



Hydraulic versus Electric

by R Tomlinson - [Plastic Moulding Solutions](#)

Introduction

The debate within the injection moulding industry continues to be discussed about the merits of both types of machines and which will come out on top, my view is the electric version. Having seen the first electric machine some years ago, my first reaction was as it is now, that this is the way forward for injection moulding.

I clearly remember the reactions of all the European manufacturer's saying at the time that they would never take off yet nearly all of them now produce an electric version or a hybrid version of the machine. At the last Interplas [exhibition], several machines from different manufacturer's were on display, proving that they now believe that the electric machine is not only here to stay, but is the future of injection moulding - with one company quoting that electric machine sales now accounted for 40% of their sales world-wide.

Why has it taken Europe so long to catch on? I believe that initial cost differential was probably the major factor in holding back sales but this differential is closing all the time and is now about 20% compared to the original 50%. This difference will continue to reduce through competition. However, if you compare the relative merits of the electric machine against the hydraulic version the differential I believe is already gone in fact if you compare the lifetime costs of each type of machine over a 10-year period the saving in reduced energy cost alone justifies the extra investment, the overall maintenance cost is lower by 50% and the overall downtime attributed to breakdowns is 50% lower.

In fact, no matter how you look at each attribute of the two types of machine the electric machine it comes out top and the cost down savings do not stop.

The only area at present that the electric machine falls down on is performance in the fast-cycling thin wall packaging applications this is due to the technology not being able to match that of hydraulic machines in the injection pressure/speed area but a solution will be found, in every other area of the injection control system the electric machine out performs and is superior to the hydraulic machine. The injection moulding process relies on several factors to produce quality parts and this is an area that in my view not been marketed or sold by the manufacturers to produce good parts you need accuracy, repeatability, consistency and reliability.

By removing the hydraulics, you remove a variable that affects all of these factors and therefore reducing the probability of rejects which in turn takes you closer to the goal of zero defect and that is why I would choose the electric machine.

Benefits of the Electric Moulding Machine

These benefits may apply to new manufacturing or existing operations using both hydraulic and electric machines and have not been listed in any priority.

- Reduced installation cost for the electrical supply and power requirements.
- Smaller size cabling and reduced installed capacity plus the reduction in overall power requirements.
- Lower power consumption at start up leading to lower maximum demand requirement.
- Reduction in the overheads due to lower power consumption.
- No cooling requirements or plumbing for the hydraulic oil.
- No oil required for the machine.
- No oil changing, filtration, stocks or disposal costs.
- Reduce risk or elimination of contamination of product, buildings or environment.
- No special storage requirement for the oil stocks.
- No annual requirement for oil changing and replacement filters.
- Reduction in the planned maintenance time requirement.
- Reduction in the skill's requirement for maintenance personnel.
- Reduction in the downtime caused by oil leaks.
- Reductions in the spare parts inventory no hydraulic spares to carry.
- Elimination of the cooling equipment for the hydraulics and power requirements for this equipment.
- Reduced health and safety requirements or elimination of water towers ending the need for water treatment and chemical additives to meet Legionella issues associated with this equipment.
- Eliminates the annual cleaning and servicing of this equipment.
- Eliminates the requirement for personnel to be trained in or the use of external contractors to monitor this area to comply with health and safety regulations.
- Eliminates the need to keep records of this monitoring, servicing and actions arising from this equipment.
- Eliminates the risks associated with this equipment in the event of failure.
- Lower annual water consumption.
- Reduction in heat generated by the machines equals a lower load on air conditioning or temperature control of production area particularly during hot seasonal periods.
- Reduced risk of the machine and process being affected by internal or external temperature changes.

- Cleaner and quieter operating surroundings leading to a better working environment for everyone.
- Improvement in the operating environment leads to more customer satisfaction and overall impression of the manufacturing department and is easier to keep clean.
- Reduced risk if a lights-out operation is being considered no potential oil leaks to worry about.
- Quicker start up to production no waiting for oil temperature to stabilise or reach operating temperature.
- Process is more stable and reliable reducing the risk of rejects.
- More accurate process electric operation is too within .001 mm hydraulic is too within .1 mm on most movements.
- Electric machines do what you want there is no inertia or overrun to be compensated for on movements.
- Reduced risk of breakdowns, easier to maintain the machine and easier to repair at lower cost.
- Easier to relocate to another area or facility.
- Smaller machine footprint better suited to clean room applications.
- Lower support costs and reduced spare's stockholding requirement by supplier.
- Training of maintenance personnel requires less time and money.
- Diagnostics of machine faults or breakdowns is quicker.
- The reduction in parts on the machine means there is less to go wrong.
- It is an easier machine to set up.
- It is easier to calibrate and therefore it is easier to validate the process.
- Removal of the hydraulics removes a variable from the process.
- Energy costs will continue to rise.
- It allows a more streamlined machine with no protruding parts.

Advancements in on board computers will allow manufacturer's to build in more monitoring of the machine and process it will allow an increase in the planned preventative maintenance control that is actioned by the machine, data acquisition and monitoring will prevent breakdowns before they occur. These advancements along with production data and quality monitoring will reduce the labour involvement and requirements still further. Interfacing with other equipment and operations will become commonplace rather than the exception.

I have already given an estimate that 50% of all maintenance costs are hydraulic related in some way or other this figure may actually be 75% based on my experience couple this with my estimated figure that power consumption and other related overhead and variable cost savings could amount to a further 40% in savings.

From a manufacturing point of view a 40% reduction in the machine hour rate alone would increase the competitiveness of any moulding operation and in these difficult times should at least be considered before making a capital investment.

This article is my own viewpoint regarding the hydraulic versus the electric machine debate if you would like discuss to it in anyway or require further information then please contact myself.

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