Service Training

User Manual

VAS 6321 | VAS 6324 | VAS 6321/1

Panel Repair System Pneumatic Press Gluing Technology

Table of Contents

1. The VAS 6321 vehicle body dent removal system

Benefits of the VAS 6321 dent removal system

The VAS 6321 is a complete innovative system designed for the economical and high-quality repair of the outer skin of vehicle bodies.

With the optional AiroPower press **VAS 6324** and with the Miracle glueing technology the systems opens up many additional application possibilities.

Applications of the VAS 6321 dent removal system

- 60% of all accident damages are outer skin damages.
- Modern vehicle bodies can no longer be professionally repaired through conventional repair methods.
- Economical repairs also for vehicles from segment II and III.
- Exhausting unused potential.

The advantages of the VAS 6321 as opposed to conventional repair methods

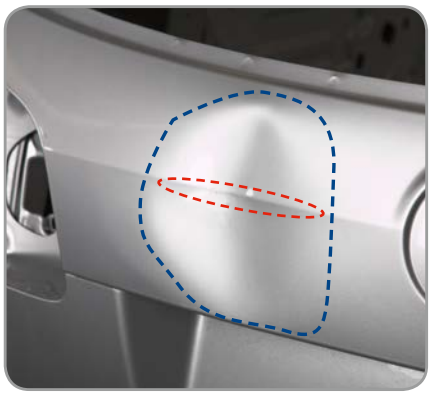
- Greater quality of repairs.
- Clearly reduced time expenditure for repairs.
- Original components are preserved.
- Lower filler requirement.
- Lower material costs.
- Vehicle structure and corrosion protection remain intact.
- Job costs are lower by up to 60%.
- Lower heat effects – fewer structural changes.
- Less dismantling.
- Improved straightening of straight visible edges.
- Competitive benefits from insurers.
- Image gain supports the new customer acquisition.

2. Typical damages

Which damages can be repaired with the VAS 6321?

Damages on the outer skin of the vehicle as well as the rocker panel and quarter bends.

The VAS 6321 dent removal system uses the fact that the majority of deformations of the outer skin are elastic deformations that return to their original condition almost by themselves without any great effort. These elastically deformed areas can be restored quickly with the VAS 6321 by removing tension from the damaged area. Targeted work on a few elastic deformations with plastic deformations beyond their boundaries actually minimizes the damaged areas. This results in great time and material savings, since only a minimum of filler and putty work is required.



Deformation area

Areas with plastic deformation

Can supporting components of the vehicle structure be repaired with the VAS 6321?

The VAS 6321 is an outer skin vehicle body repair system, the repair of supporting parts is only conditionally possible.

2. Typical damages










3. Safety information

Application scope of the dent removal system

Performing vehicle body repairs, such as dent removal via resistance welding and straightening devices. Local heating of metals via copper electrodes.

The SMS-7Q Inverter welding equipment and the pulling and straightening tools may not be used improperly!

Structural changes, even at a minimum, are not permitted and result in the exclusion of the legal warranty! CARBON GmbH rejects any liability for damages to persons, animals, property and the machine itself, which can be traced to improper use of the safety criteria in this training manual, even at only slight manipulations, as well as any use of replacement parts that are not original or compatible.

Personnel

We recommend to only assign skilled personnel to perform work with the VAS 6321. Personnel working with the system must be instructed of potential risks and have read and understood this manual.

Participation in instructional training is urgently recommended!

Safety information

Please read these instructions carefully. If you do not observe the safety instructions and basic precautionary measures, serious physical injuries and property damages may result. Please be sure that employees working next to you are not injured, for example, by sparks that may develop during the work process.

3. Safety information

Protective clothing

Wear work clothing with long sleeves, gloves, safety gloves, head covering, safety glasses and possibly hearing protection. The system heats metal to high temperatures and may spray sparks. In order to prevent burns and other potential injuries, the general safety regulations of welding technology and vehicle body repair must be adhered to when working with the VAS 6321 dent removal system!

Caution: Danger of explosion!

Do not perform any repairs on metals or tanks that contained flammable material, such as a fuel tank.

Avoid explosion-prone surroundings.

The device may not be used in the proximity of flammable liquids, gases or other combustible and hazardous objects in order to prevent any risks. Sparks developing when using this device may otherwise result in explosions.

Caution: Risk of burns and poisoning!

Metal components to be processed may become very hot. Toxic vapors or gases may develop that are due to the surface coating compound on the front and the back of the metal, such as zinc, paints, sealing material, anti-drum compound, etc. In order to prevent poisoning, appropriate precautionary measures, such as good ventilation at the work place or wearing respirators in case of insufficient ventilation, must be adhered to.

Always work attentively and concentrated!

3. Safety information

Magnetic fields

Please note that the M-7 welding inverter included in the VAS 6321 produces magnetic fields that exercise great magnetic forces on magnetic metals. Watches, magnetic cards and data media may be damaged by this.

Persons with pacemakers must consult a physician prior to approaching the welding area!

Caution: Disconnect the vehicle battery and secure all airbag systems!

The vehicle battery must be disconnected prior to using the welding inverter. The electronic system of the vehicle may otherwise be damaged! Furthermore, all existing airbag systems must be locked or secured in accordance with the guidelines of the respective car manufacturer.

Notes

4. Components of the VAS 6321

Scope of delivery for VAS 6321 MIRACLE system

MS-17S	Strong Puller
MS-10Z	Easy Puller
MS-38L2	Line Puller 1600
MS-13R	Lever Puller
ONA-01	Pulling Hammer
ONA-02	Pulling Hammer
MHSG-03	Planishing Hammer (330 g)
MHS-01	Planishing Hammer (555 g / horizontal)
MHV-01	Planishing Hammer (555 g / vertical)
SMS-7Q	Stud Welder (CE)
MB-2	Miracle Bits, straight (2 packs of 110)
MB-3	Miracle Bits, twisted (2 packs of 110)
M-01	Welding Tip
CM-029	Miracle System Trolley
CM-024	Bit Cutter
CM-060	Small Parts Set
CM-025	Tension Rod Set Ø 7 mm
CM-026	Tension Rod Set Ø 8 mm

Additionally required tools and aids

- Sander with nylon disk and triangular scraper to remove the paint coat (paint removing kit)
- Steel ruler, felt pen and marker to mark and check edges and contours

Optional

- Vehicle body file or sanding file for a visual illustration of the damage, such as the size and depth, as well as the surface finish.
- Caliper
- Contour gauge

4. Components of the VAS 6321

4.1 Welding inverter SMS-7Q

The MS 7 E CE is equipped with a computer-controlled 220 V inverter. It serves for welding BITS on, as an energy source for the EASY Pullers, the pulling hammers and to pull in metals, as well as other similar welding jobs.

