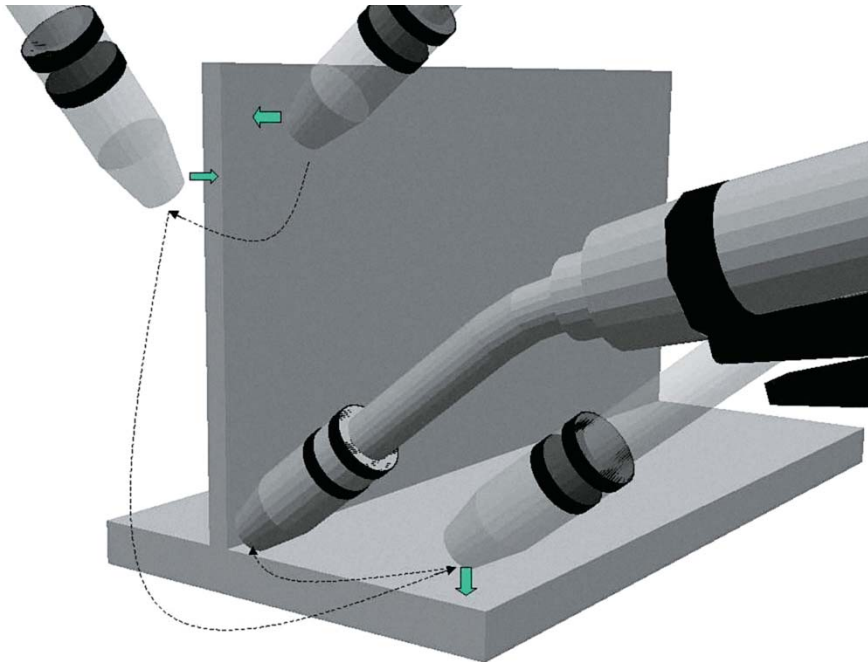




SmarTac

Welding Equipment



The start and end points on a seam can be set using a 3-dimensional search pattern. Searching and detection are performed before welding operations begin and the program can take into account rotation, inclination and offset of the workpiece. Any number of points in a seam can be located and corrected as required.

A well-proven joint detection system

ABB's SmarTac is a flexible, versatile system that searches for and locates weld joint positions using its electronic sense of "touch". For many years the SmarTac solution has represented a simple way of making robots a little more intelligent at a reasonable cost, as well as providing a dynamic challenge to other types of weld joint locators.

SmarTac

A welding robot follows the path programmed into its memory and as long as the workpiece is correctly aligned, the results will be excellent. A misaligned workpiece, on the other hand, can cause serious problems in welding quality. To cope with such situations a robot must be able to adapt its path relative to the workpiece. In other words, it needs an adaptive system to control it.

SmarTac – a simple solution

The reason that SmarTac has remained a competitive robotic solution for so many years is that it is an ingenious, simple and very cost efficient solution to tolerance problems in robotic welding. Since the system uses the standard gas nozzle on the welding torch as a sensor, there are no bulky attachments on the torch to get in the way – ensuring unrestricted welding accessibility. The system works by energising the gas nozzle with an electric charge when in the search mode. A closed circuit is made when the nozzle and workpiece make contact, sending a stop signal to the robot's control system via a converter unit. After comparing the actual position of the workpiece with the programmed position in the memory the system calculates the differences between the two positions and adapts the program to suit the actual position.

The entire search process is fully integrated with the robot's control system, with all functions being run from one programming unit.

Basic function and benefits

The search mode is initiated in order to locate one or more points on the workpiece before welding begins. In the search mode the torch runs until it comes into contact with a surface of the workpiece, energising the SmarTac system which thus determines the position. To define the location of a point precisely three movements must be made, each new movement being at right angles to the one preceding and to the surface of the workpiece. Search distances and speeds can be varied as required, with a complete 3D search taking some eight to twelve seconds, depending on workpiece complexity.

The search function can be used for setting the weld start and end points as well as locating a series of points along a weld e.g. where the surfaces are curved. SmarTac is not limited to parallel offset workpieces since programmed positions can be located individually, thus encompassing most workpiece misalignment situations. The search geometry can also locate linear, circular or combined linear and circular joints.

SmarTac provides complete workpiece orientation

Using the 3D shift function it is possible to move, turn and incline the orientation of the complete program using a limited number of search movements. This feature can be used to move a program to another robot station with the same configuration without having to program point corrections.

Workpiece material

Since SmarTac is based on electric contact being made between the torch nozzle and the workpiece, the system operates with any unpainted conductive materials. The nozzle is primarily used for searching open surfaces, mainly fillet joints. SmarTac can be provided with options that allow location of surfaces in more confined areas e.g. V-grooves.

Mechanical torch cleaning

Spatter build up on the torch nozzle may cause positioning errors. A mechanical nozzle cleaning system is therefore essential for joint detection systems. The TC-96 torch cleaner is an indispensable aid to continuous, reliable positioning when using the SmarTac system.

Technical data

Detection mode voltage	ca 7 – 40 V DC
Search speed	20 – 50 mm/s (depending on position accuracy required)
Search time per point/ one dimension	2 – 6 sec (depending on workpiece complexity)
Search length	Depends on workpiece variations
Sensitivity	Typically detects at 1 V drop on workpiece contact (configurable)
Accuracy	± 0.25 mm (with search speed 20 mm/sec)