



**PLASTIC REPAIR:
CRITERIA AND SOLUTIONS
IN AUTOMOTIVE INDUSTRY**



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CONTENTS

PLASTIC AND THE AUTOMOTIVE	4
PLASTIC REPAIR	6
WELDING WITH NITROGEN	7
WELDING EXAMPLES: CUT REPAIR	8
WELDING EXAMPLES: RECONSTRUCTION	10
MWM WELDERS	12
NITROGEN GENERATOR	14
ACCESSORIES	15



It is just in the early 60s that the dichotomy vehicle - plastics finds its origin. Initially starting being used mostly for dashboards and small internal parts, the usage of plastics fastly spread out at a first stage in shape of back and front bumpers and thereafter in more essential vehicle parts such as car doors, spoilers and side fins, to become the fastest growing material being used in vehicle body manufacturing.

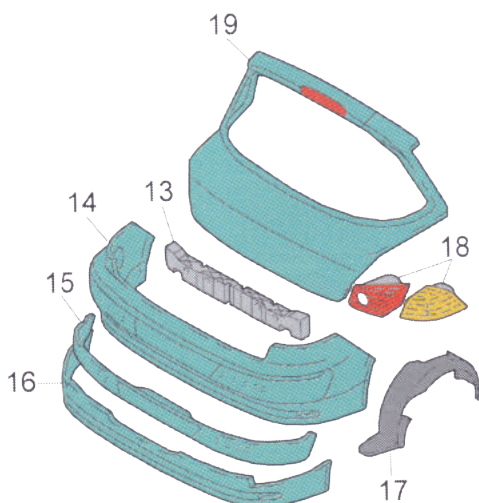
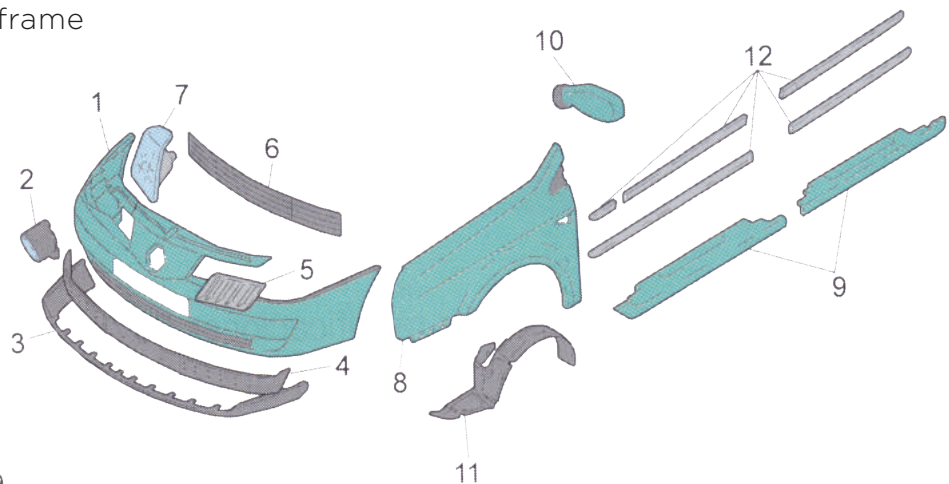
Nowadays, thanks also to the continuously changing vehicle building technology, car manufacturers designing new cars are increasingly using plastics, especially when relating related to vehicle body.

Main reason for this decision is to reduce vehicle weight in order to cut manufacturing costs and be more environment friendly.

Just a simple 10 % weight reduction can practically turn into 7 % fuel need saving, in this way making plastics, after metals, as the second most used material when car manufacturing.

FRONT

- 1 Front bumper
- 2 Fog front light
- 3 Lower spoiler of front bumper
- 4 Front bumper frame
- 5 Front bumper grill
- 6 Radiator grill
- 7 Front light
- 8 Front visor
- 9 Side frame
- 10 Rear mirror
- 11 Front internal fender
- 12 Side door frame



BACK

- 13 Inner absorber rear bumper
- 14 Rear bumper
- 15 Rear bumper frame
- 16 Lower protection of rear bumper
- 17 Rear internal fender
- 18 Rear indicators
- 19 Rear door

Goal of this information leaflet is therefore to outline techniques to repair plastics used to manufacture vehicle bodies and, more specifically, all theoretical, economical and practical specifics related.