Before you connect the SMS-7Q to the power supply, please verify that the main switch is set to off and that the ground clamp and the live handle do not contact each other. You can activate the main switch and activate the desire program key only after these requirements are fulfilled.

An additional safety switch and the equipment control unit (250 V 2A) are located on the back of the equipment.

How is the SMS-7Q operated?

- Select the relevant program 1 - 4.
- Parameters for welding time (timer) and welding current (Amperes).
- Adjustment according to the selected components.
- The device is now ready to use!

What is the designation of the individual symbols on the SMS-7Q?

Program 1:

II For work with the Easy Puller (see section 7).
P For pulling hammer and manual pulling device (see section 8).

Program 2:

A The program for welding on the bits.
B B is selected in conjunction with the copper electrode to pull in dents.
S Impact welder for attaching repair panels (not required for dent removal!).

4. Components of the VAS 6321

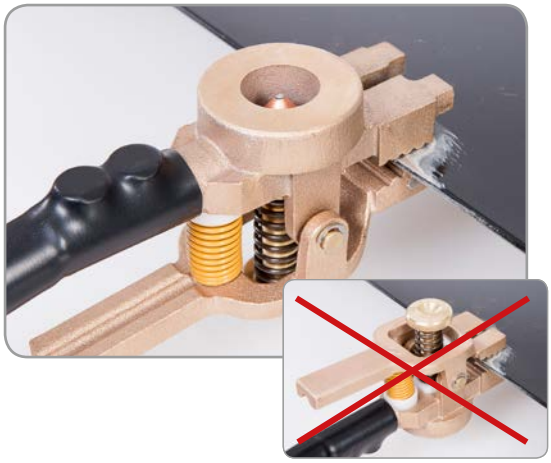
Program 3:

C Graphite electrode for pulling in and hardening panels. Do not use the graphite electrode on the thin panels used on modern car models. Adding carbon can cause corrosion and noticeable hardening.

Program 4:

D Rolled seam welding (not required for dent removal!)

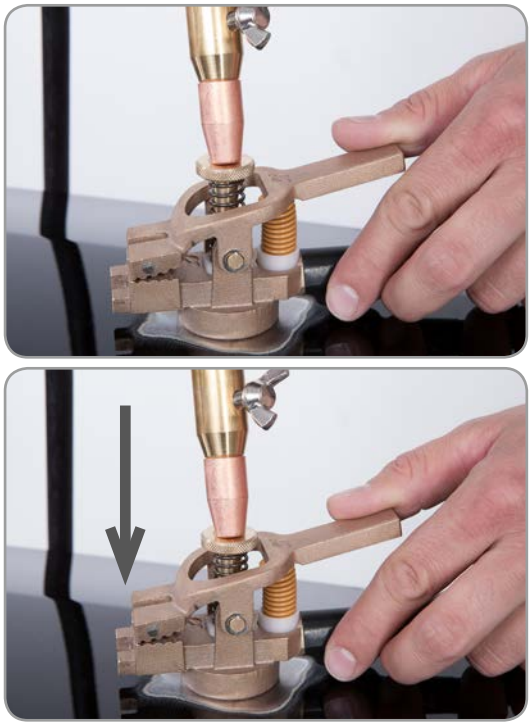
The letters of the individual programs may be found on the controllers for the welding period and the current on the scales. They simplify finding the correct parameters.



Safe ground connection to the vehicle body

If an edge is available, the ground clamps are directly connected to the plain ground edge.

Caution: The fixed part of the ground clamp must contact the vehicle body and not the joint in single-sided ground areas. Attaching teh joint side to the ground area can result in faulty welds or can even burn holes into the panel!



Attaching the ground on a plain surface using the welding tip

The ground clamp can be directly welded to the plain panel. Place the ground clamp onto a clean surface. Now use the bit welding tip and press onto the bolt. A soon as the welding tip connects, it is automatically welded onto the panel.

To remove the clamp, simply twist the welding tip to loose connection.

Caution: The current is being transmitted not through the welding tip, but through the plain metal surface on the bottom of the clamp, so make sure you connect to a clean and plain surface.

4.2 MIRACLE VAS 6321 BITS

The Miracle-Bits serve as power-transmitting medium between the Line Puller, the Level Puller, the Strong Puller as well as the AiroPower pneumatic press and the damaged vehicle body components.

Application scope for the straight “long-hole bits”?

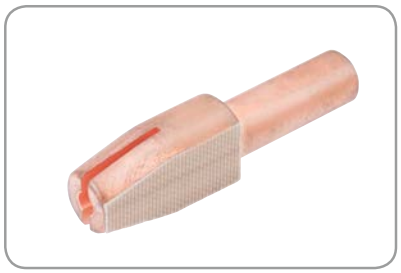
The straight bits can be welded onto the damage at very small distances and therefore provide great pulling power without tearing out the metal. They are designated for stable areas, such as the rocker panel, quarter bends and other stable edges.

Application scope for the turned “screw bits”?

These are used to repair light to medium damages on edges and contours, specifically on contours in the area of large surfaces and wheel arches.

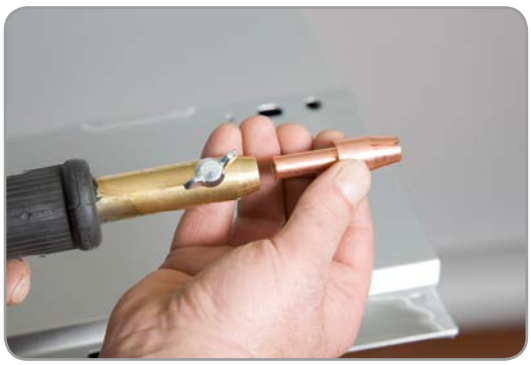
Optional: Power-Bits

MB-4 (rotated), MB-5 (straight):
Special alloy Bits for high strength steel panels, e.g. on sills, doors



Optional: Bitholder electrode

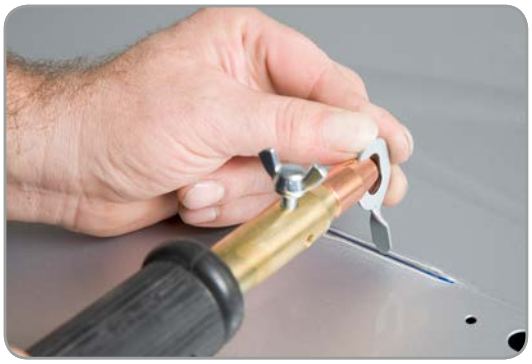
MS-U-B10 Bitholder electrode, slim



Welding on the Bits

- Sand bare the area to which the bits will be welded. All existing primer and zinc coatings must be completely removed.
- Score possible edges and contours or mark these with a thin felt pen.
- SMS-7Q must remain off!
- Insert the bit holding electrode into the handle and set in place with a wing bolt.
- Power on the SMS-7Q at the main switch and select program 2.
- Set welding period (TIMER) and welding current (AMPERE) at A. The yellow mark around the knob indicates the proper operational range.
- Create ground connection (see section 5.1).

