



## The future of battery manufacturing is here with the innovative TEC (TEKMAX expandable concept) line

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### 1. History and concept

TEKMAX has produced many types of machines that range from simple, easy-to-operate, low-production machines like the Model 85 Handfed. Brought out in 1980, this machine ran at 45 envelopes per minute. At the other end of the spectrum were the complex, high-production machines like the Model 2500, which runs at 220 envelopes per minute using five feeders.

Feedback from the battery manufacturing industry was that the machines were rigid in design, difficult to change over and had feeding methods that caused repetitive motion injuries. Although they did offer speed, they did not offer flexibility. By getting input from various battery manufacturers around the world, TEKMAX decided that the best approach to overcoming this inflexibility was through modularity. The result is the TEC Line.

Not only do you get to configure your assembly line initially, but also the system is structured around retrofitability. TEC Line owners are also encouraged to assist in the design of specific modules that conform to their individual manufacturing needs.

The concept behind production of the TEKMAX TEC Line is to provide equipment that will help customers quickly adapt to the changing demands of today's battery-production requirements.

### 2. Machine specifications

The production speed for polyethylene material on the TEC Line is 200 envelopes per minute with a component design speed of 220 envelopes per minute. The production speed for AGM is 120 wraps per minute.

The TEC Line accommodates a wide plate range to satisfy the requirements of today's battery manufacturer. With a plate height range of 88–254 mm and a plate width range of

98–203 mm, the TEC Line is the most versatile enveloper on the market.

### 3. Unwinds

There are many unwind options available with the TEC Line. Customers can choose from customary unwinds, such as the pedestal and heavy-duty pedestal. However, they can also select the high output dual-inline unwinds with automatic and semi-automatic splicing for both PE and AGM separator materials. The automatic splicing feature combined with auto-rejection can save 30 min or more of down time in a shift for roll changes.

### 4. Main machine

The TEC Line is a modular, building-block assembly line that uses a basic drive platform on which the rest of the machine is built. Downdraft ventilation is designed into the base of the machine frame. The mechanical drive systems are all mounted above the ventilation at 57 cm for easy access. Because of this design, the drive system is isolated from lead oxide to reduce contamination, wear, and the maintenance associated with lead contact.

Another unique feature of this TEKMAX assembly line is that it only uses two feeders for all group configurations. This design not only reduces mechanical complexity, but it also greatly simplifies the automation of the loading process. The straightforward design of the TEC Line results in reduced maintenance and changeover time.

### 5. Tracks and cutter/folder/sealer

The adjustable slide-in track tooling of the TEC Line enhances the flexibility of this assembly line. Customers can:

- (1) mechanically adjust the machine tracks for each of their plate widths;

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- (2) have one set of quick-change tooling for each plate width; or
- (3) have any combination of #1 and #2.

Separate tooling reduces equipment down-time by permitting maintenance and set-up on track systems not currently in use.

Modular Cutter/Folder tooling allows customers to quickly adapt their TEC Line to produce precise separator lengths that cover the complete range of specified plate heights.

Conversion from AGM to polyethylene separator material is simple with the drop-in Pressweld<sup>®</sup> sealing module.

## 6. Feeders

### 6.1. Hi-Flo feeder

The all-new TEKMAX Hi-Flo Feeder provides reliable feeding of automotive plates at 200 plates per minute operating speed with little regard for plate quality. The plates are fed off of the top of the incoming plate stacks as they are moved up a simple inclined conveyor, avoiding complex and complicated mechanical indexing systems.

With total automation and elimination of repetitive motion injuries in mind, TEKMAX made the Hi-Flo Feeder self-loading from horizontal plate stacks. This positions TEC Line customers to add auto-blocking of plate stacks transferred by conveyor from the drying ovens. These additional features result in a totally automated enveloping system.

### 6.2. Hi-Flo plus feeder

The Hi-Flo Plus Feeder offers all of the features that the Hi-Flo Feeder provides. However, this second feeder has the added ability to feed the entire range of plates at a somewhat reduced speed. This wide range of plate sizes is accommodated with minimal feeder adjustments.

### 6.3. Plate lug preparation

Lug straightening is an available feature for expanded metal, con-cast and con-roll plate types. This provides obvious benefits to customers whose plate quality is less than perfect.

Two lug brushing stations (top and bottom) provide independently adjustable lug cleaning and support. A quick-release positive hold-down system firmly grips the

plates between driven top and bottom belts throughout the brushing process.

## 7. Stackers

### 7.1. Vertical stacker for polyethylene

Polyethylene assembly line requirements can be met with a wide variety of lengths and configurations of vertical stackers. Multiple custom group alignment modules are also available to meet customer-specific needs.

#### 7.1.1. Optional rejection

Optional defect rejection with group-count correction that functions flawlessly to the maximum speed of the machine is available. Automated monitoring and rejection of a number of quality defects are available, including Separator Strip Defects and Mis-aligned envelopes. Choices like these give you the ability to increase production without sacrificing speed or quality.

### 7.2. Horizontal stacking for AGM with rejection

The tough job of building quality VRLA batteries has become even easier with the TEC Line horizontal stacker. Groups are aligned as they are built to within  $\pm 1$  mm on the X and Y-axis without damaging the AGM material!

Rejection of quality defects is included as standard with the horizontal stacker.

## 8. Summary

The building-block design of the TEKMAX TEC Line redefines the standardization process for the battery industry. The TEC Line enables you to initiate standardized training with standardized tooling and do preventative maintenance using standardized spare parts.

All this flexibility comes in a fully upgradable package that allows customers to start with a basic machine. When production demands dictate, they can develop it into a fully automated assembly line.

The TEKMAX TEC Line is designed to become the fully automated link between the customer's drying ovens and the COS machine. It will do this without operator intervention under normal operating conditions and will eliminate repetitive motion injuries.