PLASTIC TYPES

Plastic materials normally used in vehicle bodies manufacturing can be divided in three main sections: thermoplastic, thermosetting and composite.

Thermoplastic

It is the widest used material when manufacturing bumpers as it can be heated up several times and worked in many different ways. Most common types are PP (Polypropylene), PC (Polycarbonate) and ABS.

Thermosetting

This type of material can not be heated up again and therefore can not be reworked. Most common on the market is PU (Polyurethane).

Composites

It is the most uncommon material used in bumper manufactory but widely used in other vehicle parts. GRP is the acronym for this special plastic regularly reinforced with glass or added polyester.

PP (polypropylene) is used for as much as 80 % of all plastic materials used to manufacture vehicle body parts (including bumpers) as it provides important features such as stiffness, flexibility and resistance to high temperatures, up to 130 degrees.

Thank to these product features, PP can be repaired in any condition.

But first let's take a look at the economic advantage when repairing plastics before exploring the different repair techniques.

ACRONYM	PP	PU	PE	PC	ABS	TPO	NYLON
PLASTIC MATERIAL	Polypropylene	Polyurethane	Polyethylene	Polycarbonate	ABS	TPO	Nylon

ECONOMIC ADVANTAGE

The huge volume of polymeric plastic material being today used in the vehicle manufacturing industry offers the market players an even bigger achievable economical potential gain considering:

- The big quantity of plastic elements inside every vehicle today as a matter of fact fully repairable
- The total elimination of the recycling costs of the replaced parts and all existing taxations on them
- Average cost ratio between repair and replacement is today 30/100 allowing consequently a consistent economical gain
- The complete elimination of waiting times to receive the needed spare part in case of replacement
- Repairs can be carried out achieving even a better quality than the original spare part so enabling longer lifetime of the repaired parts leading to increased customers' satisfaction.

ENVIRONMENTAL ADVANTAGE

Once the economic gain of repairing is known the ecological benefit should be considered: repairing means a contribution to the safeguard of the natural environment by reducing volumes and all recycling costs of the replaced parts and subsequent polluting emissions.

PLASTIC REPAIR

Plastic repair is to be carried out exactly in the same way metal repairs are repaired today, checking repair cost so to consciously realize the advantages but at the same time evaluating quality and technical improvements achievable through plastic repair.

WHAT IT IS

Repair by plastic welding means bringing on the part to be repaired some new material absolutely identical to the damaged one by the hot melting process generated by a heating gun powered by Compressed Air or Nitrogen Gas as later explained.

MAIN STEPS OF REPAIR PROCESS

- Total cleanliness of the damaged part
- Material identification and related choice of consumable material to add
- Hot melt process
- Finishing

USEFUL TO KNOW

Any plastic part of a vehicle is relief engraving branded so to allow the material identification and use the right consumable for the repair. The existing plastic supports to be used for the repair are shaped in two ways: plastic rod or stick. The rods normally used to fill cuts or small holes whereas sticks, available in different width (broad or narrow) and shapes (flat or angle) are mostly used to rebuild missing parts, fixing supports and to fill major complex cuts or big holes.

HERE ARE THE EXISTING STICK SHAPE SECTIONS:



