A Giant Leap for Remankind

New $140 million REMADE Institute brings remanufacturing to the forefront of the industries of the future.

page 6
Happy New Year, Let’s Start It Out right!

So, if you’re like me, I ate too much great food over the Holidays and now I need to get back in shape, well who am I kidding, I just want to get back to where I was, so I need to lose a few pounds.

As we reevaluate ourselves, this is the perfect time to reevaluate our businesses and our strategies going forward to get the most out of the New Year. If we wait, there will always be excuses, right? I'm too busy, we don't have the time, I'm exhausted, we can’t afford change, there are a million excuses to procrastinate, make up your mind this time to NOT procrastinate, make a CHANGE!

Are you staying up with the times? Have you thought about new products you want to launch in 2017, you can't launch them all at once, you need to strategically plan the launches so your team isn't overwhelmed and give them the ability to do the best they can. Planning is essential.

Have you thought about your customer strategy, maybe it's time to diversify your customer base, maybe it's time to diversify your market space. There’s no doubt that the Automotive Markets are getting tougher and tougher to compete in, maybe it's time to develop some Heavy Duty Product or even Ag or Marine product. Maybe it's timing, Oil & Gas markets are poised to comeback soon, but when exactly is SOON? Understand your market or markets and get some factual information about your area as far as how many vehicles are within the market area you work in, what are the approximate age of these vehicles, what is the most common model. I'm not saying you have to go buy this information, just get out and drive around your market for starters, you would be amazed how many people think they know their market by what comes in through the door, the question is, “what doesn’t come through the door”, and why does it not come through the door, understanding that and you will start to know your market. Talk to customers, but also talk to people who are not your customers and understand why they are not your customers. Is it price, is it quality, is it location, is it availability?

Challenge yourself now before the year gets going and work at making 2017 your best year!

APRA appreciates your support of the Remanufacturing Industry!! It’s a great place to be!

I always welcome response or rebuttal to my comments at kripli@apra.org

Respectfully,
Joe Kripli
Used Equipment Available

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Automotive Parts Remanufacturing Market Is Expected to Generate Huge Profits by 2024
According to a new report by Persistence Market Research, the automotive parts remanufacturing market is inversely related to the economy as a whole. When customer spending is high, demand goes down because motorists will replace worn-out vehicles rather than extend its use through remanufactured parts. Alternatively, when customer spending is low, demand for such parts increases as these services consists of a cheaper alternative to new parts. The latter condition is expected to benefit the automotive parts remanufacturing market. For more info, visit http://www.persistencemarketresearch.com/toc/10810

Denso Names Senior Manager to California Reman Plant
APRA Member Denso Products and Services Americas Inc. has named D.J. “Dong Ju” Park senior manager of engineering and electrical operations at its Murrieta, California, remanufacturing plant. In the newly created position, Park is responsible for all engineering and design aspects of DENSO’s remanufacturing activities, including its growth initiatives to meet increasing market demand for top-quality reman products in North America. Denso’s Murrieta plant specializes in the remanufacturing of rotating electrical products – starters, alternators and fuel injectors – as well as diesel products.
More information may be found at www.apra.org/news

Flex Reman Transmissions Brought to Canada by Eaton
Eatons’ Flex Reman transmissions have been introduced into the Canadian marketplace as of Jan. 1. This will allow Canadian OEM dealers to offer customers two tiers of Eaton Factory Reman products: standard reman transmissions with clutch housings and Flex Reman transmissions with no clutch housings.

J&N is now part of the Arrowhead Family
APRA Member J&N recently announced it is part of the Arrowhead family (another APRA Member). This merger combines two of the oldest and strongest rotating electrical programs in the market today. The combined companies will continue to expand their product offerings and programs, and
our “first to market” approach while enhancing our service levels to our customers. Both companies will continue to operate independently into the foreseeable future.

More information available at www.apra.org/news

**BBB Industries Announces Executive Management Changes**

APRA member BBB Industries, LLC, a leading remanufacturer and distributor of automotive parts in the North American aftermarket, announced the appointments of Duncan Gillis, as its new Chief Executive Officer, and Odd Joergenrud, as its new Chief Commercial Officer & President.

