RoMan MANUFACTURING

THE POWER TO TRANSFORM™

The Features and Benefits of The New Fast Rise Time MFDC Welding Technology

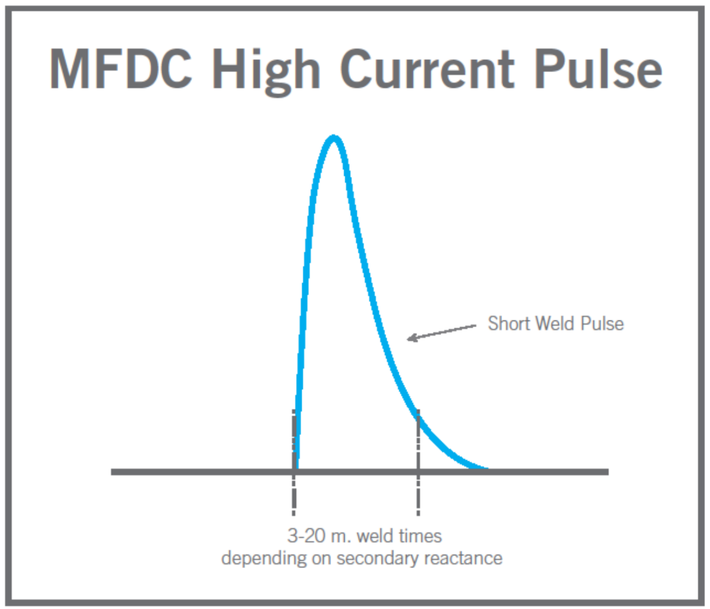
Question—What is Fast Rise?

Answer

Weld current rise time is the period of time it takes for a weld current to rise from no amperage to its target current.

How Fast?

3-20 ms Weld Times vs Conventional 60-200 ms Weld Times

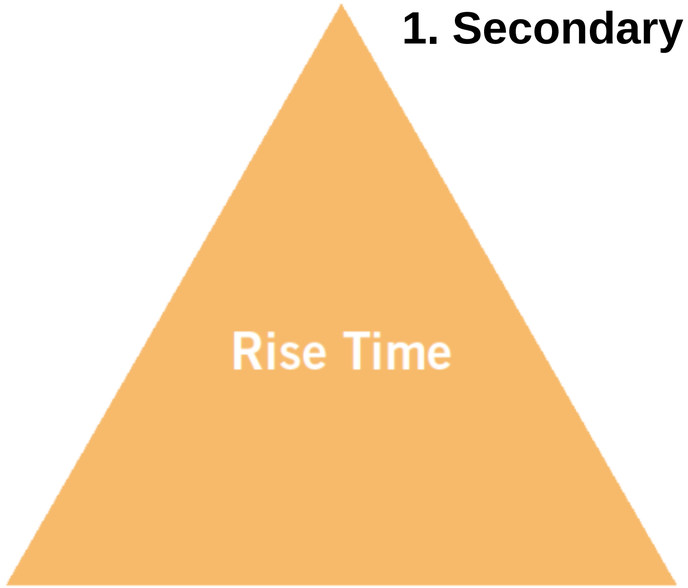


Why is Fast Rise Important?

- Variance in projected weld nuts and studs, along with specialized steels such as “Hot Stamped or Press Hardened” (1,200-1,300 MPa) have proven difficult to weld with conventional methods and equipment.
- Some aluminum welding applications have shown best results with fast rise time secondary currents
- Using fast rise time equipment has provided more stable and consistent results.

What Variables Influence Rise Time?