ROD



NARROW
STICK

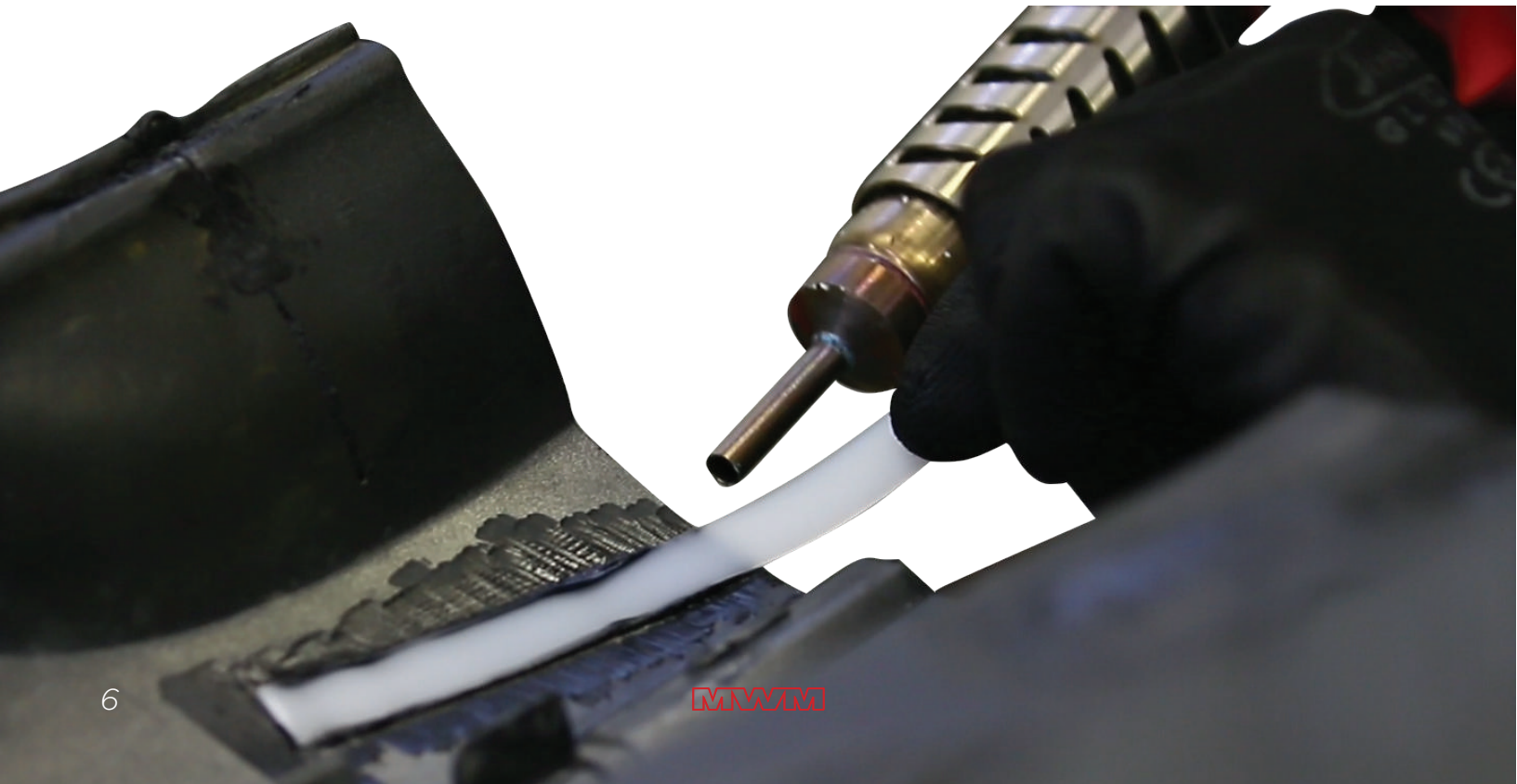


BROAD
STICK



ANGLE
STICK

Repair with broad stick



WELDING WITH NITROGEN

Further innovation and quality improvement in plastic welding repair technique has been achieved through the use of Nitrogen Gas instead of Compressed Air. Thanks to multiple tests on the field and later through deep simulations of thermal cycles to reproduce all environmental conditions, MWM has witnessed that Welding repairs powered by Nitrogen provide 20 % more-time durability than the ones operated by Compressed Air. Because of its purity (about 89-99 %) Nitrogen Gas is preferred for repairs as completely free of contaminating elements which would surely jeopardize the final weld quality, oxygen being one of the dirtiest available in traditional compressed air. Plastic burning, toxic gases and smokes exhalation, plastic oxidation and crystallization are bad consequences not only for the quality of the repair (which would then compromise plastic flexibility and resistance of the repair) but for the health of the operator which should be highly safeguarded.



WELDING EXAMPLES

Lorem ipsum

In these sections are described tools and steps needed to carry out a professional plastic repair. All plastic repairs were performed on car bumper damages using MWM NITROGEN plastic welder.



1

Step 1

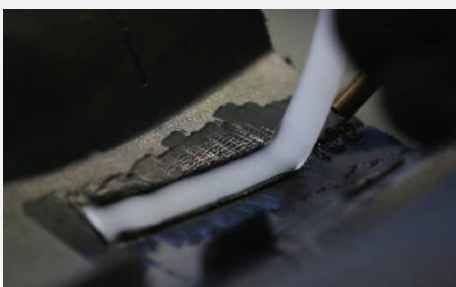
Clean properly damaged area with a manual cutter or a pneumatic sander, making a V profile along the cut. It is recommended to drill a hole of diam. 5,5mm at the end of the cut in order to avoid any further enlargement of the same. Clean with degreasing product before start welding.



