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Why Switching to AC Drives for Plastic Extrusion Makes Sense

Over 20 years ago DC motors and drives dominated many markets, in particular the plastics and rubber industry. The reason was simple. DC motors were the only electrical machine capable of achieving the high starting torque followed by constant torque at low speeds that typify the requirements of single and twin extruders.

Early-generation AC drives, by contrast, did not provide the high starting torque necessary for an extruder. They did not provide the stable speed control required at low speed for some extrusion applications. AC drives were inefficient in the low speed ranges due to the high initiation current needed at these speeds.

Quite simply, DC motors and drives offered a degree of accuracy and reliability at an affordable price. Production lines around the world boomed with this technology.

Changing technology

With the incredible pace of progress over the past two decades, AC motors and drives are now becoming the replacement standard as old DC machines come to the end of their useful life.

The reason for replacing DC with AC comes down to two reasons. The main costs in any plastics extrusion business are raw materials, labor and energy. At least two of these – labor and energy - are impacted by the DC motor and drive.

High maintenance

Labor manifests itself by way of maintenance costs. DC motors, especially ageing machines, require heavy maintenance. They operate using carbon brushes, which ride on a rotating commutator to form a rotary switch. This results in arcing, wear and graphite dust from the brushes, requiring annual to semi-annual maintenance.

An AC motor, however, uses a very different technique which avoids brushes altogether and is generally less expensive, smaller, lighter, more rugged and, other than occasional bearing greasing, virtually maintenance-free. Maintenance alone, though, is not enough to justify changing to an AC drive.

Efficiency and Losses by Rewinding

If the magnetic core of a failed motor is undamaged and appropriate procedures are followed, a rewound motor will retain its original efficiency. The process for rewinding a DC motor starts with heating the field pole pieces or armature to loosen the old windings. Over heating these cores during this “burnout” process damages the laminations and results in a less efficient motor. Another factor that comes into play is that within the last 20 years, AC motors are becoming the most commonly seen design in many motor repair facilities. Competent DC motor repair technicians are becoming a thing of the past, so the chances of your motor being repaired and returned with mistakes having been made is a real possibility.

On the other hand, those times when a motor has failed are also opportunities to *upgrade* motor efficiency. Especially if the failed motor is 10 or more years old — perhaps with unknown efficiency, and possibly having been improperly rewound in the past — you will want to seriously consider *all* the options, and look into the economics of replacing it with a new energy efficient motor.

What are these realistic options? See the back of this document!

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Technicon, in association with ABB drives and Baldor motors, can provide AC or DC options that can help you in this area. Take a look at these scenarios for a 75 hp DC single line extruder failure. **(Note: These are approximate prices)**

Option 1: Replace the failed DC drive or motor with DC products. **(not including contactors or fusing)**

ABB DCS800 75 HP 480 Volt Drive: $ 3,500.00

ABB 75 HP DC Blower Cooled Motor - 3BSM003050-CAA: $ 32,000.00

Potential total cost: $ 35,500.00

Option 2: Convert the failed DC motor and drive to AC products.

ABB ACS880 75 HP 480 Volt AC Drive: $ 9,500.00

Baldor RPMAC 75 HP Motor - EDBRPM25754: $ 7,900.00

Potential total cost: $ 17,400.00

As you can see, the AC solution is approximately half the cost of the DC motor alone! Additionally, the Baldor motor is a high efficiency, power dense inverter duty motor designed for high torque applications. The ABB ACS880 uses Direct Torque Control, allowing you to control this motor with accuracy never before imagined - open loop with full torque down to zero speed! Of course, each application is unique and needs to be evaluated individually. We would be happy to visit and review your application. Please contact us and we will schedule a time to come and discuss this further. We look forward to hearing from you.

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