in theory the sealing cycle time could be reduced. Depending on the selection of the actuator in terms of maximum speed, the time for engage and retract moves could also be reduced. The move profile is smooth using S-ramps. Hence it may be possible improved production rates (providing the products can be loaded quick enough) of 5-10%, this would have to be tested.
- 4) **ACCOUNTABILITY** – Since it is possible to accurately measure and datalog the applied current during the sealing cycle and hence applied force, it is possible to create an accurate history log of this information and give assurance and evidence that the sealing force was applied as demanded.

### **REDUCED INTERNAL WASTE:**

- 5) **REDUCED WASTE** - Cost of miss-sealing based on 1 tray every 100 meals, based on 15 trays per minute at 16 hours per day  $\approx$  53,090 wasted trays per year. This obviously has a cost. There is labour required to check the trays.  
If the tray arrives to your client, there is a possibility of a fine.  
Less miss-sealing = better quality.
- 6) **HEALTH AND SAFETY** – The Electric system is quiet compared to a pneumatic cylinder. Many companies are trying to reduce their factory floor noise levels in line with health and safety machinery directive of 85dB(A)@1m. Obviously there are also no high pressure air lines feeding the machine. No potential dirty air contamination of product.

## REDUCED ENERGY / GREEN SOLUTION:

- 7) **REDUCED ENERGY** - Based on 12p/kWhr a compressor system providing 25cfm @ 6-7Bar pressure of air will require approx 5kW of energy. Therefore based on 16 hours per day, 365 days per year total running cost = £ 3,504.  
 This energy will be used even when there is no movement (excluding leakage costs). An ELECTRIC system only consumes the energy when needed and hence does not use any energy when stationary (apart from the 2-3% servo drive losses).
- a) Based on a gas cycled machine duty cycle as shown below using the **GSX 1m/s 1400kg** test machine the nett savings will be 20% or £700 per year.
- b) Based on an optimised **GSX 0.5m/s 1000kg** machine on the same duty cycle the calculated energy savings will be approx 70% or £ 2,500 per year.



- 8) **REDUCED ENERGY** - It is well known that Compressed Air Systems always have leaks. Based on a Study completed by the US Department of Energy, based on an energy cost 12p/kWhr, if you have a 1.6mm hole/gap in the system line you will waste £ 1,258, if there is an air gap of 3.2mm then wasted energy = £ 5,028, if the total leak path is equal to 6.4mm then energy wastage = £ 20,117. These figures assume the air supply is constant & the Compressor is Efficient (many are not).

**Cost of Air Leaks in £ per Year**

| Leak Size (mm) | Annual Cost (£) |
|----------------|-----------------|
| 1.5mm          | ~£1,258         |
| 3.2mm          | ~£5,028         |
| 6.4mm          | ~£20,117        |

The annual costs are based on an energy cost of compressed air of £0.12 per kWh, this calculation assumes that the air supply is constant and that the compressor is efficient (many are not).

Source: Improving Compressed Air System Performance, US Department of Energy.

**IN ADDITION: Electric Actuators only use energy when needed = up to 90% savings!**

## Why SAVE Energy?

**EXLAR**

**Servo Electric "Roller Screw" Actuators**

- No Oil
- No Air
- No Leaks
- No maintenance

How much does your machine cost to run?

[www.consultolsen.com](http://www.consultolsen.com)

- 9) **CARBON REDUCTION** - Climate change is a hot topic at the moment and there is only one way energy costs are going. Large Multi-Nationals have identified the benefits of going “airless” on sites and would much prefer to be independent of compressed air machines and systems. With “ALL Electric” machines it is possible to reduce the factory carbon footprint / CO<sup>2</sup> emissions and greenhouse gases. ALL Electric machines indicate to clients and investors that the company is “progressive” and seriously considers the Green Issue. Good for environment. Good politics.
- 10) **MARKETING** – Once we have assessed the machine running and accurately trended and recorded the applied current / torque over the final decided full duty cycle of the machine, we can calculate the running costs and therefore the real energy savings compared to a compressed air system. We could then approach the Carbon Trust or discuss the subject with the Food Standards Agency to promote a new LOGO of “produced using energy efficient machinery”

### **REDUCED MAINTENANCE:**

- 11) **LESS MAINTENANCE** - There is no maintenance of compressors required, no conditioning of the air, no risk of contamination in the air lines, no risk of corrosion of the air lines. This would reduce your monthly compressor maintenance contract bill (required every 5000 hours – monthly + parts, 15,000 hours oil change and disposal). Less downtime, less contractor risk assessments.
- 12) **LESS MAINTENANCE** - There is less maintenance in terms of checking the leaks, split air lines (often many kilometres of hoses), no cylinder seals that can wear out, etc. The Electric system is not prone to changes in air temperatures / flow rate problems, no moisture / condensation built up. Potentially less damage and maintenance of springs on the sealing head since the force build up is controlled and smooth using S-Ramp “Elevator style” ramp profiles. It should be possible to detect if any failed springs are jammed in the sealing head by monitoring position and force, this can provide a fault / machine trip to prevent damage / loss of production.
- 13) **LESS CAPITAL / LESS PLANT** - Based on 3 machines you would require a 15kW Compressor. Depending on the type of compressor selected the cost is approx £30k new (not installed). This means potentially it could be possible to sell the obsolete compressors and put the money on the bottom line profit. In the case of new installations there is no capital cost associated with the compressor and installation. Also less there is less physical space / infrastructure required.

“1 Off Atlas Copco Air Cooled Oil Free Compressor complete with integrated refrigerant dryer Model ZT15-7.5 Workplace FF - Output FAD : 80 cfm @ 7.3 bar = Power : 15 kW £ 25,228.00  
 1 Off 500 ltr Galvanised Vertical Air Receiver complete with fittings kit £ 580.50  
 1 Off Atlas Copco Heatless Desiccant Air Model CD50 with 2-stage filtration £ 3,189.60  
 1 Off Activated Carbon Filter Type QD44 £ 207.20 - **Equipment Summary £ 29,205.60”**

- 14) **LONG LIFETIME** – based on the duty cycle, movement and loading cycles the estimated travel life of the actuator is over 10 years. We would recommend re-greasing the roller screw once every 1 year, which takes approx 30 minutes. Front wiper and scraper IP65 seals should be checked every year.