4. Components of the VAS 6321

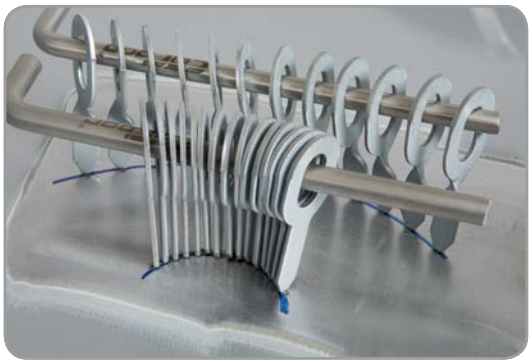


- Insert the bit into the V-shaped opening of the bit holding electrode and hold in place.
- Place the bit at the desired point by applying light pressure.
- Welding is automatically triggered by the SMS-7Q.
- A sample weld is recommended! Weld on the bit, check the seating and remove again by twisting it off. The panel may not show a hole!

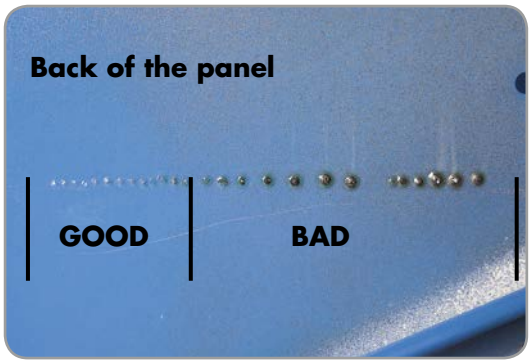
Important information for welding on the bits:

- Begin welding the bits onto the deepest point of the damage.
- Do not select excessively large distances between the bits.
- In order to prevent shunting, diagonally weld on tightly seated bits and then bend these up!
- Outer bits must remain diagonal at greater damage depths.
- Align bits so that the tension rod can be inserted easily. Align the bits so on rounded areas that the straight tension rod fits through despite the curvature.

Arrangement of the bits on two edges with wider gaps



Arrangement of the bits in case of arched damages



Easy fine tuning of the welding current: High process accuracy, strong connection, no burning.

- **Never make any adjustments via the timer, always only adjust the current.** An extension of the welding period only results in unnecessary heating of the panels and tools!!!
- Adjust the welding current according to the thickness of the panels! Low panel thickness = low current, high panel thickness = high current.
- "Apply" current from the lower area in case of unknown panel thicknesses, check seating of bits!
- Adjust the pressure of the bits to the amperage (as in RP welding)! High current = high pressure, low current = low pressure.

What advantages does a high current and the brief welding period offer when welding the bits?

- The brief welding period prevents heat overloads and therefore welding through of the panels.
- The high welding current promotes solid surface welding of the bits with the panel.
- The properties of the vehicle body panels are not changed adversely by the "smart" welding process!
- Almost no burns develop on the back of the panel, zinc is not burned.

Bits do not hold, great development of sparks and traces of fire? Potential error sources:

- The surface was not ground sufficiently (paint residue, corrosion, zinc) or the surface is contaminated (oil, grease, wax, etc.).
- Insufficient pressure when welding on the bits.
- Unsafe handling.
- Poor ground connection.
- The SMS-7Q is operated with an extension cable.
- The amperage is too low (see above).
- Shunting (contacted neighboring bit during welding).
- Bits were not cut with the bit cutter.

Important information for the use and care of the bits

- Use only original VAS 6321 bits. The bits are manufactured from an especially improved material alloy for technical reasons. Only this will guarantee great processing accuracy.
- Remove the bits after use by twisting them off, incorrect bending may cause holes in the panels!!!
- The bits must be cut after 3-4 welding operations (refer to section 4.4 Bit Cutter).
- Always use new or cut bits for solid areas!
- Do not cut bits differently, but always jointly.
- Store differently cut bits separately!

4.3 Tension rods

Select the relevant tension rod that will be fed through the elongated holes according to the number of the welded bits. The tension rods are of 4 different lengths and 2 different diameters. If the damage is slightly deeper than the height of the elongated holes, greater damage depths can be reached by tilting the outer bits.

Why do the tension rods have various diameters?

The 8 mm tension rods are selected for very solid and rigid areas. The 7 mm tension rods, especially the long ones, have the advantage that they bend easier at a greater pulling force and therefore guarantee a desired overstretching of the area that must be pulled (especially on the door and sidepanel).

4.4 Bit cutter

Application

- Clamp the bit cutter into the vise (see illustration). Please take care that the lower waste opening remains open.
- Connect the compressed air hose (5-8 bar).
- Set the stop according to the bit length (stop 1 for uncut bits).
- Hold straight bits flat and turned bits lengthwise in place against the stop.
- Press the control lever.
- Straight bits can be cut up to 10 times.
- Turned bits can be cut up to 7 times.

Maintenance

- Routinely oil the bit cutter!
- Check the cutting head routinely for proper seating in the pressure cylinder and tighten, if necessary.

Optional: Bit-Cutter Conversion Kit for Power-Bits

CM-024-3
Bit-Cutter Conversion Kit
for cutting MB-4 Power-Bits

Storing the bits

The cut bits must be sorted and stored on wire rings. This will guarantee that you will always use bits of an equal length. You can separate freshly cut and already used bits by inserted markings.

4.5 STRONG PULLER

Application: Rocker panel, posts and other edged areas
Pulling force: up to 2.0 t

Application

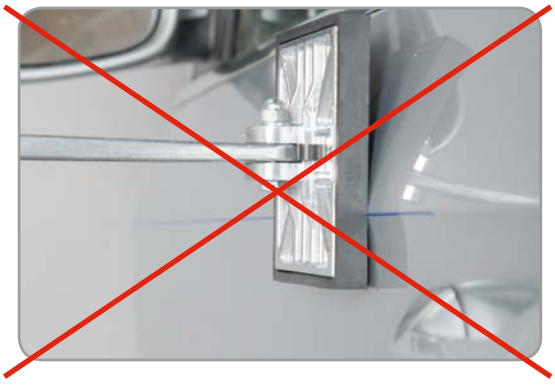
- Provide the strong puller with the appropriate support feet.
- Attach the tension rods to the lowest bit.
- Align the support feet so that they can support themselves on the undamaged solid area.
- Set the drawing spindle by twisting so that the pulling lever form a max. angle of 45° toward the traverse.
- Pull by moving both levers toward each other. Do not pull suddenly, but "walking" slowly and sensitively during several movements.
- Watch for rebounding of the damaged area.
- The pull can be reduced or increased by twisting the drawing spindle.