1. Secondary Impedance



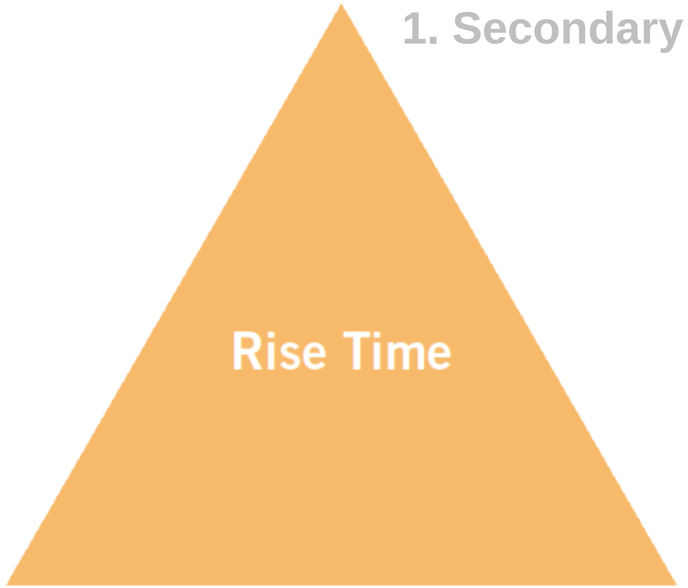
2. Secondary Voltage

3. Weld Control Capacity

Changes to the secondary impedance including: transformer resistance, weld tool secondary design, shunt sizes, conductor sizes and length.

What Variables Influence Rise Time?

1. Secondary Impedance



2. Secondary Voltage

3. Weld Control Capacity

Increases in secondary voltage drives faster rising rate currents. However, due to the turns ratio, change for higher voltages, it will increase primary demand.

What Variables Influence Rise Time?

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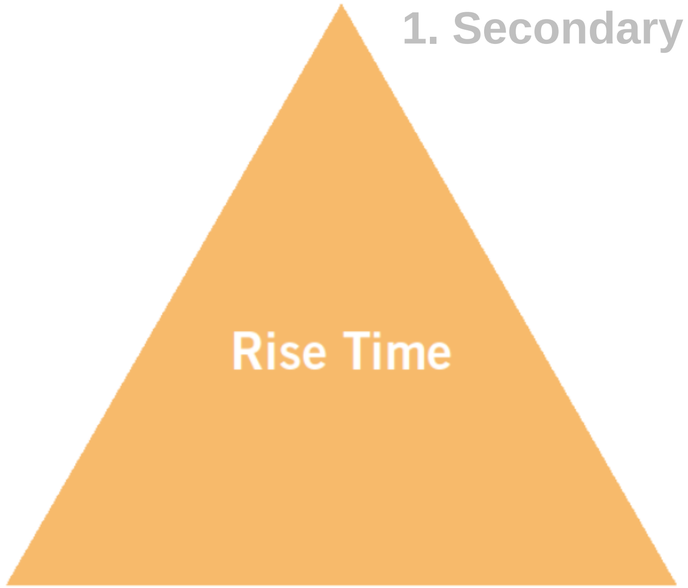


2. Secondary Voltage

3. Weld Control Capacity

Weld control software plays an important part in Rise Time. Controls at times have “governors” in place to control accuracy or protect hardware—if so, this will tend to slow down the rise

How Is Fast Rise Time Achieved?

Until recently the most common process to achieve Fast Rise Time was Capacitive Discharge Welding best known CD or CDW.

Now, there is a more advanced product available which delivers the same results while providing additional benefits—RoMan’s FRT-MFDC

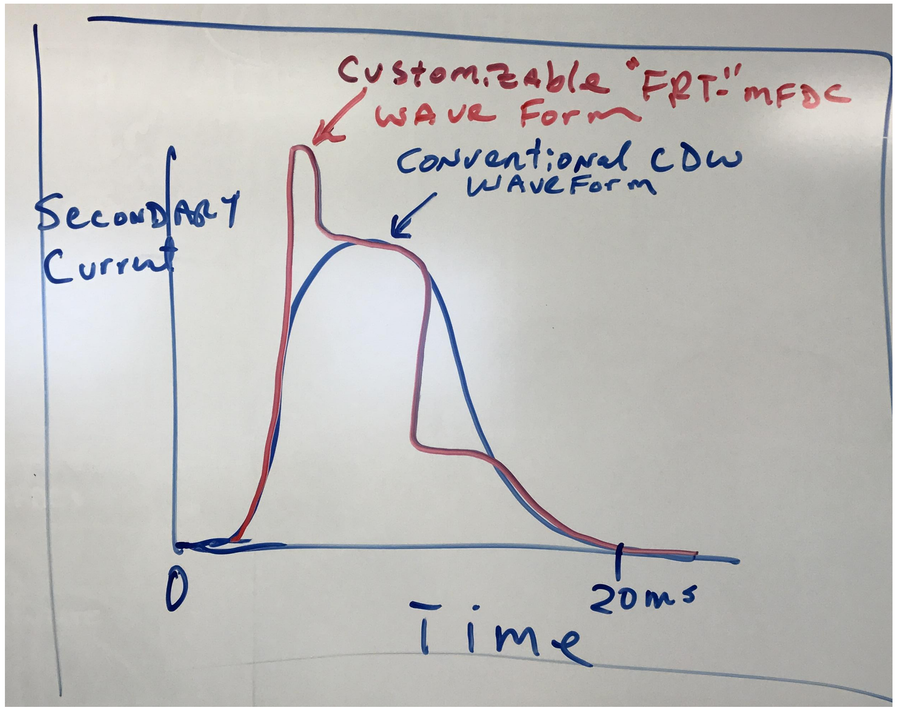
Capacitive Discharge Welding (CDW) & RoMan's FRT-MFDC