2

Step 2

If needed, apply a pre-cut staple at the beginning of the cut, holding together the two sides of the cut.



3

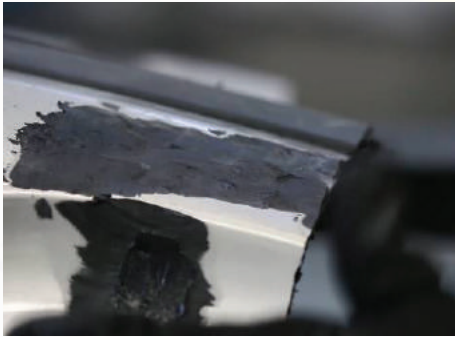
Step 3

Start the welding and proceed slowly together with heating gun and plastic strip. Verify the correct application of the strip and its penetration within the cut slot.



Step 4

Compact and press plastics with the appropriate roller in order to fill properly the cut. Ensure that plastic was previously heated up with the gun.



Step 5

Refinish with pneumatic sander or manually with sanding paper.

If needed, apply a further plastic strip to on the external side of the bumper ensure that cut slot is totally filled and damaged area had been reinforced.



WATCH THE VIDEO



1

Step 1

Clean properly the damaged area by using a manual cutter or a pneumatic sander and, eventually, with a degreasing product.



2

Step 2

Before starting the welding, position an aluminium plate on the damage and hold it up with appropriate pliers.



3

Step 3

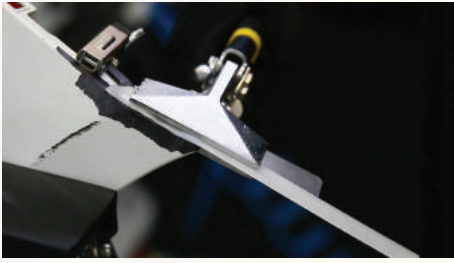
Heat up with the gun only the area where the repair will be performed. Follow slowly the plastic strip with the heating gun, trying to focus the heat within the plastic strip and the bumper, creating an angle of 45°. Ensure that the damage had perfectly been covered with the strip and it adheres on all sides, applying, if needed, additional strips.



4

Step 4

Heat up the damaged area and use the roller to compact and press the plastic. Turn the bumper and apply a further plastic strip on the external side of the bumper, repeating same procedures.



Step 5

Heat up and press furtherly plastics with proper clamp.



Step 6

Refinish with pneumatic sander or manually with sanding paper, drill the plastic to shape it and recreate a bumper support.



MWM WELDERS

MWM design, develop, test and produce the **wider range of plastic welders** present on the market, differentiating for:

EASINESS OF USAGE all machines are pre-set, tested and **pre-calibrated** during production **by MWM technicians** and no further adjustment is needed during their usage;

ECONOMIC EFFICIENCY 210W only are needed to heat up the gun;

VERSATILITY of the welder which can be powered with **compressed air** or **Nitrogen gas**, just switching power sources;

COMPACT IN DIMENSIONS AND GLOBAL WEIGHT ALLOW allow a **better mobility** of machines in all their compositions available.

SINGLE GAS PLASTIC WELDER

31871



The most complete and easy to use Nitrogen operated plastic welder.

DOUBLE GAS PLASTIC WELDER

31872



For past lovers and faithful to the tradition: gas bottle version.

COMBI NITROGEN PLASTIC WELDER - MOBILE

31876



The Flash of car-body shop!
Everything needed on 4 revolving wheels.



Nitrogen Membrane filter and
Welding machine in the same body
to optimise room.



Pocket is an MWM entry level welding
machine operating both with
compressed air and Nitrogen.



