

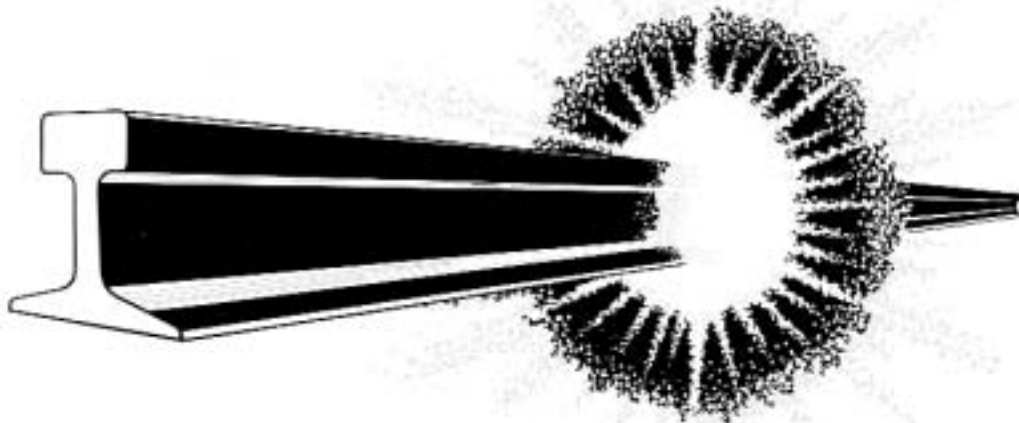
Mobile Flash Butt Welding Systems



PROGRESS

RAIL SERVICES

A Caterpillar Company



CHEMETRON

RAILWAY PRODUCTS
Progress Rail Services Welding Division



Mobile Flash Butt Rail Welding Systems

Reliability And Performance

Chemetron Railway Products, Inc. is a subsidiary of Progress Rail Services Corporation (a Caterpillar® company). Chemetron has been designing, manufacturing and operating rail welding equipment for over 50 years. During that time, our weld systems have made over 25 million welds and we provided welding equipment for use around the world. We own and operate fixed plant and mobile welding equipment throughout North America. In addition, Chemetron-built welders are owned and operated by many major railroads. At Chemetron, we are continually expanding our in-track welding fleet to meet increased customer demand for our welders and services. Sixteen new machines were manufactured in the last two years and all were immediately put to work on North American Class 1 railroads. Additional machines are scheduled to be completed in 2009.

Chemetron is very excited to announce the addition of a multi-purpose welding head to our in-track fleet. Following the development of the world's first DC power for in-track welders in our CHEM 110 machines, we designed a 180-ton in-track welding head that is capable of making closure welds up to a 10-inch gap without a separate puller unit. Now both of these weld systems are available to the global market. The DC weld heads allow for greater efficiency of the generator thus allowing a smaller generator with more welding current than competitive AC machines.

Our mobile welders are designed to equal or exceed the quality and reliability of fixed plant welds. Our mobile welder combines the industry's most advanced welding technology with the reliability and consistency that Chemetron designs into all its welding systems. In addition to improved productivity and quicker setup, our patented software automatically detects if the rails are properly positioned and applies the proper hold times for a closure weld. If no stretch is detected, our normal electric flash weld parameters are applied. All of Chemetron's welding systems also contain complete self-diagnostic software to allow for easy maintenance and repairs. Chemetron welding systems can be accessed via cellular modem in the event technical assistance is needed from our U.S. headquarters. All of the systems are designed for extreme hostile environments with protection from shock, vibration, temperature, and humidity built-in. Performance and reliability of the systems are designed to emulate fixed plant machines. The maintenance procedures adhere to MTBF schedules. Every unit has complete self-diagnostic systems built-in that operated through user friendly displays. Spare components are commonly available and easily accessed throughout the world.



