

Melt-Detect™

Introduction:

Dukane's patented Melt-Detect™ feature, also referred to as Force Drop (US 8,052,816 and US 8,720,516), is used to ensure complete initiation of melt, which leads to improved weld strength and reduced stress in the welded assembly. When this feature is enabled, the horn travels down until the set trigger force is registered. At this point, the horn stops and the ultrasound is initiated. Once the desired drop in force is detected, signaling that the parts have begun to melt and collapse, the horn will continue to travel and compress the part for the programmed weld.

Melt-Detect™ is especially useful for applications where it is difficult to achieve the required amplitude to melt the parts. This feature is one of the fundamental components of Dukane's patented **Melt-Match®** technology and provides stronger and more consistent weld results.

Should Melt-Detect™ be used for your particular application?

If any of the conditions below are present in your application, then Melt-Detect™ should be used:

- 1) The energy director seems to be deformed rather than melted after welding.
- 2) Melt is initiated at discrete points rather than uniformly around the joint.
- 3) The horn and booster available for the application provide little gain.
- 4) The material of the parts requires high amplitude to weld.
- 5) The desired weld strength is not being achieved, or its standard deviation is too high.

Melt-Detect™ Settings:

Trigger					
Type	Force	Max Trigger Time	Sensing Speed	Sensing Start Position	Teach
Force	65.0 lb	1.000 s	0.0500 in/s	1.5000 in	
<input type="checkbox"/> Enable Advanced Trigger Settings					Advanced
Weld					
Primary Method	Distance	Max Time	Secondary Method		
Distance	0.0200 in	1.000 s	Disabled		
<input checked="" type="checkbox"/> Enable Melt-Detect™	After Force Drops By: 5 %				
Weld Profile	Speed				
Constant	0.0400 in/s				
Post Weld					
Dynamic Hold Method	Hold Distance	Speed	Max Time	Travel Limit	Teach
Distance	0.0020 in	0.0600 in/s	1.000 s	2.0000 in	
Static Hold Method	Hold Time				
Time	0.500 s				
<input type="checkbox"/> Afterburst					

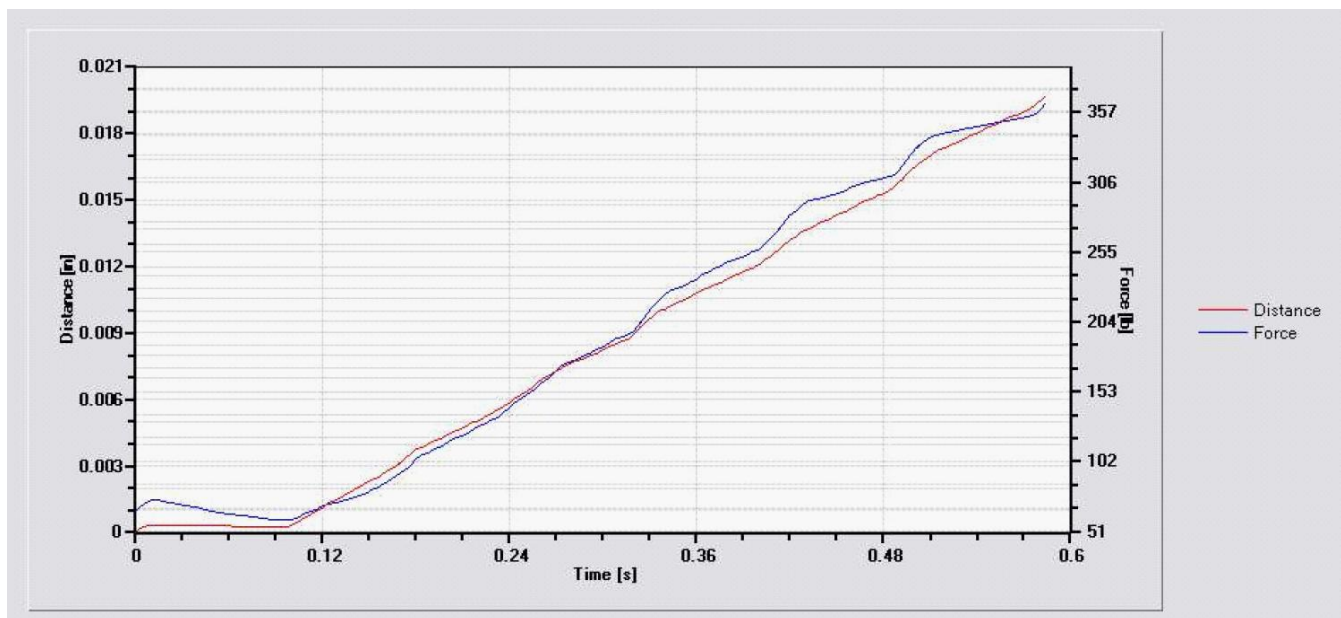
Advanced Servo

View Live Data

Melt-Detect™ Setup Sequence:

- 1) Enter a normal set-up using Trigger by Force or Trigger by Power as the trigger method.
- 2) Check the “Enable Melt-Detect™” or “Start Motion After Force Decreases By” box.
- 3) Set the “After Force Drops By” or “Force Drop” to approximately 5% - 10% of the trigger force.
- 4) Weld parts!
- 5) If the weld collapse was not achieved within the allowable time (Weld Timeout), the Force Drop may be too high. Refer to the graph of the weld to determine if the force ever decreased by the programmed amount.
- 6) If weld improvement is not observed, the Force Drop may be set too low.

Graph of weld cycle where Melt-Detect™ was used:



In this example, weld motion is initiated after the force drops by 3.25 lbs (5% of the 65 lbs force).

Examples of applications where Melt-Detect™ may be useful:

- Large assemblies with semi-crystalline materials

For parts larger than about 4" diameter or square it is difficult to provide gain in the horn, and often horns of this size cannot be used with high ratio boosters. Semi-crystalline materials require high amplitude to weld, such as polyamide (Nylon) or polyoxymethylene (Acetal). In this instance the ability to initiate melt before collapsing the part through control of the servo motion is a great advantage.

- Parts with worn or non-ideal joint designs

For some applications it may not be possible to ensure a small initial contact area at the joint, whether due to wear of the mold or design restrictions. In these cases, melt initiation time will be increased and weld strength can be greatly improved if the parts are not collapsed until after melting begins at the joint surface.

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