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# Plastic bag machine launched with Ethernet-based motion control

Two UK plastic bag machine support specialists have cooperated to launch a machine offering new levels of programmability and bag production flexibility. Based on ABB's Ethernet Powerlink compatible motion control range, the new machine features all-servomotor architecture and a user interface developed from the operator's point of view.

Modern plastic bag making machines often have two servomotor based axes - web feed and cut/seal - plus a mechanically linked third axis for 'picking off' the finished bags. The new machine - a joint development from Hartech Engineering and GPL Machinery - also implements servo control on this third axis to provide programmable 'electronic cam' control of pick-off action. It allows users to finely adjust pick-off so that the machine can avoid the sealing problems that commonly arise as conventional machines are set up to handle different types of blown or cast film materials - to minimise scrap and downtime.

The machine - dubbed the BBM1100 - is built on the mechanical framework of a common bag making machine from Woodbank, who ceased production around a decade ago. There are many of these old machines in the UK, which GPL and Hartech have been servicing and refurbishing for more than a decade. During this time, the two companies have developed numerous add-ons and upgrades based on ABB motion control technology, including replacement servomotor axes and a new user interface.

This proven technical know-how, plus a number of new developments, are now being brought together to create the re-engineered machine. The developers believe a strong market exists for this type of new machinery in local UK and Irish markets, due to the rapidly rising cost of sourcing plastic bags - or bag making machines - from maturing Asian economies that are now having to pass on substantial material cost and wage inflation.

The re-engineered all-servo machine not only offers inherently finer control over manufacturing - and as a result quality and productivity - than many current competitors, it is also extremely price-competitive, costing up to 30 percent less than a brand new machine.

The BBM1100 machine's three axes are powered by drives from ABB's three-phase MotiFlex family, linked to the company's BSM brushless servomotors. Control is provided by the ABB NextMove e100 machine controller with a touch-screen colour operator panel.

Numerous features of the NextMove motion control family have helped GPL to design a bag making machine with more flexibility and productivity.

The Ethernet Powerlink interfaces of ABB's drives and machine controller - with their single network cable interface - provide one major benefit. They substantially reduce cabling to speed system building and lower hardware costs, and simplify subsequent machine commissioning as well.

The ABB NextMove controller also includes enough onboard digital and analog I/O to satisfy all of the bag making machine's I/O requirements. In addition, a high-speed digital input on the drives provides a direct interrupt that capture positions to within a microsecond resolution. This feature is used to support high speed print registration on the BBM1100 - which will operate right up the machine's fastest production rate.

The developers also greatly value ABB's MINT programming language, which provided the machine with high level keywords for many of the motion control operations employed during the bag making cycle. For instance, one of the keywords used in the control software for this new machine architecture is SENTINEL, which allows events to be triggered under software control. In this case SENTINEL synchronises the pick-off axis to a virtual line shaft acting as a 'master clock' for the machine cycle. This allows users to program the profile of the electronic cam with high resolution and precision, rather than being limited by a fixed-profile mechanical cam. It ensures that the machine can be configured to operate in the optimal way for the exact type, grade and thickness of plastic material being processed.

ABB also provided Hartech and GPL with in-depth application programming support during development of the various parts of the new machine. This was of great help during the early stages of control software development.

"ABB provides us with motion components offering genuine real-time performance, plus support for the complete motion control package - all from a single point," says GPL Machinery's Graham Levine. "It's helped us to bring our new machine to market both efficiently and rapidly."

In addition to implementing core performance features in the new machine, the design team has emphasized usability and reliability throughout the design. For example, the user interface has been developed from the point of view of the operator. The machine can be set up for a new batch with just a few touches on the control menus. Operators can also change action on the fly, to adjust the print registration for instance, or the dwell time of the cut and seal bar. Users also have access to deeper configuration possibilities via a password-protected screen. This can be used for purposes such as changing the action of the pick off belts - the grip speed, acceleration and deceleration profile for example. Such settings can be saved and renamed so that operators are able to load a proven bag making setting for any particular job or material within seconds.

A number of hardware features - developed over many years of work in the bag making sector - also endow the new machine with high reliability. Bag making machines have an inherent stop/start movement, and there is always a degree of vibration. So, the machine builders avoided some of the more modern but more fragile feedback technologies, and instead chose to use resolver feedback to measure rotational position - a technology that the machine builders and many of their customers have great confidence in. This preference was made simple by the broad encoder support options available on ABB's MotiFlex drives.

The re-engineered BBM1100 machine is a first step for GPL Machinery and Hartech Engineering. The two companies already have plans for an all-new own-brand machine, which will feature a mechanical chassis of their own design, and a number of new advanced features for this segment of the packaging marketplace.

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**Caption:** New plastic bag machine using ABB's Ethernet Powerlink compatible motion control.

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**For more information please contact:**

**Layla Hewitt**  
**Marketing Communications**  
Phone: 01925 741517  
Email: [layla.hewitt@gb.abb.com](mailto:layla.hewitt@gb.abb.com)

**ABB Ltd.**  
Daresbury Park  
Daresbury  
Warrington WA4 4BT

**Emma Jenkinson**  
**Armitage Communications**  
Phone 020 8667 2218  
Email: [emma.jenkinson@armitage-comms.co.uk](mailto:emma.jenkinson@armitage-comms.co.uk)