How To Select A Portable Spotwelding Work Station

The fundamental difference between a remote transformer cable gun and an integral self contained portable spotwelder is the location, size and KVA ratings of the transformer needed to weld similar gauges of metal [illustration 1 & 2]. These differences can have a significant impact on the installation and operating costs of the selected equipment.

The welding transformer converts the high voltage and low current of the primary electrical service to the low voltage and high current required at the electrodes for welding. This secondary voltage and current is affected by the impedance of the secondary circuit which consists of all items joining the secondary terminal pad of the welding transformer to the welding head or gun. Since the length of the kickless or single conductor cable used with a remote transformer cable gun increase the impedance, a larger transformer is required to deliver the needed welding current at the electrodes.

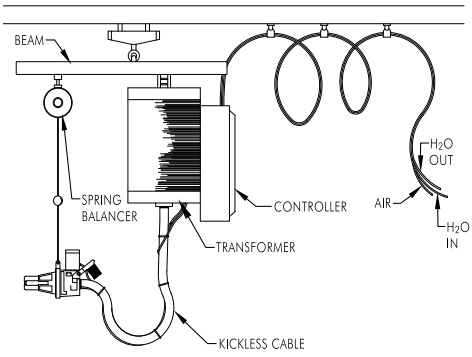

ILLUSTRATION 1

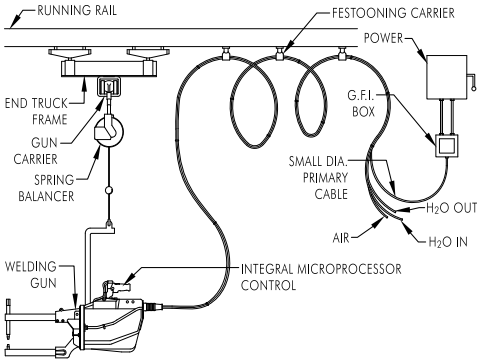

ILLUSTRATION 2

The transgun-type incorporates a compact welding transformer into the welding gun and eliminates the heavy kickless or single conductor cable. This in turn reduces the impedance of the welder. This low impedance factor allows a lower KVA rated transformer to be used. The lower KVA requirement offers several advantages. The first advantage is a reduced demand on the plant electrical system permitting a transgun to be utilized where the old style cable gun might overload an already loaded electrical power system. The second advantage is the cost factor. The lower KVA rating allows the user to have a less expensive electrical installation. Since many electrical generating utilities may charge rates based on plant KVA capacity, whether fully utilized or not, the transgun offers lower operational costs than the cable gun.

Transguns are much more efficient than cable-type guns. As an example, a typical 18 KVA transgun can weld two pieces of 0.050"/1.26mm low carbon mild steel requiring 10,300 secondary amperes welding current. In order to weld the same material using a typical cable gun, a 50 KVA or possibly larger transformer is required due to the high impedance created by the long kickless cable. If both transgun and cable gun are designed for a 220 volt primary supply, the following comparison of electrical efficiency can be made:

$$\frac{\text{KVA} \times 1000}{\text{Primary Voltage}} = \text{Primary Current}$$

CABLE GUN WITH REMOTE TRANSORMER

$$\frac{50 \times 1000}{220} = 227.3 \text{ Amps}$$

TRANSGUN

$$\frac{18 \times 1000}{220} = 81.9 \text{ Amps}$$

The lower primary current demand of the transgun mean lower installation costs resulting from a lower buss duct, switchgear and fuse requirements, as well as, lower operational costs.

Although cable guns are available in greater number of configurations, this advantage is frequently offset by the better maneuverability of the transgun. The stiff kickless secondary cable of the remote transformer cable gun can severely restrict its maneuverability. It limits the rotation from only 90 to 140 degrees. This may require two or more cable-type guns to weld an assembly. Each additional gun would mean greater equipment, installation and probably labor costs as well.

Since the transgun eliminates the stiff kickless cable, it can usually be rotated a full 360 degrees in three planes. Due to this greater maneuverability, a single transgun may now replace two or more cable guns with a resultant reduction in capital equipment expenditures, lower installation and labor costs as well as a lower cost per weld.

The new generation of self-contained suspended transguns offer additional economies. Self-contained transguns feature built in microprocessor welder controls and encapsulated solid state contactors which eliminate the old style remote mounted controller cabinet further reducing installation and servicing cost. Combination earth leakage detectors and circuit breaker replace the electromagnetic isolation contactor common to the older generation transguns.

Below you will find a summary of features with advantages and disadvantages which may help fabricators to compare the merits and costs of both types of portable spot welders.

	REMOTE TRANSFORMER CABLE GUN	TRANSGUN
WELDING HEAD:	Available in a variety of configurations. Many components may be specified to meet welding requirements. Choice of Pinch, Scissor, “C” and Push Types.	Fixed geometric design. Major components can not be relocated. Usually choice of scissor or “C” types.
TRANSFORMER:	Available in various KVA ratings. Requires secondary cable to connect to any style welding head. Usually remote mounted overhead. May require balance beam and a heavy duty support structure.	Compact, lighter weight. Built into welding head. Normally single KVA rating per model. Higher KVA requires selection of a larger model. Usually does not require heavy duty support structure.
SECONDARY CABLE:	Connects welding head to transformer. Stiff, cumbersome. May require water cooling. Restricts movement. High impedance.	Eliminated. Small diameter primary cable direct to integral transformer.
GYROBAIL:	Rotation usually restricted to 90° - 140° due to stiff secondary cable. Restricted movement may require additional welders.	Normally 360° rotation in two or three planes. Greater maneuverability.
PRIMARY ELECTRICAL SERVICE:	Requires large primary cable, buss duct, switch gear and fuses. Greater installation costs.	Smaller primary cable, buss duct, etc. may be installed in shop areas having limited electrical service.
SUPPORT STRUCTURES:	Requires larger overhead support structures to accommodate greater weight of large transformer. May increase costs.	No special heavy construction needed.
BALANCE BEAM:	Usually required for hanging transformer, varying controller and spring balancer. Additional cost item.	Eliminated.
SPRING BALANCER:	Permits up and down motion of welding head with reduced effort.	Permits up and down motion of welding head with reduced effort.

As we can see from the comparison, both types of equipment can be used for large difficult to handle workpieces not suited for conventional stationary spotwelders. While the traditional cable gun may be best suited for those applications where the welding head is used in a single plane and in a confined area, the need for maneuverability, rotation of the welding head and/or welding in more than one plane may warrant the use of a transgun.