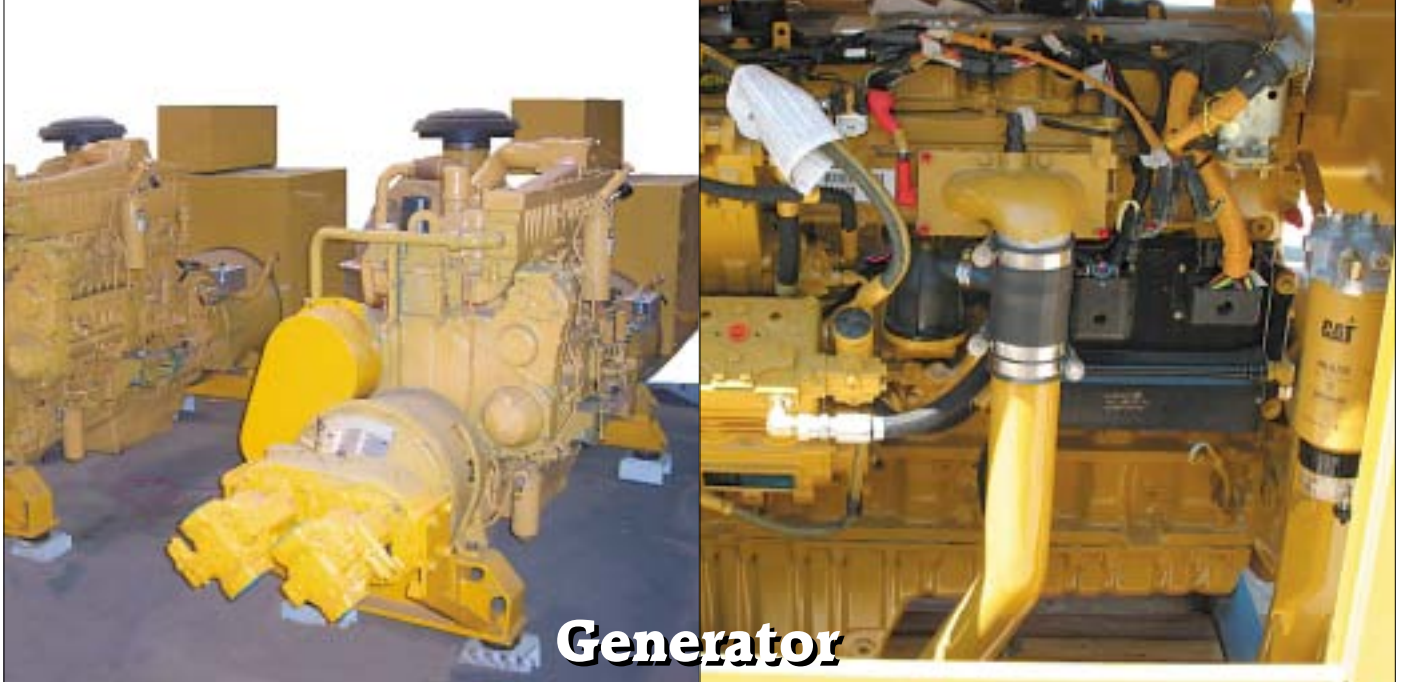
Fully Enclosed Mobile Track Welding Container

For versatility on various gage railways, we offer our Flash Butt Welding Machine as a stand alone container. It is ready to mount on a truck chassis equipped with appropriate hi-rail gear or on stands to use as a portable welding plant or mount on existing flat cars for in-track capability. The user only needs to connect the unit to a supply of fuel and it is ready to weld. The CHEM 110 container shown above has been in operation in Argentina since early 2007 and, after completing approximately 3,500 welds in the setup as seen as a portable welder, it was mounted on a flat car and has since produced over 6,000 welds in-track.



General Description

The system is fully self-contained complete with a diesel engine (Caterpillar) generator set with an integral cooling system. All our welding systems are built at our headquarters in Kansas City, Missouri. An electronic control system is provided to furnish welding current to the Chem Series welder unit. This control system also regulates the speed functions of the welding process. Voltage control is by means of SCR's and the process control is accomplished by a programmable controller. A self-contained hydraulic power unit, supplied with the generator, provides hydraulic power for the welding system. An industrial chiller, complete with a circulating pump, is provided to ensure the welding head operates with the correct temperature levels.



Generator

Chemetron DC welding heads are powered by a self-contained Caterpillar® 3406 diesel generator rated at 300 kW which yields approximately 40,000 amps for welding. The replaces the need for the larger 365 kW required for AC machines that yield only 25,000 amps for welding. It also uses all 3 phases instead of just one phase as used in AC welders to reduce the size of the generator. This puts an even load on the generator to reduce wear and tear and eventual maintenance costs. This system is designed for cold weather operation and equipped with an ether starting system. The generator output control system is modified to ensure that a balanced system exists when operating in a single phase mode. All operating controls, coolers, batteries, etc. are included with the generator unit plus a 110 volt secondary system to power the system controls.



Welder Control

The output from the generator is rated at 460 volts. Welding voltages are varied according to the rail size and metallurgy as driven by the PLC control system. Accurate voltage control and maximum current limit levels are monitored by the controller. The voltage control SCR's are controlled by a specially designed printed circuit board. This board receives commands from the programmable controller. There are programs for several rail sizes. The controls are contained in a shock insulated cabinet divided into two sections: A. Power Control System; B. Electronic Control System.