Both Capacitive Discharge Welding (CDW) and RoMan's FRT-MFDC have many advantages over other welding processes, including:

- Weld nugget formation takes place during the first few milli-seconds of the welding process
- Allow extremely fast energy release with large peak currents
- A greater percentage of the energy goes into weld formation and less into heating surrounding material
- The heat affected zone, where the properties of the metal have been changed by rapid heating and cooling, is localized to a small area around the weld spot.
- The quick discharge rate allows electrically and thermally conductive materials, such as copper or aluminum, to be welded
- Both CDW and FRT-MDFC deliver repeatable welds even during line voltage fluctuations

What's the Difference Between the Two?

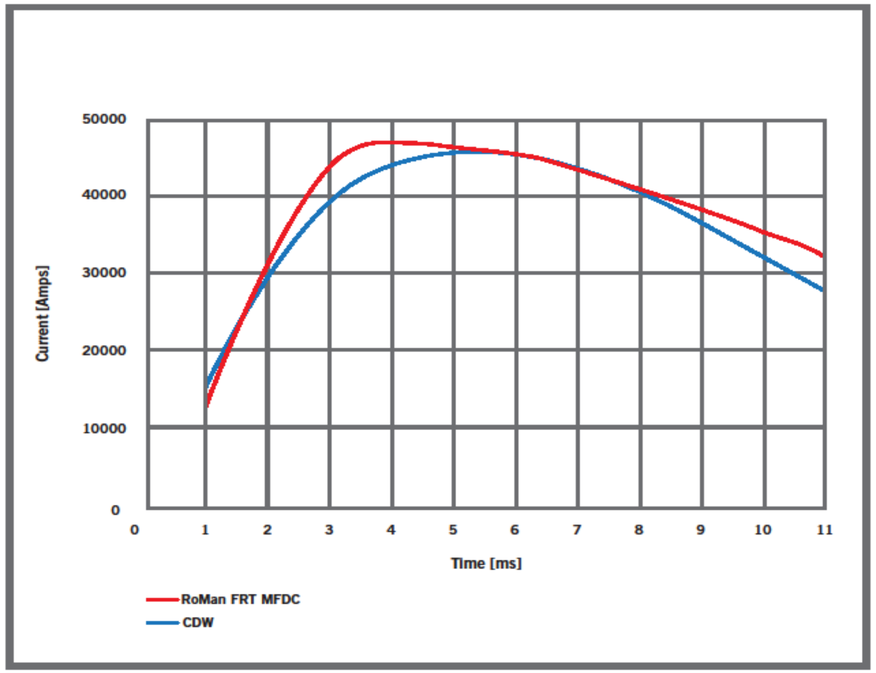
The RoMan FRT-MFDC transformers **do not** use capacitors to store energy. This allows the operator to program custom wave shapes using the MFDC weld controller. CDW technology **does not** allow the customization of the wave shape.



What's the Difference Between the Two?

In many cases the RoMan FRT-MFDC technology can achieve faster rise times compared to CDW. The RoMan FRT-MFDC technology allows welds to be made every half second. CDW generally requires one to two seconds between weld to allow charging of the capacitors. Capacitors also have a limited life based on number of charges.

