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INDUCTION HEATING SYSTEMS ADR #370

INTRODUCTION

Approximately five years ago, NPCCRS published ADR report #348, entitled: "New Tools and Products for Collision Repair". That report contained an overview of several newly introduced products for collision repair that were also of interest to the damage estimator, as the usage of those products could affect estimating decisions, such as access, part replacement and additional labor operations.

One of the products in that report was the Induction Heating System. It was described as being a viable option to an open flame torch or heat gun, by producing a sufficient amount of heat for a variety of collision repair situations while greatly reducing the possibility of damage to non-metallic parts or painted surfaces.

As the information in ADR #348 remains accurate, this report contains additional information about induction heating that is far more in depth, providing a greater understanding of the product. This report will also address the more recent uses of induction heating within collision repair, along with the effects on damage estimating decisions, as well as the potential savings for insurance companies and collision repair facilities.

EXPANDED PRODUCT LINE

The model shown and described in ADR#348 was "the Inductor", invented and patented by Tom Gough, a collision repair specialist of nearly 30 years, and the President of Induction Innovations, Inc. Since first introducing this product at NACE in the year 2000, Induction Innovations has sold over 6,000 units throughout North America and abroad. Additionally, as this technology has evolved, they now produce four models from which to choose (see figure 1). Several tool attachments have also been redesigned since then for improved or expanded usage.

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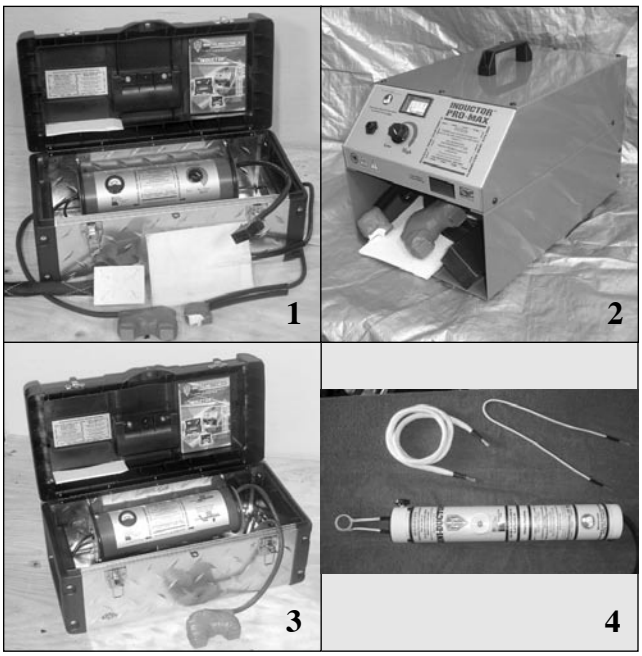

Figure 1 *Each model, along with a brief description of attachments is shown below.*

1. Inductor Max–Includes Fast-Off pad, Concentrator & Glass Blaster plug-in tool attachments. The Rosebud is optional.
2. Inductor Pro-Max–Includes the same plug-in attachments as the Max, for use as a cart model. The Rosebud is optional.
3. Inductor Glass Blaster Kit–Hard wired with Glass Blaster tool.
4. Mini-Ductor–Shown here & described later.

While there are other manufacturers of induction heating systems, the method of operation and the overall results can be similar. Bear in mind, however, that other systems may require different techniques and precautions than those in this report, whereas specific manufacturer instructions should always take precedence.

HOW INDUCTION HEATING WORKS

Induction heating systems utilize a power *inverter,* that can use ordinary 120 volt current producing up to a 2000 Watt, high frequency alternating magnetic output that is converted by various tool attachments (work coils) designed to perform specific tasks. The magnetic field crosses a metallic, conductive surface (such as a sheet metal body panel), causing the electrons in the metal to vibrate. Kinetic energy, created by the vibrating electrons is dissipated as heat, warming any metal that is within the tool attachment's range (approximately 1½ inches). Surfaces that are more easily magnetized will develop more heat, but has no direct effect on other non-conductive materials, such as plastic, glass, wood or cloth. Although, it is possible to damage plastic components or painted surfaces if excessive heat radiates from a metallic part. To avoid such damage, it is advisable for an inexperienced technician to practice first, using a similar part or assembly that is to be discarded. The inverter can also be equipped with a meter that indicates the amount of power being delivered to the tool attachment that indirectly translates to the amount of heat being produced. The inverter may also be equipped with a control knob to further regulate the amount of power/heat being produced. As both hands are normally occupied when using this heating system, a foot switch is often used to turn the inverter on and off. Whereas stepping on the switch will turn the inverter on, that will remain on until foot pressure is removed, thereby turning the inverter off.