The cabinet is fitted with cooling fans to ensure a stable operating environment for the electronics. A full set of operating controls are mounted on the welding head to allow remote operation of the welding process. Monitoring points are available within the cabinet to allow on site troubleshooting. The control system can be equipped with a phone modem which allows our technical staff to monitor the equipment from our headquarters and change the welding parameters or perform diagnostics while the welding equipment is on site anywhere there is a cellular or satellite signal.

System Control

The integrated control system of using a linear transducer in conjunction with a flow control system and programmable controller ensures that a minimum of operating components are required to perform a weld sequence. All field changes for various rail sizes are accomplished by program selection - there are NO weld cycle overrides available to the operator. All welds meet or exceed the AREMA specifications for flash butt welding of rails.

Rail Hardness Minimum	Test Sample Length	Bend Block Spacing	Modulus Of Rupture (min.)	Deflection Minimum
248 BHN	6'0"/1.829m	48"/1.219m	100,000 psi	1.5"/38.1mm
300 BHN	6'0"/1.829m	48"/1.219m	120,000 psi	1.0"/25.4mm
341 BHN	6'0"/1.829m	48"/1.219m	125,000 psi	.75"/19.05mm

Weld Data

The PLC continually monitors the weld process. A printout of all weld parameters is provided at the end of each weld cycle and is correlated to the exact weld by custom annotation. Any parameter which exceeds either a customer determined quality guideline or AREMA guidelines is automatically highlighted on the weld print out.

Last Weld		Weld #		Date	
15:13:27		1361-NEW		4/10/2007	
Burn Off		Upset			
Time	64 sec	Current Time	1.50 sec		
Distance	0.33 in	Holding Time	0.00 sec		
Velocity	0.31 in/min	Distance	0.87 in		
Heat Flash		Miscellaneous			
Time	157 sec	Total Time	242 sec		
Distance	1.12 in	Total Flash	1.70 in		
Velocity	0.43 in/min	Continuous	0.56 in		
Progressive Flash		Power			
Time	12 sec	Drag / Stretch	61 tons		
Distance	0.25 in	De-Stress	600 sec		
Velocity	1.20 in/min				
Customer BNSF		Worklimits			
Division CHICAGO		432.0 thru 435.0			
SubDivision MARCELINE					

The screenshot shows a software interface for weld data management. At the top, there is a calendar view for the year 2004, with months from April to September visible. Below the calendar is a table listing welds with columns for Customer, Year, Month, Day, and Number. The table contains several entries, including 'BNSF' and 'TESTWELDS'. Below the table, there are buttons for 'DISPLAY WELD' and 'PRINT WELD'. The main area of the screen displays detailed weld parameters for a specific weld, including 'Burn Off' (Time: 64 sec, Distance: 0.33 in, Velocity: 0.31 in/min), 'Upset' (Current Time: 1.50 sec, Holding Time: 0.00 sec, Distance: 0.87 in, Force: 122 tons), 'Heat Flash' (Time: 157 sec, Distance: 1.12 in, Velocity: 0.43 in/min), 'Miscellaneous' (Total Time: 242 sec, Total Flash: 1.70 in, Continuous: 0.56 in, Power: 103 kws), 'Progressive Flash' (Time: 12 sec, Distance: 0.25 in, Velocity: 1.20 in/min), and 'Worklimits' (432.0 thru 435.0). The interface also includes a 'Weld Cycle Stop' button and a 'Fan Rev' indicator.

Hydraulics

Pressure-compensated engine-driven double pumps provide power for the welder and crane. All control functions are by means of solenoid actuated valves. The pumps and valves used ensure prompt response to program commands. Welding speed is controlled by high precision proportional flow controls which ensure very accurate welding speeds. A linear transducer ensures repeatability of the flow settings within the program changes. The hydraulic system is self-contained and features an external cooling system for stable operating temperatures. High and low pressure return filters are used in the system for reliable operation.

Chiller

An electrically driven chiller unit is provided to control the welding head operating temperatures within preset limits. Chiller operation is automatic and has adjustable temperature settings.

Ease Of Operation

Both the CHEM 110 and CHEM 180 are equipped with simplified operating systems. The weld head is positioned by the "Three Selector" Crane Control. The weld head control is operated by a "Six Pushbutton" control panel and, when clamped and ready, a one-button weld cycle control initiates the fully automated weld cycle that has NO weld cycle override.



Crane

A self-contained twin-arm articulating crane is provided to handle the welding head. The crane arms also carry the necessary cables and hoses for the safe operation of the welder. Design of the crane gives a lifting capacity of 4545 kg for the CHEM 110 and 7727 kg for the CHEM 180. Both provide an outreach of 3.2 meters. The crane can pivot 90 degrees to either side of centerline to allow welding on adjacent tracks. When the crane is retracted into its transit position, the design positions the welder on a pedestal in the crane base to provide a secure unit for travel. The CHEM 110 is shown below on the left and the CHEM 180 is on the right.





