Intro To Tools, Equipment, And Attachment Methods - Part 2

Video Scripts

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Video: Three-Dimensional Measuring Equipment
To ensure that a collision-damaged vehicle is properly repaired, a three-dimensional measuring system is often required. Three-dimensional measuring references the length, height, and width of a vehicle.

There are different types of three-dimensional measuring systems. These include fixture systems. With this system, an undamaged vehicle will properly set onto fixtures. If a part is not in the correct location or damaged, it will not properly connect with the fixture. Another type of measuring system is an electronic measuring system. This uses sensors and a computer to measure specific points on a vehicle.

Video: Anchoring Equipment
Vehicle anchoring equipment is used to securely hold vehicles during the measuring and straightening process. There are different types of anchoring equipment, which includes pinchweld clamps and fixtures.

A pinchweld clamp anchors the vehicle in position by gripping the lower pinchweld of the vehicle in jaws that are tightened. When using a fixture system, the fixtures are attached to a bench. Then the vehicle is lowered onto the fixtures and secured with threaded fasteners.

Video: Straightening Equipment
Structural straightening equipment includes a bench and pulling towers with chains. There are also portable benches for straightening jobs.

There are typically multiple pulling towers for doing several pulls at one time. The chains used for structural repairs are designed to withstand multiple tons of pulling force.

When pulling on a vehicle for straightening, there are also safety chains or cables used to help minimize a backlash if a chain or anchoring clamp slips or breaks.

Video: Tram Bar
A tram bar is used to make point-to-point measurements on a vehicle. They have an internal measuring tape or digital display that is used to show the distance between the points being measured. They extend to various lengths and can be available in different sizes.

Video: Pulling Hardware
There are many different tools that can be used for pulling or holding a vehicle. Some of these tools include chains, mounting plates, various clamps, hooks, and chain tensioners.

Video: GMA (MIG) Welding Machine

There are many parts required for a welder to function. There's of course the power source, the welding torch, the welding electrode wire, the contact tip, work clamp, shielding gas nozzle, and the shielding gas.

If we open up the welding machine, we can see the electrode wire drive rolls. The drive rolls are used to feed the wire from the machine to the welding torch.

The electrode wire is used as the filler material for either steel or aluminum.

There is also a work clamp. The work clamp is used to complete the electrical path necessary for MIG welding.

Video: Welding Torch / Gun

The welding torch is commonly referred to as the welding gun or torch. With this type of welding gun, the electrode wire and shielding gas are fed from the machine.

Another type of welding gun that may be used for aluminum welding is called a spool gun. A spool gun contains the spool of electrode wire and the drive motor. This design allows the welder to work further away from the machine, and with most of the parts contained in this small hand-held unit.

In every welding torch, there is a contact tip threaded into the end. The contact tip energizes the electrode wire so the arc can be created.

There is a shielding gas nozzle that is attached to the end of the welding torch. The function of the gas nozzle is to surround the contact tip, electrode wire, and arc with the shielding gas. Shielding gas nozzles may be different shapes depending on the welding process being performed.

All welding guns use a liner. A liner provides a smooth path for the electrode wire to travel through. Welding gun liners may be made of steel, aluminum, Nylon, or Teflon.

Video: Shielding Gas

Compressed gas used for welding is stored in cylinders. Depending on the welds being made, the gases may be argon, helium or a blend of various gases at different percentages.

Shielding gas flow is controlled using a flow meter. The flow meter shows how much gas is flowing to the torch. To verify that the proper gas flow is exiting the torch, a verification test gauge can be used. This ensures that there is gas getting through to the tip.

Video: Spot Welder And Accessories

For a spot welder to operate, there needs to be the proper power supplied.

There also has to be compressed air attached to the machine. The compressed air is used to operate the arms so that they can squeeze together. Depending on the manufacturer, the arm sets may be copper or aluminum. Arms can also be solid or hollow like this one. Hollow arms allow liquid to pass through for cooling.