A FEW SAFETY PRECAUTIONS

The operator of an Induction Heating System should become thoroughly familiar with the supplied instructions and precautions prior to use. While this is not a complete listing, there are several precautions worthy of mention, as they may not only apply to the operator, but to others in the vicinity as well.

- The operator should not wear metallic items, such as rings, watches, chains, belt buckles, body piercing jewelry or clothing that contains metal rivets, buttons, or zippers. The operator should also remove all loose coins, keys, pocket knives and any other metallic objects that could otherwise cause serious burns or even ignite clothing if the tool comes within 4 inches of these items.
- The operator should wear heat resistant gloves to avoid burns to hands or fingers when attempting to remove parts from heated metal surfaces.
- Do not operate the tool attachment within 4 inches of any air bag component, as the heat created can ignite the airbag propellant, causing it to deploy without warning.
- Heated adhesives may produce toxic smoke and/or fumes that require the use of an OSHA approved respirator mask.
- Do not operate or stand within twenty-five feet of operation, if you have a cardiac pacemaker or any other electronic or surgical implant, such as artificial joints, screws or braces containing metal, as dangerous heating within the body may occur.
- Keep a fire extinguisher accessible in the work area at all times.

Following the directions and precautions supplied by the manufacturer will insure proper and safe operation of this device, as is also true with many other tools used by the collision repair technician.

WHAT IT CAN DO

Heating of metallic parts through the principle of electromagnetic induction can greatly assist in the removal of many parts and materials, especially those attached to the vehicle with any type of adhesive. Removal by this method often enables many undamaged parts to be reused, and should be estimated accordingly. With the removal of certain types of adhesive *materials* (that by nature can not be reused), there is almost always some type of labor savings and/or decreased material cost associated with induction heating when compared to other more traditional removal methods, such as grinding or the use of solvents. These combined benefits are of interest to collision repairers as well as damage estimators and will require more in-depth knowledge of each of the aforementioned tool attachments and their specific applications. Many of these applications, as well as detailed usage recommendations will now be addressed.

Glass Removal

The "Glass Blaster" attachment was originally intended for the removal of urethane-bonded windshields, side and back glass. Once the adhesive on the pinchweld is located,

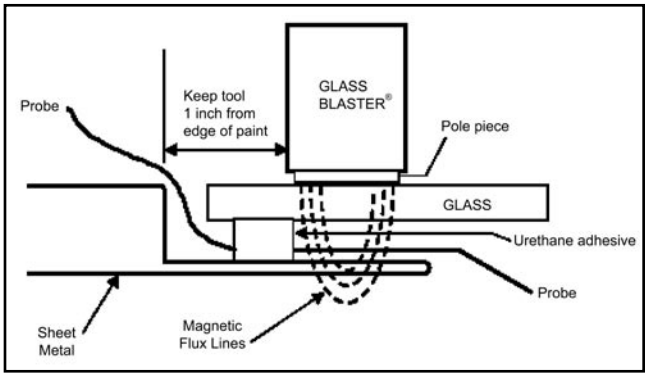

Figure 2 *This cross view diagram shows locating the adhesive with a probe and the typical Glass Blaster placement.*

the Glass Blaster tool is placed just inside the edge of the adhesive, but no closer than 1 inch from the edge of the glass to avoid paint damage around the opening, as shown in figure 2. Beginning in the corner of the glass that is most accessible and with the switch turned on, the tool is moved away from the corner approximately nine inches, at a rate of ½ inch per second, and then back to the corner. This is repeated in the other direction while pressing the glass from the inside to release the bond. A wedge shaped, wood or plastic shim should be placed within the gap between the glass and adhesive to maintain the separation. Constant outward pressure to release the bond at the lowest possible temperature will eliminate the need to remove interior trim. Otherwise, excessive heat could cause damage. The same process is continued around the perimeter, using shims periodically until the entire glass is released (see figure 3).

