

**Traditional repair and joint elimination welding is expensive and challenging** to coordinate in today's PSR environment, especially when factoring in the disadvantages of thermite compared to flash-butt welding, repair time and rail cost.

**Holland's short plug flash-butt welding** process provides railways with a **cost-effective** way to take advantage of the **benefits** of flash-butt welding over thermite welding.

### TRADITIONAL REPAIR WELDING GANG

- 20-40' Plug
- Gang consists of:
  - Holland welding truck
  - Grapple truck
  - Crew truck
  - 6-8 railroad employees
  - 2 Holland employees



### HOLLAND SHORT PLUG FLASH-BUTT REPAIR WELDING GANG

- 5' Plug (Wood & Concrete Ties)
- Gang consists of:
  - Holland Welding truck
  - Crew truck
  - 4 total railroad / Holland employees
- Ability to crop to specific crib spacing
- Plug is long enough to cover the length of a mechanical joint. 6-8 plugs of varying wear limits can be carried by an F550 with a small boom. This eliminates the required use of a grapple or larger maintenance truck.



## SHORT PLUG WELDING ADVANTAGES

- Superior **joint strength and durability** compared to thermite
- A single **4-man crew** can match the production of 3 thermite crews
- Typical repair takes between **1 hour** to 1 hour and 15 minutes
- Using 5' plugs out of a 40' or 20' rail, there is **no scrap**
- A small gang is more **nimble** than a large repair gang



## HOLLAND SHORT PLUG FLASH-BUTT REPAIR WELDING GANG

Features	Flash-Butt Weld	Thermite Weld	Flash-Butt Advantage
Basic Metallurgy	Forging	Casting	Joint is as good as parent material. No porosity, voids or inclusions. No filler material.
Automated Process	Yes	No	Less dependent on operator skills. Consistent, higher quality.
Heat Affected Zone	40-60 mm	145-185 mm	Better head wear surface under traffic
Full Rail Profile Shear	Yes	No	Better fatigue life of joint. Flush rail - no protusion.
Personal Hazard	Low	High	No molten metal masses
Failure Rate	Low	High	Higher efficiency and productivity

- Reduces maintenance **costs**
- **Faster** installation
- Lowest **life cycle** cost
- **Saves** track time
- **Minimizes** corrugation
- **No** weld filler material
- Smaller **heat affected**
- **Smaller** annealed zones
- **Consistent** hardness
- Highest **fatigue resistance**