There are also electrode tips. Electrode tips are made of copper and may be a replaceable cap or part of the arm set.

Video: Dye Penetrant

Dye penetrant is used to check parts and welds for cracks. Dye penetrant consists of three parts, a cleaner, a dye, and developer. The red dye, seen through the white developer, indicates holes or cracks.

Video: Resistance Spot Weld Stages

The STRSW weld cycle is a three-stage process. The first stage is the squeeze time when the electrode tips close against the panels to be welded. The electrode tips apply equal force to both sides of the metal.

The second stage is the current-on time, lasting only for a fraction of a second. The current meets resistance in the sheet steel between the electrode tips, which is not as good a conductor as the copper alloy. This resistance to the current flow causes heat, which melts the sheet metal.

In the third stage, the current is off and the electrodes are held in place. This keeps the molten steel contained, allowing the weld to cool and solidify. After 1–2 seconds the electrode tips are released, ready for the next weld.

Video: Magnetic Field

This video demonstrates how a suspended sheet metal coupon is attracted to the intense magnetic field around spot welding arm sets and connecting cables when the trigger is pressed.

This magnetic field can affect sensitive electronic devices and should be a consideration for personal safety and vehicle protection when using spot welding equipment.

Video: Electrode Wire Feed

This is a welding gun used with a GMA welder, or more commonly referred to as a MIG welder.

The electrode wire is fed from the spool of wire, through the drive rolls, into the gun liner, and out through the electrode tip.

Video: Making A Weld

To make a plug weld, the welding gun is held at both a 90º work, and travel angle to the base metal. The electrode wire is aimed at the lower piece, through the hole in the top piece. The weld can be started in the center of the hole and then moved out to the edge of the hole and circled around, or it can be started at the edge of the hole and circled around in either direction. The hole must be completely filled by the weld nugget, with no skips or voids.

Video: Making A MIG Braze Weld

Though they are similar processes, where GMA (MIG) welding fuses panels together, MIG brazing results in a non-fusion joint as the filler metal bonds to the surface of the base metal.

The backside of the weld joint is where the real benefit to MIG brazing is, because of the lower heat input into the panel and a smaller heat-affect zone.

Notice how capillary action has drawn the weld bead around the panels, completing the weld joint.

Video: Air Compressors

Air compressors are used to convert ambient air into high-pressure air. An air compressor, like this one, is used as a power source in a collision repair facility. Instead of using electricity for powering tools, air is stored and available on demand at various locations around the collision repair facility.

Generally, air compressors used in a collision repair facility are permanently mounted, though some air compressors are portable.

Video: Floor Jack And Safety Stand

Portable hydraulic floor jacks are designed to temporarily lift a vehicle so a jack stand can be placed underneath.

Jack stands are designed to support a vehicle up to their maximum rated capacity.

Video: Vehicle Mobility Jacks

Vehicles can be moved around a collision repair facility using vehicle mobility jacks. Each jack is placed under one of the tires.

Video: Battery Charger And Jumper Packs

Here we have some equipment that is used with batteries in a collision repair facility. This is a battery charger that is used to recharge a discharged battery. This is a portable jumper pack that is used to re-start a vehicle with a discharged or drained battery. There are also battery maintainers, which are used to prevent the battery from discharging while the vehicle is being repaired.

Video: A/C Leak Detector

Here are two types of A/C leak detection equipment. One is a refrigerant sniffer that uses a probe to detect refrigerant molecules. The other type of detection system involves using a dye that shows up under black light.

Video: Headlamp Aiming Equipment

Headlamp aiming equipment is used to position the headlamps so they shine properly ahead of the vehicle.

There are different types of headlamp aiming equipment. Some attach to the headlamp lens. Some require the headlamps to be projected against a wall and the vehicle positioned a specific distance away for adjustment. Others are positioned ahead of the vehicle so the headlamps can be aimed at a grid on the face of the equipment.

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