Figure 3 *As shown here, the urethane adhesive will remain attached to the glass with little or no clean up of the pinch weld needed. Glass to be reinstalled will require clean up.*

An experienced operator can usually remove a windshield in about 15 minutes *without breakage*. Side and back glass (encapsulated or not), being smaller and made of tempered glass, are less delicate and can usually be removed in less time. For example, some small quarter glasses can be removed in less than two minutes. Occasionally, a "stubborn" glass may be encountered that does not release from the pinchweld and will require additional measures to remove without causing damage. This could occur when the adhesive is closer to the edge of the glass than usual, or following a previous replacement of the glass where the application of adhesive was excessive. In these situations when it is necessary to work the tool closer to the edge of the glass to release the bond, the use of a damp, rolled up towel, welding paste or a thermal gel placed along the outside edge of the opening will avoid paint damage.

Bonded SMC/Plastic Panels

The Glass Blaster attachment or the "Fast-Off" pad can also be used to remove SMC bonded panels or other bonded plastic trim parts without causing damage. A light cloth covering the tool attachment will prevent scratching these plastic parts. When outward pressure is applied to the panel, adhesive dollops (if present) can be located by a depression on the panel surface. A circular motion of the Glass Blaster or the Fast-Off pad in these areas will release the bond. Similar to glass, work around the perimeter until the entire panel is released. As some bonded plastic parts may otherwise be impossible to remove without breakage, this product will eliminate the costly replacement of undamaged parts that must be removed to facilitate another operation.

Sprayed-on Bedliners

Another, more recently discovered use of the Glass Blaster is to remove sprayed-on bedliner material in order to repair a damaged bed interior or to access welded seams for bed side replacement (see figure 4). The removal of a sprayed-on bed liner using the Glass Blaster typically takes about 4 hours for an entire full-sized bed, opposed to as much as several days for conventional grinding methods. The considerable dust created by grinding is also eliminated. Smaller areas or *partial* removal will presumably take less time. The time required could also vary somewhat depending on the bed liner manufacturer, as some may take longer to remove than others. These factors should be considered, negotiated and estimated as an additional labor operation.

When repairs/replacement of bed components are complete, sprayed-on bed liner material can be *partially* reapplied by "back" or "roll" taping along a distinct body line on the bed floor. This method allows the newly sprayed material to taper onto the body line rather than displaying an obvious edge. Color tinted bedliner material can also be applied in the same fashion, but may require additional time to color match.

Sound deadening pads commonly used on trunk floors can be removed most effectively using the Fast-Off pad. This same attachment can also be used to remove undercoating, although wrapping the Fast Off pad with a cloth is advisable in keeping the pad clean.

Figure 4 *The Glass Blaster attachment is being used to remove sprayed-on bed liner material.*

Adhesive Trim

The "Fast-Off" flexible pad attachment can be used to remove body side mouldings, emblems and name plates that are attached with adhesive. Side mouldings are removed by

Figure 5 *This side moulding was removed in several minutes. Wider or thicker mouldings may require more time.*

placing the Fast-Off pad at either end of the moulding and by sliding a wedge shim behind the edge of the moulding. Continue by sliding the pad back and forth while applying outward tension to the moulding (see figure 5). Once again, the key is to remove the moulding at the lowest possible temperature, whereas the adhesive will be removed along with the moulding, as shown in figure 5. For best results, the R & I of undamaged mouldings should include additional time on the estimate to apply new adhesive to the moulding (commonly noted as Clean & Retape). When removed with care, undamaged mouldings containing an aluminum backing or metal/chrome inserts or strips can also be reused. However, when re-using these particular types of mouldings, additional time will be required to remove the moulding without excessive bending, to avoid damage. In such cases, the repairer should be compensated as much as 1-2 tenths of an hour per moulding, (in addition to the typical R&I / Clean and Retape allowance). Some of these mouldings, being quite expensive, more than justify this additional cost in order to re-use an undamaged moulding as an alternative to replacement.

The Fast-Off pad can also be used to remove vinyl graphics, strip tape and decals from steel panels *without leaving adhesive on the panel*, greatly reducing the amount of "clean-up" time needed (see figure 6). Although, excessive heat could cause the adhesive to become somewhat messy. When installing adhesive trim onto sheetmetal panels, this attachment can also be used to pre-heat the metal, resulting in better adhesion.

Figure 6 *The time required to cleanly remove a vinyl graphic of this size can be performed in a matter of seconds using the fast-off pad.*

CONCLUSION

As shown thus far, induction heating offers many benefits and advantages to the collision repair process. There are many other uses for induction heating that will not only assist in part removal, but also with certain types of repairs, and will be further addressed in the next report.

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