Special features

- When placed vertically, the pulling levers will snap in under force!
- Tensions in the damaged area can be repaired by targeted blows with the aluminum hammer and plastic wedges after the levers have snapped in and the pulled area remains.
- The pulling height can be adjusted by turning the triangular head on the drawing spindle.
- The thread pitch of the drawing spindle of 1.5 mm per revolution means that a 1/3 turn of the head results in a change of the pulling height by 0.5 mm.
- Up to 80% of the damage can be repaired by the first pull with the strong puller!

4. Components of the VAS 6321

Perfect ergonomics and an extremely low weight of 4.0 kg (including the support feet) guarantee easy and fatigue-free handling.



Important notes

- Please do not attempt to repair the damage by only "pulling".
- If the center is too high during pulling, then pull in several segments from outside!
- Forced pulling results in overstretching the damaged area, tearing off of bits, holes in the panel!
- Pull in several stages and always release the tension with the aluminum hammers.
- Always select a secure and solid support area!
- **Caution:** If the simple support feet of the strong puller are set on the edge, you must ensure that the supporting point is located precisely in the center of the support feet. If the supporting point is far outside the center and if the pulling force is very high, a bending moment develops on the support feet and they can break!

It is essential to use the double feet as soon as lateral tension occurs.

4.6 LINE PULLER

The line puller is exclusively used in the outer skin area, specifically for large-scale damages on doors and sidepanels.
The line puller straightening tool works similar to the strong puller, only with the difference that it has a measuring instrument that assists in pulling out precisely to the millimeter. The line puller has a sliding pulling rail and suction cups. This makes it very easy to handle. Just like the strong puller, the line puller also has single and double support feet that are used depending on the supporting possibilities and pulling direction.

Application

- The requirement measurement is taken at an undamaged point of the vehicle via a measuring instrument.
- The line puller is positioned above the damaged region with the pulling hook.
- The support feet are placed in the solid area.
- The line puller can also be affixed to the vehicle body or the window by using the rubber suction cups.
- Each damage may have to be processed differently, however, the following applies for damages on several vehicle body lines:

  1. Lowest line 2. Uppermost line 3. Center line

- Begin at the lowest or strongest line (body line/edge) for large-scale damages on doors and sidepanels. This area, however, should not be brought into the original position immediately. Then the uppermost line will be processed and then the center line.

- The line puller is only placed once and can then be shifted over the overall damage. The distance always remains the same. As in the strong puller, the pulling device can be snapped in and the pulling height can be adjusted by turning the spindle.

Special features

- If the entire width of the line puller is used (outer support feet), it can easily bend at a greater pulling force.
- **Result:** The measuring instrument becomes inaccurate!
- **Remedy:** Check the edge or the contour with a steel ruler!

The suction cups will not hold?

Possible cause:
Rough surface, contaminated surface, contaminated suction cups.

Remedy:
Clean the suction cups or surface, moisten the suction cups!

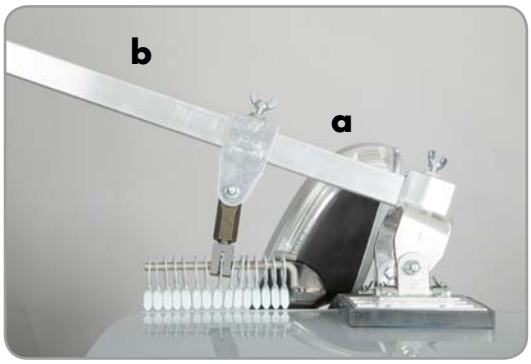
Important notes

Caution: When working with single support feet, the correct positioning must be verified as in the strong puller (see page 19). The supporting point must be located precisely in the center of the support feet. If the supporting point is far outside the center and if the pulling force is very high, a bending moment develops on the support feet and they can break!

- The feet must only ever be subjected to a vertical load when pulling.

  It is essential to use the double feet as soon as lateral tension occurs.

4.7 LEVER PULLER



The lever puller is used if the characteristics of the material within the vicinity of the deformation do not allow the use of a strong puller.

The lever puller can be provided with two different support feet, in order to also find support on curved parts. It can be used individually or in combination with the strong or line puller for larger and more complicated damages.

Advantage: You have the option to increase the pulling force by up to 300% for triple the lever length (b) in proportion with the length (a).

Application and benefits

- The lever puller is used where only one possibility for support exists.
- The lever puller can be restructured from pushing to pulling with a few movements by exchanging the positions of foot/pulling unit (see illustration).
- Quick pull-out of deep deformations in the area of surface areas.
- Many potential uses via individual assembly and adjusting options.

The lever puller has the disadvantage over the strong and line pullers that it cannot be fixed/locked under stress.

4.8 EASY PULLER

Strong, line and lever pullers are generally used on large-surface damages. Following rough repairs, small dings generally remain, which are repaired during the following finishing work. The easy puller is a capable tool for these finishing jobs, as well as suited for repairing sideswiping damages and parking dents.

Possible applications

- Fine surface processing of residual damages.
- Quick repair of sideswiping damages.
- Easy dent removal for hail damage.
- Pulling in smaller surface irregularities in metal.
- Dent removal without paint damages, in conjunction with the gluing kit.

Advantages

- Excellent ergonomics, low weight.
- Multi-purpose use, easiest handling.
- Precise and sensitive straightening of surfaces.
- Low-noise work.

4. Components of the VAS 6321

Application

What are the 6 reinforcement frames and the 2 flat supports for?
The various supports are used depending on the size and characteristic of the surface that must be straightened:

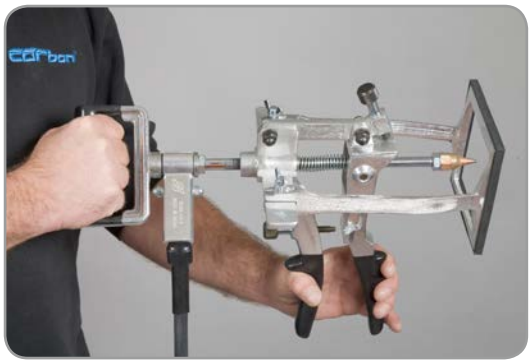
- Square frames for plane and lightly curved surfaces.
- Round frames for very curved surfaces.
- Flat supports generally for sideswiping damages.

Use of the straight feet for sideswiping damages and scratches.

Use of the round feet on curved surfaces, such as fenders, roof curvatures, etc.

