



Manufacturing the workforce of tomorrow.™

Browse by Department

Please Select ▼

New Visitors

- [Class List](#)
- [NEW! Free Trial Class](#)
- [Take a Tour!](#)
- [Price List](#)
- [Request for Quote](#)
- [Contact Us](#)

Solutions

- [Manufacturers](#)
- [Educational Institutions](#)
- [Industrial Distributors](#)
- [Individual Students](#)
- [Training ROI](#)
- [Latin America](#)
- [Programs by Job Title](#)

Products

- [Classes](#)
- [Assessment Tests](#)
- [BookStore](#)
- [Custom Training](#)

Customers

- [Student Login](#)
- [Administrator Login](#)
- [First-Time Registration](#)
- [Support](#)

Company Overview

- [About Us](#)
- [Partners](#)
- [Press Releases](#)
- [Newsletter](#)
- [Download Brochure](#)
- [Contact Us](#)
- [Careers](#)

New! Try a FREE class!
 Risk-Free Offer! Start Now!
TAKE A FREE CLASS!
www.toolingu.com/free

SMAW Applications 210

[Welding Department](#) >> SMAW Applications 210

[Take a Free Trial Cl](#)

Class Information:

Tooling University classes are offered at the beginner, intermediate, and advanced levels. The typical class consists of 12 to 25 lessons and typically requires at least two hours of instruction time.

Class Name:	SMAW Applications 210
Description:	This class describes the SMAW process and the variables that affect electrode selection, electrical variables, and methods for starting and extinguishing the arc. Includes an Interactive Lab.
Prerequisites:	650110 650115 650130 650140
Difficulty:	Intermediate
Number of Lessons:	18

Class Outline:

- Objectives
- What Is SMAW?
- Pros and Cons of SMAW
- Metals Welded with SMAW
- SMAW Electrical Components
- SMAW Electrode Materials
- Types of SMAW Electrodes
- SMAW Electrode Classification
- DC or AC Selection
- Amperage
- Voltage
- SMAW Joint Preparation
- Starting the Arc
- Breaking and Re-Starting the Arc
- SMAW Electrode Orientation
- SMAW Travel Speed
- Running a SMAW Bead
- Summary

Sample Lesson Screen Shot:



- > [Take a Free Trial Class!](#)
- > [Request for Quote!](#)

Class Objectives:

- Define SMAW.
- Distinguish SMAW from other weldir processes.
- Contrast common metals welded wi
- Explain characteristics of common S electrical components.
- Identify common SMAW electrode n
- Distinguish between the types of SM electrodes.
- Explain how electrodes are classifie
- Distinguish between using AC and C SMAW.
- Describe the factors that affect amp selection for SMAW.
- Describe the factors that affect volt: SMAW.
- Describe common methods for prep for SMAW.
- Explain techniques for starting the a SMAW.
- Explain common techniques for bre re-starting the arc with SMAW.
- Distinguish between the methods of

orientation.

- Explain the effects of travel speed on the welding process.
- Explain how to run a weld bead.




Class Vocabulary:

Term	Definition
alloy	A metal consisting of a mixture of two or more materials. One of these materials must be a metal.
alternating current	Current that regularly reverses the direction of its flow. It is best to use AC for SMAW when welding larger workpieces with larger electrodes.
aluminum	A silvery white metal that is soft, light, and an effective conductor.
amperage	The amount of current flowing in a circuit. SMAW uses 10 to 500 amps.
arc blow	A condition that occurs when the arc does not follow its intended path from electrode to the workpiece. Arc blow can cause undesirable weld beads.
arc length	The distance from the electrode to the workpiece in an arc welding application.
arc voltage	The amount of voltage present between the electrode and the workpiece. For SMAW, arc voltage ranges from 17 to 45 volts.
backhand technique	Moving the electrode along the workpiece opposite the direction of welding.
calcium	A nonmetallic material that is often present in the powdered coating of a SMAW electrode. Calcium floats to the top of the molten weld puddle and forms slag.
carbon	A common, nonmetallic element found in all types of steel. Carbon is the most important hardening element in steel.
cast iron	A metal consisting of iron, over 2.11% carbon, and 1 to 3% silicon. Cast irons also contain trace amounts of other elements.
chipping hammer	The hammer used to scrape slag from a cooled weld bead. The chipping hammer is also sometimes called a scaling hammer.
circuit	A controlled path in which electricity can flow. SMAW, like all arc welding processes, requires a closed circuit.
conductor	A material that allows for the easy flow of electricity. The components in the circuit must be good conductors.
constant current	Welding using a current that varies slightly with changes in voltage. SMAW uses constant current welders.
consumable electrode	An electrode that conducts electricity to the arc but also melts into the weld metal. SMAW consumable electrodes also provide shielding that protects the molten weld puddle.
cracking	Cracks in the weld bead or base metal. Cracking can be the result of using too high an amperage with larger electrodes.
crater	A recess in the weld bead. A crater can cause cracking if it is not properly filled.
deoxidizer	A material that removes oxygen from the molten weld puddle and arc. Deoxidizers prevent oxygen from ruining a weld bead.
deposition rate	The rate at which an electrode melts into the molten weld puddle to form a weld.
direct current	A current formed when electrons flow in one continuous direction. DC used for SMAW sometimes can cause arc blow.
directly proportional	A constant ratio between two values. If value A increases, value B also increases. If value A decreases then value B also decreases.
drag angle	A term used in industry for the backhand technique.

electrode	A device that conducts electricity to the welding circuit. SMAW electrodes conduct electricity, serve as the filler metal, and provide shielding for the arc and weld.
electrode axis	A line through the length of the electrode, perpendicular to and at the geometric center of its cross section.
electrode cable	The path used in welding to conduct electricity from the welder to the electrode. Electrode and work cables are connected to the welder, the workpiece, and the power source, which provides a closed electrical circuit.
electrode diameter	A measurement of the thickness of the electrode. Larger electrodes can improve productivity.
electrode holder	The insulated handle that clamps onto the electrode. The welder holds this during welding to control the arc.
electrode orientation	The way in which a welder manipulates the electrode. Electrode orientation includes work angle and the travel angle.
fast-fill electrode	A SMAW electrode that fills up a joint quickly. Fast-fill electrodes are ideal for filling gaps in workpieces.
fast-freeze electrode	A SMAW electrode that solidifies quickly. Fast-freeze electrodes are ideal for welding thin materials.
ferrous metal	A metal that contains iron. Steel is the most common ferrous metal. SMAW is commonly used to weld ferrous metals.
filler metal	A type of metal with similar properties to the base metal that is added to the weld. Filler metal often adds to the strength and mass of the welded joint.
fillet joint	A type of weld that is triangular in shape and joins two surfaces at right angles in a lap joint, T-joint, or corner joint. Fillet welds are the most common type of weld.
fill-freeze electrode	A SMAW electrode that has both fast-fill and fast-freeze characteristics. Fill-freeze electrodes fill up a joint quickly as well as solidify quickly.
flux	A non-metallic material provided by the SMAW electrode, which protects the weld puddle and cooling metal from atmospheric contamination.
forehand technique	Moving the electrode along the workpiece in the direction of welding.
gas metal arc welding	An arc welding process in which the bare wire electrode and inert shielding gas are fed to the weld through a welding gun. It is also referred to as GMAW or MIG welding.
gas shielding	A layer of inert or slightly reactive gas provided by the electrode. Shielding gas protects the weld puddle and arc from atmospheric contamination.
gas tungsten arc welding	A very precise arc welding process that uses a nonconsumable tungsten electrode. It is also referred to as GTAW or TIG welding.
low-carbon steel	A steel that contains less than 0.30% carbon. Low-carbon steel is also referred to as mild steel.
low-hydrogen electrode	A SMAW electrode that is used to weld restricted materials that can be susceptible to hydrogen cracking.
manganese	A hard, brittle, gray-white metal that increases the hardenability of steel. Manganese also increases strength and hardness.
multiple weld pass	A weld that is formed by two or more passes, one over the other.
nickel	A silvery white metal that is fairly hard and malleable, with properties similar to steel.
nonferrous metal	A metal that does not contain iron. Aluminum and copper are common nonferrous metals.
porosity	The trapping of hydrogen in a weld bead. Usually, porosity cannot be seen. Excessive porosity can weaken a weld.

