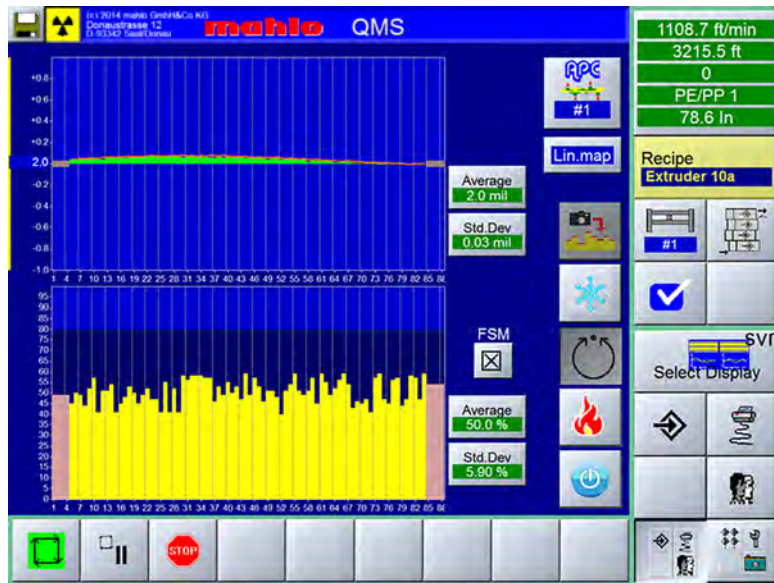


## The Mahlo APC Pro Automatic Profile Control System

Automatic Profile Dies for extrusion and coating are seeing increased use in plastic film and sheet extrusion, die coating and lamination applications with ever stricter control requirements. Mahlo has responded to these market needs by providing coating and converting measurement and control solutions incorporating automatic die control for the past two decades. Our newest generation Automatic Profile Control System (APC), refined in conjunction with major autodie manufacturers is the Mahlo Diecontrol APC Pro



### Mahlo Diecontrol APC Pro

The Diecontrol APC Pro consists of a user-friendly interface that is fully integrated into the main Qualiscan QMS System Operator Station. The control hardware uses a reliable industrial PLC with quick change SSR modules. All components are individually fused and incorporate status indicators for communications and I/O. The APC Pro cabinet is laid out with ample space for maintenance and is capable of both high power diebolt heater applications as well as very wide dies. Most Mahlo APC Pro Systems come pre-wired to the mating connector of the autodie power cable to make it truly plug-and-play.

#### Mahlo Diecontrol APC Pro Features:

- Interface Fully Integrated into the Qualiscan QMS Operator Station
- Fast Start and Kick for Accelerated Control During Startup and Changeovers
- Continuously Monitors for Die Bolt Heater Failure
- Neighboring Die Bolt Compensation
- Automatic Die Bolt Re-Mapping
- Automatic Self-Tuning
- Predictive Neck-In and Edge Bead Compensation
- Comprehensive Recipe Management
- Compatible with all Autodies
- Low Maintenance Modular Design



Fig. 1: APC Settings

## Mahlo Diecontrol APC Pro Highlights:

### Fast Start and Kick Modes

How can scrap be reduced to the bare minimum after a startup or changeover? What is the fastest way to achieve saleably flat product? The answer is the Mahlo Fast Start and Kick

- Fast Time to Weight / Thickness Specification During Startup and Changeovers
- Feed Forward Control Algorithms
- Overdrive Die Bolt Heaters for Short Duration
- More Aggressive Neighboring Diebolt Compensation
- Control Adjustments after Every Scan starting with the very first
- Disable Same Spot Synchronization

When Fast Start is selected, the PID tuning, neighboring diebolt compensation, and control damping are set to much more aggressive values (User Selectable), and the diebolt heaters are overdriven for a short duration with control action performed after the first scan. When the product is flat to within a recipe-dependent standard deviation or footage, the control reverts to normal control mode. The result is a flat, in-spec sheet in the shortest possible time and in the shortest length of material! Kick mode is used for heavier sheet extrusion and operates on the Proportional control component only.

## Diebolt Heater Testing

Included as standard with the Mahlo Diecontrol APC Pro is our Automatic Diebolt Heater Testing feature which measures for heater continuity upon startup and automatically at user-selectable intervals. Not only does the APC Pro detect and alarm in the case of a heater failure, it even identifies the specific bolt that has failed! Then the APC Pro compensates for the failed diebolt using its neighboring diebolt heaters until the defective heater is replaced. And this is all performed automatically!

## Predictive Neck-In

The amount and shape of neck-in & edge bead is dependent on a large number of parameters – polymer, melt temp., extruder and haul-off speeds, roll distance, die design attributes, etc. The Mahlo Diecontrol APC Pro incorporates preprogrammed neck-in algorithms to provide correct non-linear necked-in diebolt mapping.

These innovative features of the APCPro are focused on a single goal: control the crossmachine profile to the flattest possible in the shortest amount of time and material.

Coupled with Mahlo's large selection of precise measurement sensors and the industry's most rugged and reliable scanner offering, Mahlo's APCPro Automatic Profile Control System has achieved this goal.

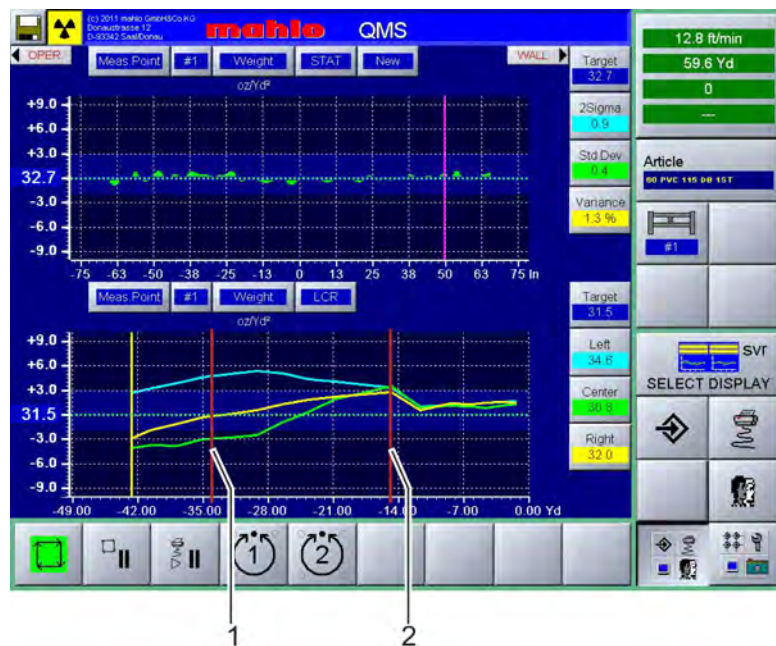


Fig. 2: Qualiscan QMS Diecontrol APC Pro User surface

- 1 Diecontrol APC Pro Start
- 2 Std Dev  $\leq 0.5$