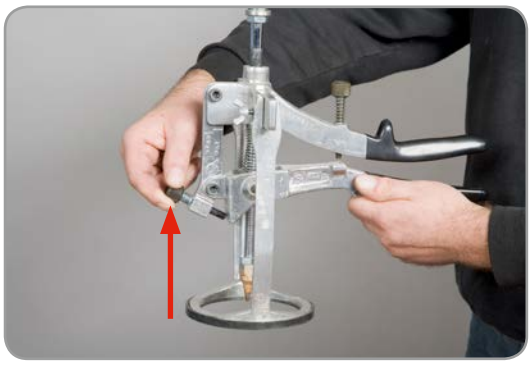
Use of the square feet on flat level surfaces.

4. Components of the VAS 6321



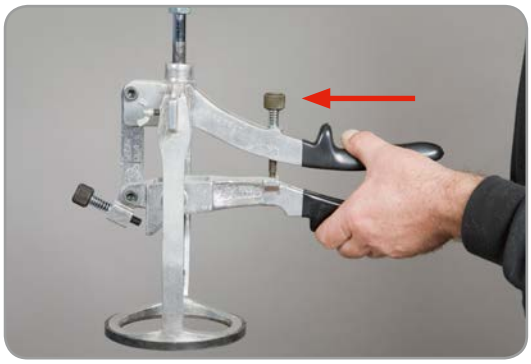
Application

- Provide the easy puller with the appropriate support.
- Connect the connecting cables to the easy puller and screw together with the handle piece.
- Note: Periodically lubricate the sliding surface of the cable terminal on the easy puller with suitable lubricant.



Basic setting

- Adjust the handles to the size of the hands of the user with the lower banking screw.
- Set up on a level surface.
- Pull the handles together.
- Turn the spindle until the welding tip contacts the surface.
- Set back by two left rotations with the handle.



- The top adjusting screw on the handles can be used to limit the pulling height.

4. Components of the VAS 6321

- Switch on the main switch of the SMS-7Q and press the program key No. 1. The signal light displays the operational readiness.
- Set the time and current control unit to setting "II".
- The parameters must be set to the matching illuminated symbols by using the controllers. The following also applies here: A fine adjustment of the welding current is required depending on the metal thickness and quality.

Procedure

- The welding process is started AUTOMATICALLY when applying the welding tip on the panel.
- Pull out by pressing the handle together.
- Turn off the welding tip by turning the handle.

Work from the center outward for small dings. Remove larger dents from outside in a circle toward the center.
Advantages: The metal can also be pulled in with the easy puller. Pulling out and shrinking is completed in one pass.

4. Components of the VAS 6321

Important notes

- Only use original MRACLE welding tips. The tips are specifically made of a special alloy. The sizes and form were optimized to the best heat deflection and low wear.
- Do not press the welding tip on, but apply lightly and smooth to the surface.
- Complete 3 – 4 welds without pulling until the material builds up on the welding tip. **Advantages:** The welding will adhere better, the tip will wear less!
- Do not pull too hard! **Note:** Many smaller pulls result in a better surface quality than a few strong pulls!
- **Caution:** Do not tighten the wing bolts excessively on the reinforcement frame! Risk of breakage!
- Switch off the M-7 after finishing the wok and remove from the power supply.

Surface finish

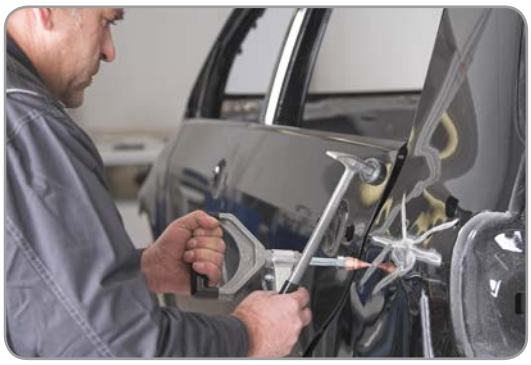
You can return surfaces very sensitively and precisely with the easy puller. Putty and filler work will be reduced to a minimum with little effort. You can effortlessly remove the small spotwelds that develop when pulling in and out with an electric sander or a manual router.

4.9 Dent puller and manual pulling device

The dent puller and the manual pulling device have been proven to be a logical supplement. These tools are used wherever using the easy puller is not possible. The welding tips of the easy puller, the dent puller and the manual pulling device are identical and must be ground or replaced after extensive use.

Potential uses for the dent puller

- Removing small hard dings, if the damaged area is still under tension with a snapped-in strong or line puller.
- Dent removal on deep, angled or difficult to access areas.



Potential uses for the manual pulling device

- Pulling of large-scale soft dents and simultaneous release using the aluminum hammer.
- Pulling in small dents and peaks in the metal.

Adjusting the SMS-7Q to program No. 1, time and current at position “P”.

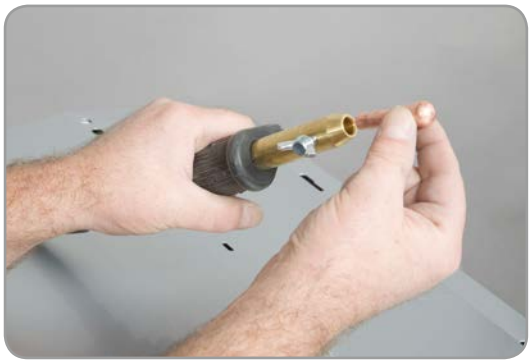
4.10 Tools for shrinking

Shrinking must be performed where too much material has developed by overstretching the metal due to the damage or incorrect straightening. The VAS 6321 system offers various tools and options to shrink spots and oil can dents.

- Copper electrode
- Graphite electrode
- Shrinking with the easy puller, dent puller and manual pulling device

A bucket with water and a sponge are also needed.

Adjusting the SMS-7Q to program No. 2, time and current at position "B".

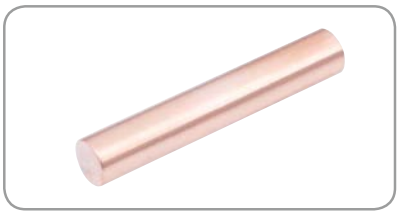


4.10.1 Shrinking with the copper electrode

- Verify that the SMS-7Q is switched off.
- Place the spot-shrinking electrode into the handle piece of the SMS-7Q and tighten it with the wing bolt.
- Switch the SMS-7Q on.
- Press program 2, the signal light will be illuminated to indicate that the system is ready to operate.
- Set the controller for the welding time and amperage to "B".
- Place the electrode on the shrinkage area and press it on tight, the current is automatically switched on!
- Do not pull the electrode away until the welding inverter has switched off.
- Cool the heated metal with a damp sponge.