Both the CHEM 110 and the CHEM 180 series machines are designed to weld rails up to 10,000 square millimeters in cross section by the continuous flash butt process. Typical weld cycles of 180 seconds allow in-track welding productivity of 8 to 10 welds per hour. Integral with the welding head is a device to automatically remove the welder flash material. Construction of the welding head is such that the two halves of the machine pivot and traverse along a central shaft. The pivot action is powered by upper lateral hydraulic cylinders to clamp the rails. Traversing is accomplished by means of two hydraulically inter-connected cylinders. One half of the head contains the specially wound transformers. Transfer of welding current and voltage from the transformer side to the other side is via specially designed shafts in the hydraulic cylinders. Four copper alloy electrode inserts and four mild steel clamp pad inserts provide contact with the rail web. Adjustments are available within the system to ensure proper alignment. A linear transducer is mounted within the welder central shaft and is used to monitor the weld process as well as control the weld speed and position. Output from the device is fed to a programmable logic controller. A system of internal passages ensures that the cooling medium flows continuously through the transformers, welding electrodes, and cylinder shafts. Design of the hydraulic system includes a circulating system to allow rapid warm up of the system during cold weather or for a quick start situation. The head is suspended from its carrier by an insulated adjustable connector.

Contact Information

For additional information, visit our web site at www.progressrail.com. To learn more about how Progress Rail Services can provide your company with the best flash butt welding solutions available, contact Richard Frostman at dfrostman@progressrail.com or by phone at 859-291-5466 or Mark McLean at markmclean@progressrail.com or by phone at 719-577-9184.

Specifications

	CHEM 110	CHEM 180
Hydraulic System		
• System Pressure (max)	3000psi/211 kg/cm	3000psi/211 kg/cm
• Delivery (max)	80 gpm/303 liters/min	80 gpm/303 liters/min
• Filtration (nominal)	10 μ m	10 μ m
• Fluid	Mobil DTE-15 (or equal)	Mobil DTE-15 (or equal)
Weld Head Forces		
• Clamp Force (max. each rail)	225 tons/204 mt	380 tons/345 mt
• Forging/Shear Force (max)	110 tons/100 mt	180 tons/163 mt
• Shear Force (separate, internal)	N/A	70 tons/63.5 mt
Welding Head Dimensions		
• Length	72 inches/1829 mm	102 inches/2591 mm
• Width	36 inches/914.4 mm	43 inches/1092 mm
• Weight	7,800 pounds/3538 kg	11,500 pounds/5216 kg
• Welding Stroke	3 1/2 inches/89 mm	12 inches/305 mm
Cooling System		
• Thermal Capacity	240,000 btu/hour	240,000 btu/hour
• Fluid	50% water/glycol	50% water/glycol
• Volume	40 gallons/151 liters	40 gallons/151 liters
• Coolant Operating Temperature	70° F/21.1° C	70° F/21.1° C
• Max. Coolant Operating Temperature	100° F/37.8° C	100° F/37.8° C
Welding Power		
• Open Circuit Secondary Voltage	9.1 vdc	9.1 vdc
• Secondary Current (max)	52 kamps	52 kamps
• Rating (50% Duty Cycle)	475 kva	475 kva
Control System		
• Main Controller	Allen-Bradley SLC-500	Allen-Bradley SLC-500
• Welding Program	Chemetron Railway Products, Inc. US Patent Number 5,270,514 US Patent Number 6,163,003	Chemetron Railway Products, Inc. US Patent Number 5,270,514 US Patent Number 6,163,003
• On-Board Self-Diagnostic System		
Quality Assurance		
• Exceeds All AREMA Specifications		
Capacity		
• Rail Cross Section (max)	16 in ² /10,322 mm ² (AREMA 141# Rail = 14.1 in ²)	16 in ² /10,322 mm ² (AREMA 141# Rail = 14.1 in ²)
• Production Rate	8 to 10 welds/hour	8 to 10 welds/hour
Container		
• Length	272 inches/6909 mm	272 inches/6909 mm
• Width	96 inches/2438 mm	96 inches/2438 mm
• Height	105 inches/2667 mm	105 inches/2667 mm
• Approximate Weight	42,000 pounds/19,051 kg	45,700 pounds/20,279 kg
• Frame Rail Width	31 inches (centerline)/787 mm	31 inches (centerline)/787 mm
Motor Generator		
• Prime Mover	Caterpillar® 3406T	Caterpillar® 3406T
• Generator	300 kW	300 kW
Weld Head Crane		
• Articulated Twin Boom		
• Capacity	10,000 pounds/4536 kg	17,000 pounds/7711 kg



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