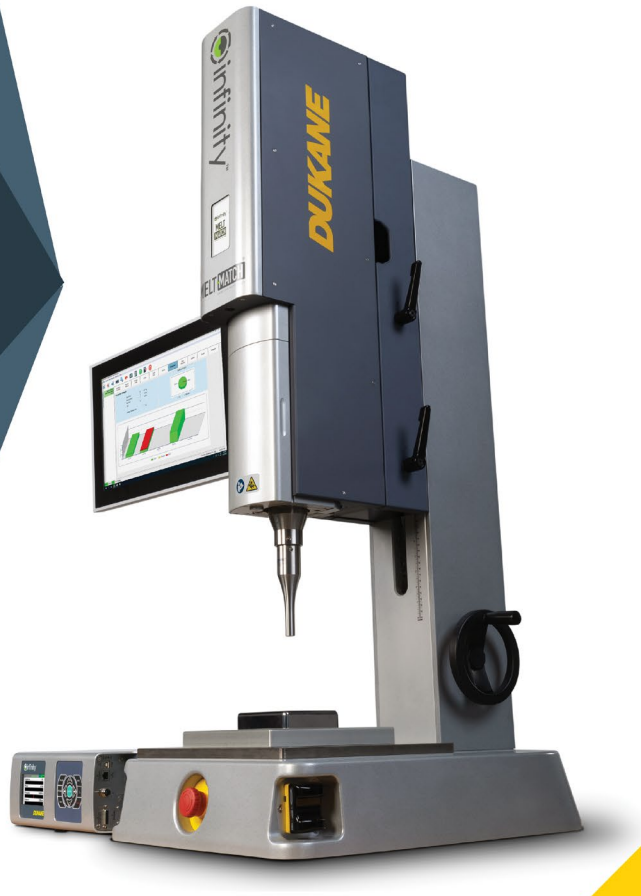
DUKANE

# Infinity™ Series

## Melt-Match® Technology using Melt-Detect™ in Infinity Servo Systems

## Application Note AN538




www.dukane.com ussales@dukane.com

# Using the Melt-Detect™ Feature in the Dukane Infinity Servo Welder

Dukane's groundbreaking Melt-Detect™ feature, also known as Force Drop (US 8,052,816 and US 8,720,516), plays a pivotal role in ensuring the comprehensive initiation of the melt process. This innovative technology not only enhances weld strength but also minimizes stress in the welded assembly.

The purpose of Melt-Detect™ is to regulate the rate of heat generation within the part, both before and during the transition from a solid to a molten state. This is crucial as it directly influences the melt characteristics throughout the remainder of the welding process. In a typical weld cycle utilizing Melt-Detect™, the horn descends and applies pressure to the part. When the force against the part surpasses a predetermined threshold, ultrasound is activated.

In a conventional design lacking Melt-Detect™, the horn would persist in its motion, intensifying the force against the part. If the plastic hasn't initiated melting, there is risk of crushing the energy director, rendering it ineffective and preventing any melt initiation. Melt-Detect™ interrupts the motion of the horn to prevent an increase in force. This allows the plastic to transition to a softened or liquid state without experiencing additional pressure, thereby averting the mechanical deformation and damage that can result in inconsistent weld performance.

We determine the necessary pause duration by monitoring the force. As the plastic melts, the force decreases. By detecting this reduction, we ascertain the optimal moment to resume horn movement for part assembly. By optimizing the value of the force drop observed, we can ensure a given resin reaches its softening or melt temperatures before the weld collapse occurs.

This distinctive capability proves invaluable in applications where achieving the necessary melt is critical to assembly function. Melt-Detect™ stands as a foundational element within Dukane's patented Melt-Match® technology, delivering consistently stronger and more reliable weld results. This sophisticated feature not only meets the demands of intricate applications but also elevates the overall welding process, ensuring optimal outcomes and heightened performance.