Optional: flat shrinking electrode

Using the MS-U-B22 shrinking electrode with flat lower surface reduces the creation of dents when shrinking. This can reduce the time needed for finishing the panel surface surface.



Important notes

- Setting “B” is only the basic setting. It can deviate depending on the metal thickness, quality and size of the damage.
- Depending on the size of the damage, the best result is obtained by adjustments on the timer. Setting “B” on the timer is the recommended maximum time.
- No pressure or insufficient pressure causes the metal to burn through!

Setting the SMS-7Q to program No. 3 and the current (AMPERE) at “C”.

4.10.2 Graphite electrode: Shrinking and Stabilizing

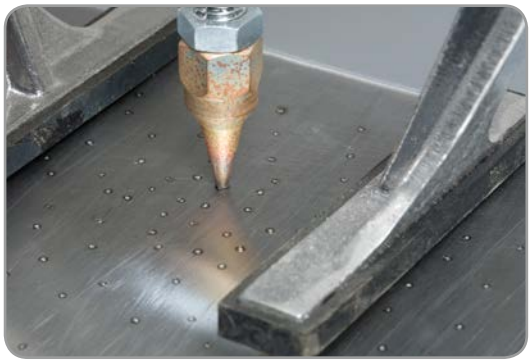
- Suitable only for very soft and thin thermoforming sheets of older vehicle models.
- Attach a graphite electrode to the handle piece. Do not tighten the screw too much, the electrode could break!
- Switch the SMS-7Q on.
- Press function key 3. The signal light above it will be illuminated and display the operational readiness.
- Set the controller for the amperage to position “C”.
- The timer is not included, since voltage is permanently at the graphite electrode!

Shrinking of thin outer body panels with graphite electrodes can lead to intergranular corrosion. The added carbon may harden the panel, making it impossible to file. For shrinking modern sheet metal only copper electrodes should be used.

Important notes

- Contact the processing surface with the graphite electrode.
- Do not remain on one spot, but move the electrode helical or lengthwise over the surface that must be stabilized, depending on the damage.
- The electrode burns off slowly. Your carbon is provided to the steel panel, the panel hardens.
- Do not press the electrode on, risk of breakage!
- The shrinkage process can now begin by sudden cooling via compressed air or a damp cloth.
- The SMS-7Q must be switched off after finishing the job.

Caution: The electrode becomes very hot, risk of burns!



Caution: Please do not perform any modifications on the copper electrode, such as regrinding or reconditioning. Its form is specifically calculated! To clean from remains the diamond file 358118 is recommended.

4.10.3 Shrinking with the easy puller, dent puller and manual pulling device

- Suitable for small spots and dent removal points that are pulled up too high.

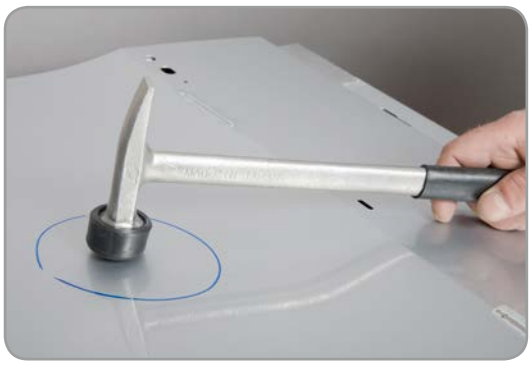
Advantages

- The working time is reduced, since dent removal and shrinking operations can be performed with the same device.
- The heat application is very low.

Application

Apply the welding tip as in the dent removal process and press it against the deformation by turning the handle at the time of the welding process.

4.11 Aluminum hammers and plastic wedges



Three different aluminum hammers and a wide and narrow plastic wedge belong to the VAS 6321 system.

The hammers not only vary by their different sizes, but also by the different position of their peens. These may be arranged horizontally or vertically to the handle. The hammers are used to remove dents and as props to release edges or grooves during pulling.

Application

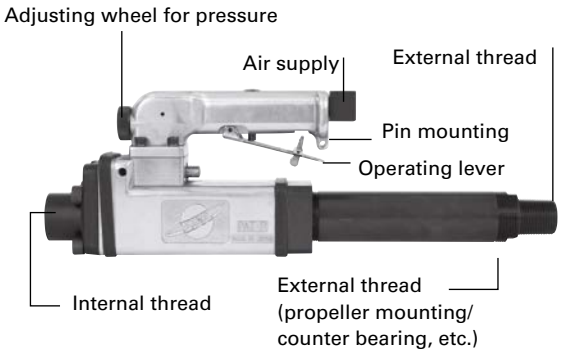
- The hammers are generally used to remove tension in the surface and to stabilize edges.
- The transverse or longitudinal peen can be used to stabilize edges depending on the access. The pointed side of the plastic wedges can also be used.
- A second hammer is used to beat on the applied hammer.
  Note: There is no risk of splitting parts as in steel hammers!!!
- The surfaces of the aluminum hammers and aluminum hammers with rubber caps are excellent to release surfaces and few damages to the edges.
- The wide sides of the plastic wedges can also be used as “damper” between the hammer and the metal.

5. VAS 6324 AiroPower pneumatic press

5.1 VAS 6324

Advantages and characteristics

- The VAS 6324 does not operate with hydraulics as conventional presses in vehicle body repair, but the pressure/pull is exclusively produced pneumatically. **Advantage:** Wear and leakage problems of the hydraulic cylinders are obsolete!
- Low weight of the press, only 3.7 kg!
- High pulling strength of the press of up to 5.25 t! AiroPower acts in both directions at the same force, therefore at pulling and pressure!
- The overall stroke of the spindle is 16 cm!



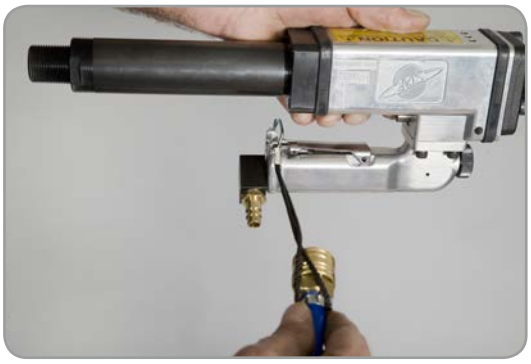
Important notes

- Max. operating pressure of 8 bar
- Do not perform any modifications on the press or its components!
- Only use original accessories!
- Keep the threads of the press and its components clean.
- Routinely check the condition of the threads.
- Components with damaged threads must be replaced.
- Use the entire length of the threads of the components.
- The optimal pulling force can only be transmitted by this method and the threads will be prevented from tearing out!
- The press has 3 threads: An external thread on the spindle, an inner thread on the back and an external thread on the housing. **Special feature:** The large external thread on the housing is double-threaded!