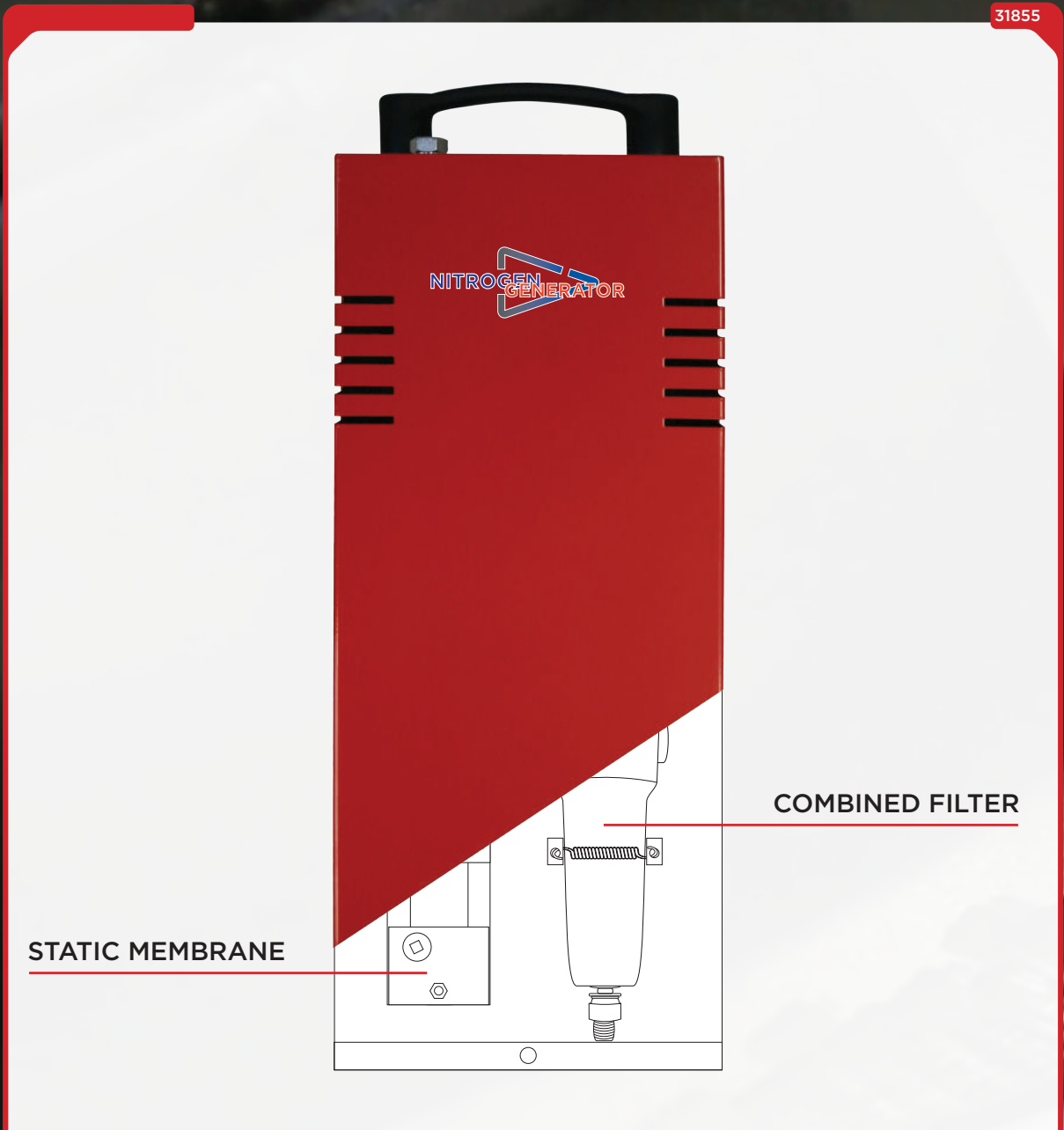
A trolley kit tailor-made:
small, light and convenient.



Bench version: to make bigger even
the smallest machine!

NITROGEN GENERATOR

31855



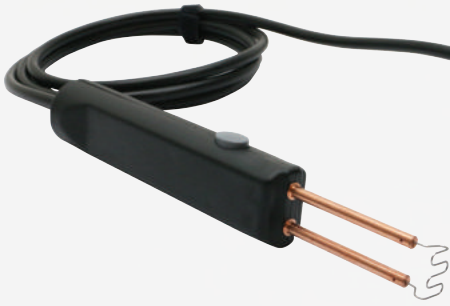
COMBINED FILTER

to remove any impurity contained in the compressed air inflated in the generator.

STATIC MEMBRANE

to produce pure nitrogen gas.

STAPLER



Used to position staples on the damaged area, usually a cut or missing part restoring, in order to provide more rigidity to the repair final result.

CUTTER

31815



Enable the user to perfectly clean damaged area from paint and any grease residuals, avoiding plastic characteristic alterations during welding steps.

ROLLER

31814



Used to compact, level and shape plastic during the various steps of repair.

CLAMP

31816



Used to press and compact two separate pieces of plastic when heated up.

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