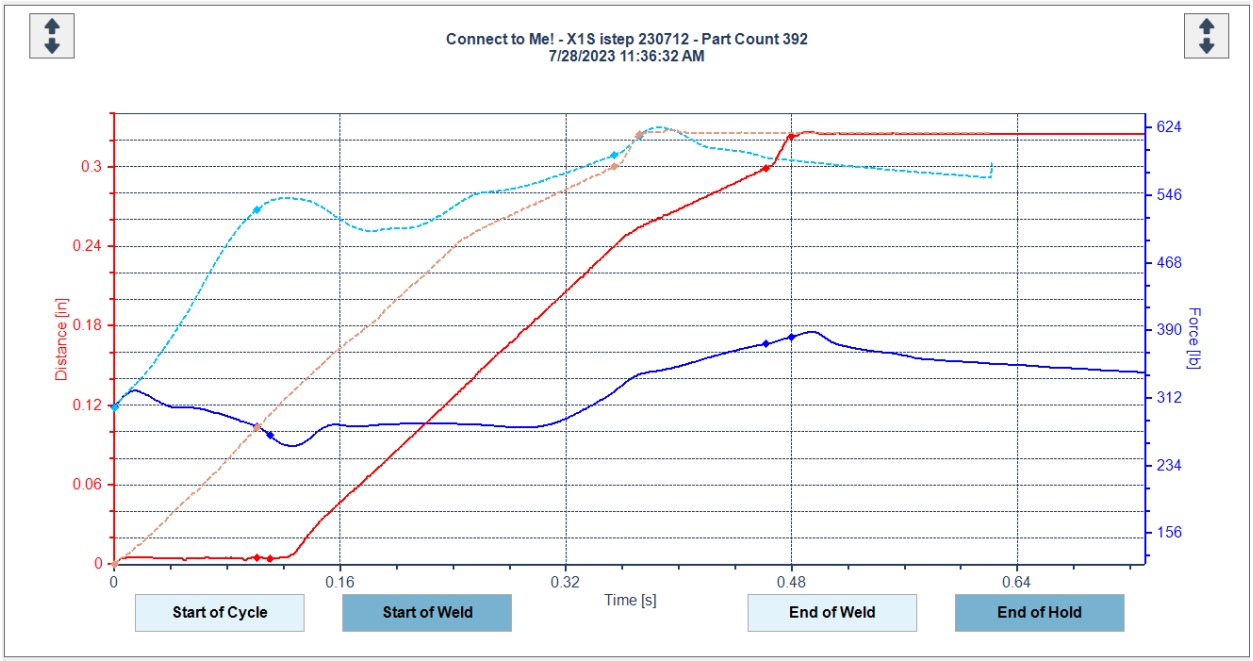
## Should Melt-Detect™ be used for your application?

It is recommended to utilized Melt-Detect™ for nearly all weld setups conducted on a Dukane servo welder. The feature is notably useful in the following cases:

- When the energy director appears deformed instead of melted after welding.
- If melt initiation occurs at discrete points rather than uniformly around the joint.
- In situations where the horn and booster may not provide sufficient amplitude to quickly melt the intended resin.
- When the materials to be welded demand significant amplitude to melt using ultrasonics.
- In cases of insufficient weld strength.
- When the weld process lacks capability.
- When dealing with parts at the extremes of ultrasonic bonding capability – parts that are either very large or notably small.

## Melt-Detect™ Setup Sequence:

1. Enter a normal setup and select Trigger by Force or Trigger by Power as your trigger method.
2. Check the “Enable Melt-Detect™” box.
3. Set your “Melt-Detect™ Force Drop” to approximately 5%-10%. This represents 5%-10% of your programmed Trigger Force. These values are valid for most welding applications.
4. Weld a part. Ensure your other process parameters are also set before welding an assembly.
5. Navigate to your Cycle Data and ensure the weld was completed as intended; check the Weld Time field to ensure the weld did not timeout.
6. Navigate to your Graph and ensure the programmed force drop was achieved as intended. The force should drop the programmed amount.
7. Analyze your part quality. Adjustments should be made to Melt-Detect™ value if the force does not continue to drop after Melt-Detect™ has been reached. Force rising immediately after achieving Melt-Detect™ is an indication that the appropriate softening or melt temperature was not achieved; see example graph below:




The sample graph shows a weld using Melt-Detect™ (solid lines), and one without using Melt-Detect™ (dotted lines). No other settings were altered. As can be observed, without allowing for the initial melt to occur, the weld force rises quickly and is significantly higher throughout the whole weld. This results in poor bond strength, as the plastic did not sufficiently melt.

# Contacting Dukane

## Identify Equipment

When contacting Dukane about a service–related problem, be prepared to give the following information:

- Model number, line voltage and serial number.
- Alarm/Fault indicators from the display.
- Software version (Press **INFO**. With selection indicators at **System Information**, press **ENTER** to get this data).
- Problem description and steps taken to resolve it.

Many problems can be solved over the telephone, so it is best to call from a telephone located near the equipment.

## Mailing Address:

Dukane IAS

2900 Dukane Drive

St. Charles, IL 60174 USA

**Phone:** (630) 797–4900

**E-mail:** *ussales@dukane.com*

### Website

The website has information about our products, processes, solutions, and technical data. Downloads are available for many kinds of literature.

This is the address for the main website:
*www.dukane.com*

### Application Support

You can get application support at the following link below:
*https://www.dukane.com/support/#application-support*

## Local Representative

You can locate your local representative at:
*www.dukane.com/contact-us*

Please refer to our website at:

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to locate your local representative.

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