5.2 Hazard warnings

- **Crushing hazard:** Do not operate the press, if your hands are located on the spindle or between the jaws!
- Attach the clamps properly to the seams and tighten the screws!
- Keep a safe distance. Use the hose extension with remote control, if necessary!

5. VAS 6324 AiroPower pneumatic press



5.3 Use of the remote control

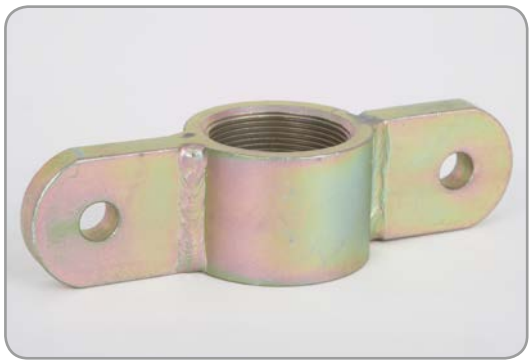
- Insert the locking pin into the pin mounting
- Connect the pressure hose.
- The remote control can be operated manually or by foot.

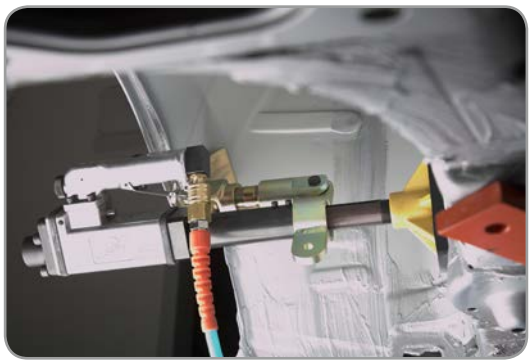
5.4 Simple applications

The illustrations show the possibilities of the AiroPower press by using the thread on the spindle and the rear inner thread.

5.5 Applications in tight places

"Propeller" 19277P is screwed onto the external thread of the press cylinder. Support feet, back stops or claws can be attached to both straps/holes.





5.6 Applications with supports and propellers

Application of the press by using the large external thread and the "propeller" component.

5.7 Use of various components

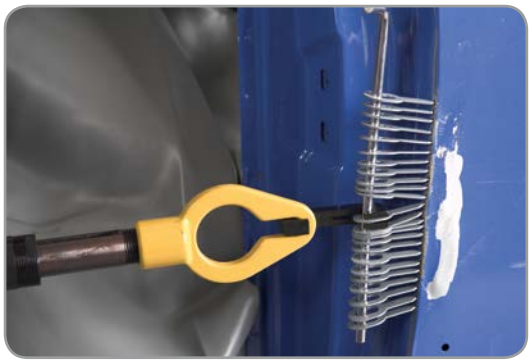
The components of the VAS 6324 are versatile.

- Inner and exterior reinforcement clamp.
- 19220P: Adjusting the hook via a hexagonal axis.

5.8 Pulling with the AiroPower pneumatic press

Components required (Eco kit)

- Clamps
- Support feet
- Extension pipes
- Propeller



5.9 Combination with the VAS 6321

The VAS 6324 is well suited in conjunction with the VAS 632, if no option to use the strong, line or lever puller components exists or if the pulling force must be greater than is possible with the strong puller.

Best application example: Repairs of a quarter bend.
When the bits are welded onto the damaged edge, the adapter is attached and fastened to the AiroPower press with the chain loop. The counter bearing can be a hinge to which the vehicle body hook is attached.

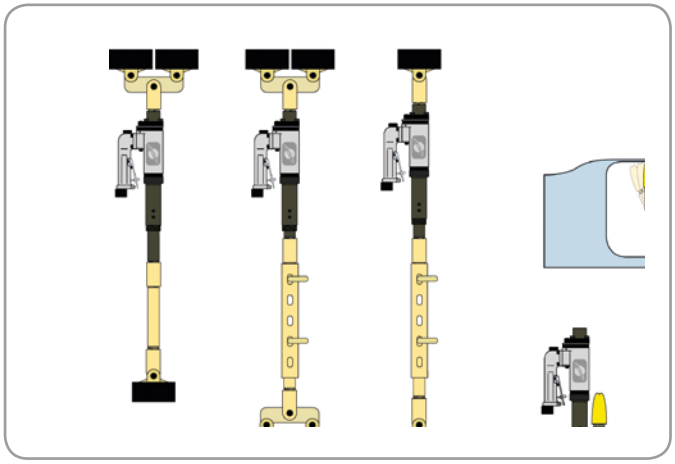
5.10 Straightening stable areas

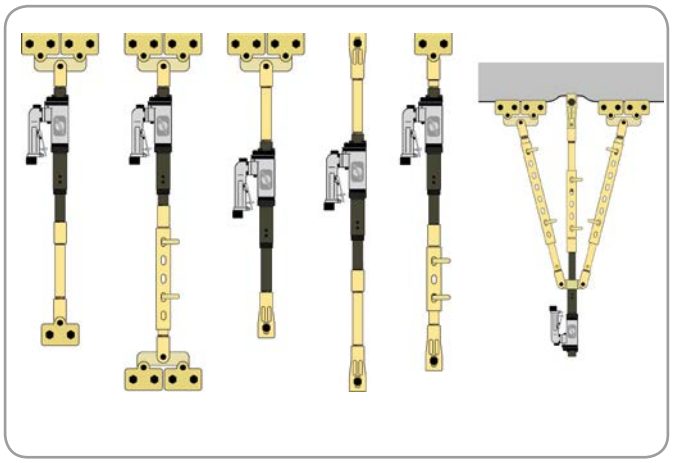
Great strength is required to straighten thick-walled or high-strength parts. Potentially, this force cannot be transmitted by the welded-on bits, which then tear off. It is recommended, for example, to attach the bits on thick walled high-strength rocker panels using a MIG soldering weld, if necessary, with a shielding gas spotweld. Only this procedure will assure that the bits hold up dependably when pulling with the VAS 6324 or the strong puller!