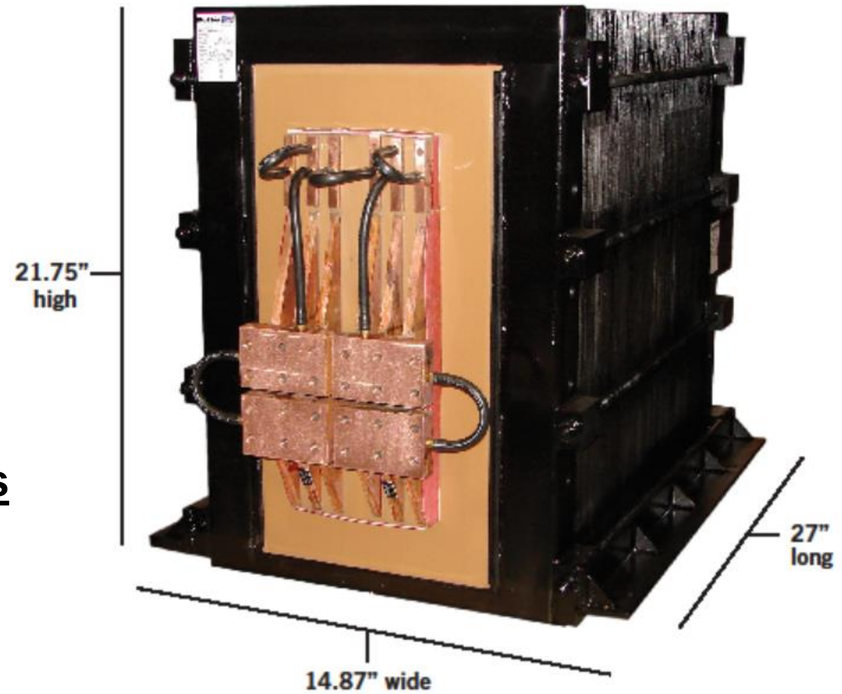
The graph below show RoMan's FRT MFDC (Red) and CDW (Blue) and time to current peak and hold levels.



Note: These wave shapes were taken from the **SAME** production machine.

RoMan's CDW transformer compared to RoMan's FRT-MFDC Power supply

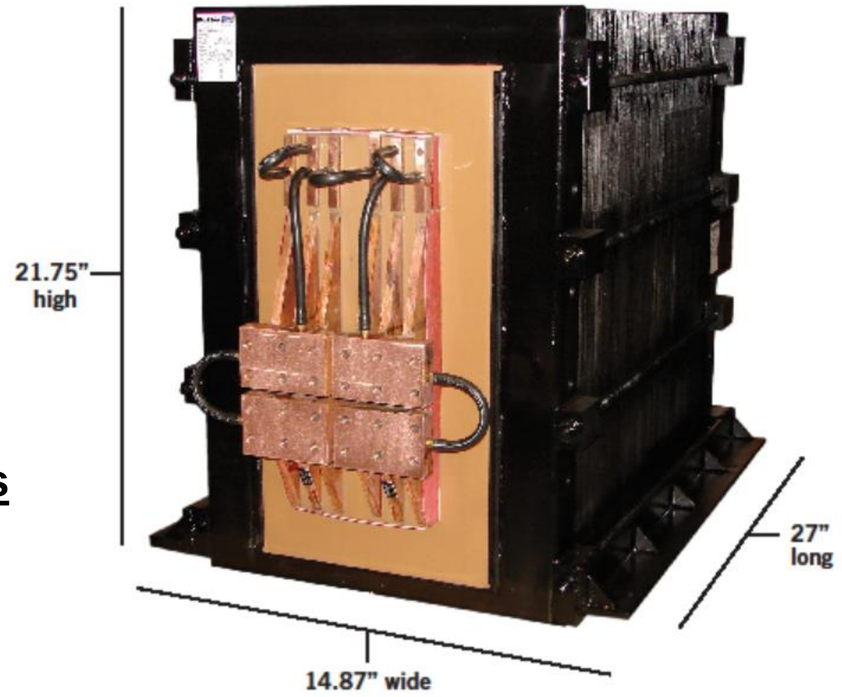
1200 pounds



A/C Tx
"Old" Technology

RoMan's CDW transformer compared to RoMan's FRT-MFDC Power supply

1200 pounds



A/C Tx
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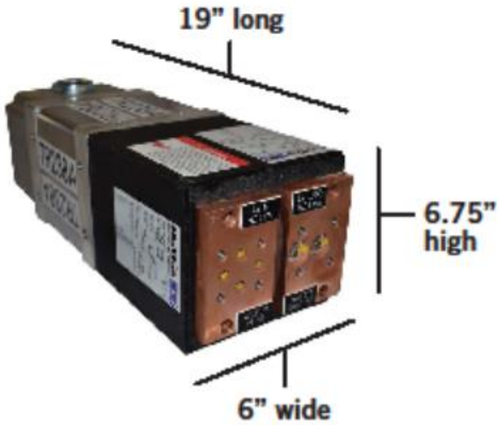