push angle	A term used in industry for the forehand technique.
run-off tab	A scrap piece of base metal with the same groove as the workpiece. Run-off tabs are tacked onto the end of the workpiece to allow the welder to extinguish the arc without forming a crater on the workpiece.
scratching	A method of striking the arc in which the welder guides the electrode across the workpiece at an angle. The scratching method closely resembles striking a match.
shielded metal arc welding	An arc welding process that uses a flux-coated consumable rod electrode. It is referred to as SMAW or stick welding.
shielding	A layer of inert or slightly reactive gas that protects the weld puddle and arc from atmospheric contamination.
silicon	A nonmetallic material that is often present in the powdered coating of a SMAW electrode. Silicon acts as a deoxidizer.
single weld pass	A weld that is formed using only one pass.
slag	Cooled flux that forms on top of the bead. Slag protects cooling metal and is chipped off.
SMAW	Shielded metal arc welding. SMAW is a manual arc welding process that uses a consumable flux-coated electrode.
spatter	Liquid metal droplets expelled from the welding process. The amount of spatter in the SMAW process yields often depends on the electrode selected and welder technique.
square groove joint	A type of weld that consists of an opening between two square part surfaces. The joint provides space to contain weld metal.
steel	A metal consisting of iron and carbon, usually with small amounts of other elements. SMAW is often used to weld different types of steel.
stick welding	Shielded metal arc welding. In industry, many welders refer to shielded metal arc welding as stick welding.
stringer bead	A type of weld bead formed by moving the electrode straight across the joint. A stringer bead looks like a roll of dimes.
tapping	A method of striking the arc in which the welder moves the electrode down the base metal in a vertical direction.
tensile strength	The ability of a metal to resist forces that attempt to pull apart or stretch it.
travel angle	The angle less than 90 degrees between the electrode and the weld.
travel speed	The speed at which the welder moves the electrode along the joint to make a weld.
undercut	A gap left in a finished weld that should have been filled with weld metal. Undercuts are unsightly but do not necessarily indicate a bad weld.
voltage	The electrical force or pressure that causes current to flow in a circuit. SMAW typically uses 15 to 45 volts.
weave bead	A weld bead formed by moving the electrode along the joint in a weaving motion.
weld axis	A line through the length of the weld, perpendicular to and at the geometric center of the cross section.
weld backing	A strip of metal located on the side opposite of the weld that provides a surface for depositing the first layer of metal to prevent molten metal from escaping through the joint. Weld backing is used for complete penetration welds.
weld bead	The end product of a joint that has been welded.
weld pass	One progression of welding across a joint. The result of a weld pass is a weld bead.
weld puddle	The small area of molten metal that forms during welding. The cooled weld puddle forms the permanent joint. A weld puddle is also called a weld pool, molten metal, or molten puddle.
weld root	The point at which the back of the weld intersects the base metal surfaces.

weld toe	The point at which the weld face and the base metal meet.
weldability	The ability of a material to be welded under imposed conditions into a specific structure and to perform satisfactorily for its intended use.
whip technique	A technique typically used for forming a stringer bead that involves moving the electrode around in a circle and withdrawing it slightly, then repeating this to form a bead.
work angle	The angle less than 90 degrees between a line perpendicular to the workpiece plane determined by the electrode axis and the weld axis. The work angle is centered on the weld bead on a given application.
work cable	The path used in welding to conduct electricity from the welder to the workpiece. Electrode and work cables are connected to the welder, the workpiece, and ground, which provides a closed electrical circuit.
work clamp	The component that, along with the electrode, can come in direct contact with the workpiece during welding. The work clamp is connected to the welder with a cable and provides ground for the SMAW circuit.

 [Printer-Friendly Version](#)
 [Send This Page](#)
 [Add to Favorites](#)
 [Comments](#)

[Home](#) | [Class List](#) | [Price List](#) | [Support](#) | [Contact Us](#) | [Meetings](#) | [Site Map](#)

Copyright © 2004 Tooling University, LLC. All Rights Reserved. [Terms of Use](#) | [Privacy Statement](#)