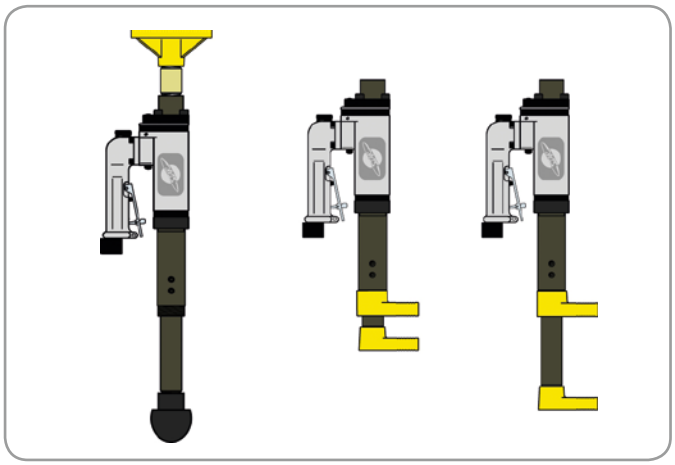
Optional

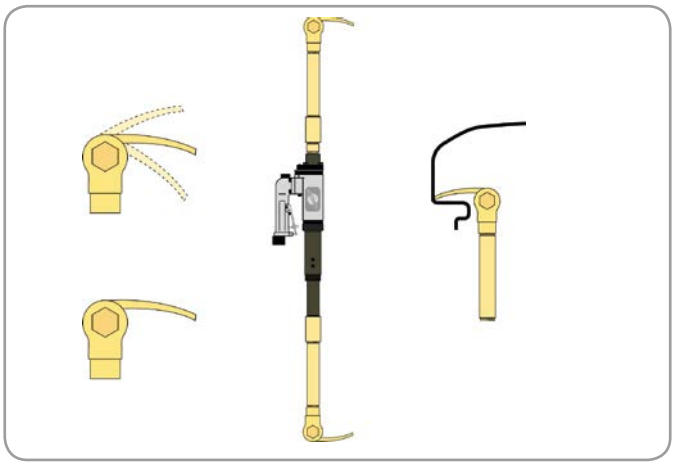
- 19286P – Bit Holder (adapter) for MIRACLE system

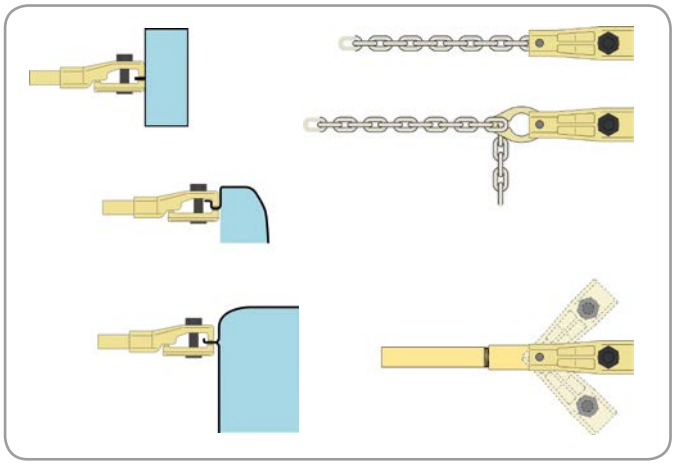
5.11 Flexible, modular plug-in/screw-in system

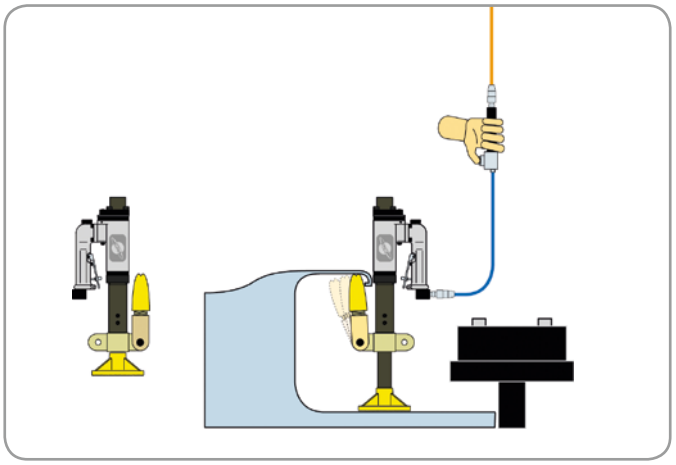












5.13 Other example applications

6. Gluing Technique with the VAS 6321/1

6.1 Gluing technology with VAS 6321/1

In order to efficiently prepare large deformations with Strong- and Line-Puller, you can work very quickly using the VAS 6321/1 kit. Instead of welded bits, special adhesive pads are being glued onto the panel. The repair process is identical to the one using bits. Remaining tension in the material can be removed using hammers with rubber cap or Alu-Titanium hammers. Depending on the damage you can use 2 or more pads along the damaged area.

Apply special cleaner to a soft cloth.

Clean the surface of the adhesive pad.

To achieve optimal connection, clean the surface thoroughly.

Apply thick line of glues.

Place the pad firmly to the surface, let the glue cool down.

Use Line- or Strong-Puller to remove the panel deformation. Hold under tension and remove remaining tension in material with Alu-titanium hammers.

To loosen the pads put some cleaner on the outer area of the pads and let it soak in for some time.

Remove the pad using the plastic wedge included inthe kit.

Remove glue. The pads can be re-used.

6.2 Example application: VAS 6321/1 on VW Polo side panel

Adhesive pads are glued onto the severely damaged side panel. Using these pads with various Miracle pulling components, the deformation can be corrected in a short time. After pre-alignment with the adhesive technique, the surface of the side panel is repaired with the Miracle Easy Puller and is almost ready for painting. Besides saving time, the biggest advantage is that the structure of the body and the ex-works corrosion protection remain intact.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6. Miracle adhesive technique with VAS 6321/1

Example application: VAS 6321/1 on VW Golf sill

In most cases of similar damage, the damaged part is removed and a new part is elaborately welded in. In the process, the ex-works corrosion protection is destroyed and must be re-coated.
This sill was repaired to its original form using the Miracle adhesive technique.


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7. Decomissioning

This chapter shows you what your have to pay attention to when you want to temporarily or permanently decommission the power unit.

7.1 Temporary decommissioning

- Switch off the power unit.
- Unplug the control cable and welding cable from the power unit.
- Protect the power unit from the penetration of liquids and debris.

7.2 Final decommissioning (closure)

We explicitly advise that in the event of termination of use, the disposal of the power units and welding guns can only be carried out by the manufacturer or a waste management company. Private household refuse and municipal collection points are thus excluded.
See www.carbon.ag (Imprint) for an explanation of the "proper disposal of electrical waste and old electronic equipment".

Notes

DECLARATION OF CONFORMITY

CE

Manufacturer's Name: Star Co., Ltd.

Manufacturer's Address: 119 Sanbongi, Fujioka-Shi
Gunma, 375-0037, Japan

declares, that the product

Product Name: SUPER MIRACLE STUD

Model Number: SMS-7Q

conforms to the following Product Specifications:

Safety: EN60974-1, EN60974-11

EMC: EN50199

The product herewith complies with the requirements of the Low Voltage Directive (73/23/EEC), (93/68/EEC) and EMC Directive (89/336/EEC).

Fujioka, Gunma JANUARY 1, 2012

Kosei Ishihara, President

Notes

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❀ This paper was produced from chlorine-free bleached pulp.