F.R.T. MFDC
"New" Technology

110 pounds

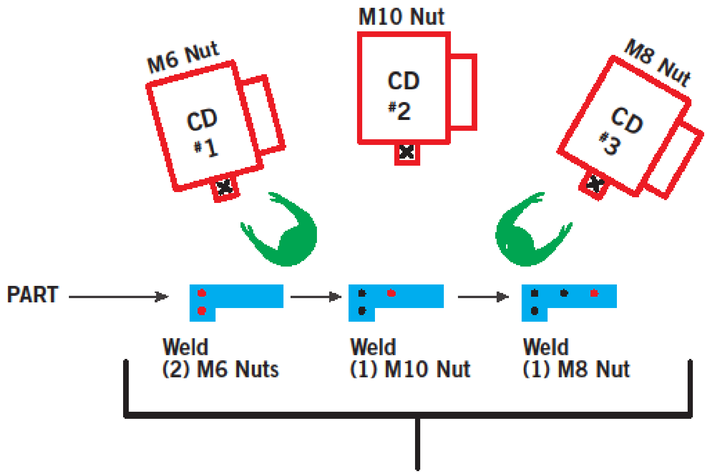
Comparison of CDW vs. RoMan's FRT-MFDC

The following example is from an actual customer production application using CDW and then converted to the RoMan FRT-MFDC.

Initial Customer Solution using CDW process to solve weld issues on Hot Stamped / Press hardened steel.

Customer application using CDW Technology

Initial Customer Solution using CDW process to solve weld issues on Hot Stamped / Press Hardened Steel.

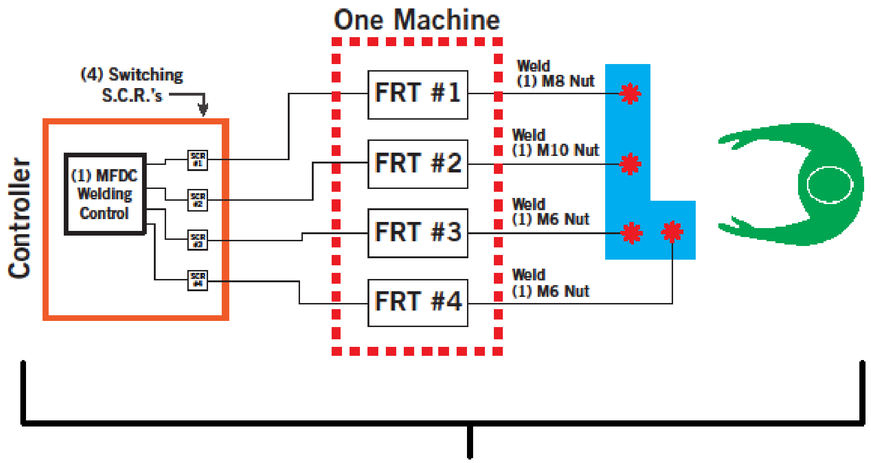


"Old" CDW Welding System

- **3** Dedicated CD (Capacitive Discharge) Welders
- **2** Operators
- **2** Parts Every Minute

Customer application using the RoMan FRT-MFDC Technology

Customer application using RoMan's FRT-MFDC process to solve weld issues on Hot Stamped / Press Hardened Steel.



Sequence of Operation

- Part loaded
- All 4 guns in at once
- Sequence though SCR's (1-4)
  - **All welds done in less than one second**
- All 4 guns out at one time
- Unload part
- Repeat

RoMan FRT-MFDC Welding System

1 Weld Controller
1 Machine with 4 Roman FRT MFDC's
1 Operator
10 Parts Every Minute

The RoMan FRT-MFDC Features and Benefits

- Smaller transformers than CDW machines, requires less space
- Uses standard weld controls, where CDW is control brand sensitive
- Unlike CDW, the RoMan's FRT-MFDC can provide custom current wave shapes
- Easier removal of metal coating (breaks through coating) than CDW (Using custom wave shape)
- Increased Productivity
- Lower operating and labor force cost (using multiple FRT units in custom tooling vs. single/standalone CDW type equipment)
- FRT has proven to be less expensive in many applications compared to the CDW process.
- Can be re-used or repurposed as needed—CDW lacks this flexibility

Questions?