Duncan Gillis brings a wide international experience in a number of sectors, most recently served as CEO of John Crane, the world’s leading supplier of mechanical seals and related components for process industries with annual revenues in excess of $1 billion. Odd Joergenrud has been in various key positions in the Automotive Aftermarket, most recently serving as President at Robert Bosch North America and before this as President for Asia Pacific.

More information available at www.apra.org/news

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Giant Leap for Remankind

U.S. government steps in to support comprehensive remanufacturing R&D. New $140 million REMADE Institute in Rochester, New York, brings remanufacturing to the forefront of the industries of the future

By Niels V. Christiansen, US Editor, Reman World
A private public partnership between the United States government, top universities, industry organizations and remanufacturing companies is set to drive remanufacturing forward as a prominent part of the advanced U.S. industry of the 21st century.

This is a dream come true for U.S. remanufacturing, from the smallest to the largest operators. But the benefits are global.

Rochester Institute of Technology’s Golisano Institute for Sustainability, already a leader in shaping remanufacturing world-wide, has been selected to run the new effort, to be known as the Energy Reducing Embodied-Energy and Decreasing Emissions (REMADE) Institute.
The announcement by the U.S. Department of Energy a few days into the new year, may be just another step in the Obama Administration’s Manufacturing USA grand plan to shape the U.S. industry of the future. But it represents a giant leap for remankind.

The REMADE Institute is to be one of 15 research consortiums across the nation, pooling the knowledge, research and development skills of academia, industries and organizations to create new advanced technologies, energy and resource savings, improved competitiveness and jobs. Each consortium is focused on its own set of advanced technologies, ranging from photonics and lightweight materials for aerospace applications to intelligence, real-time controls and 3D printing.

Huge Recognition

“To put remanufacturing in at the same levels as those advanced technologies is a huge recognition by the U.S. government of the importance of this field,” said Nabil Nasr, the driving force behind the Golisano Institute and now the chairman and CEO of the REMADE Institute. “That in itself is a huge achievement and the fulfilment of a long-time dream for us.”

The REMADE Institute will be funded by $70 million from the U.S. Department of Energy over five years and another $70 million in private commitments to share the costs from industry and other consortium members. In all, 26 universities, 44 companies, seven national research labs, 26 trade associations and foundations, and three states, New York, Colorado and Utah, are participating.

Goals

Among the stated goals for the first five years of the REMADE Institute:

- 50 percent increase in remanufacturing applications
- 30 percent increase in efficiency of remanufacturing operations
- 5 to 10 percent improvement in manufacturing material efficiency by reducing manufacturing material waste.
- 30 percent increase in recycling efficiencies.

In the longer term, the aim is to achieve a 50-percent improvement by 2027 in overall energy efficiency by driving down the cost of technologies to reuse, recycle and remanufacture metals, fibers, polymers and electronic waste. This could save billions of dollars annually in energy costs, improve U.S. competitiveness and create business and job opportunities.

World-wide Impact

For the U.S. government and Energy Secretary, Ernest Moniz, the REMADE Institute’s immediate importance is how it will help make the U.S. manufacturing industry more efficient, greener, more competitive and ready for the jobs of the future.

But the impact will inevitably be world-wide and significant.

“The challenge with remanufacturing is that it can be hard to get the attention at the national level and at the exciting R&D development level, but we did it. We did it. Basically, through that institute we are now in the forefront,” stated Nasr.

“Within hours of the Energy Department’s announcement, calls started coming in from China and Europe from people in the remanufacturing industry who wanted to learn about what we are doing to help them do similar things in other parts of the world. We are going to get the attention of a lot of governments and advanced research groups, and we hope this is going to launch a lot of wonderful initiatives.”

As has been the case in the past, technological and remanufacturing advances from Rochester will be published and shared.
Impact on Remanufacturers
For motor remanufacturers, the impacts will be profound.

They will benefit from the recognition of the importance of remanufacturing as well as the anticipated technological advances. When academia, businesses, organizations and government pool their R&D interests and efforts, technologies will result that make it feasible for many companies, small and large, to do things they cannot do today.

“The once you raise awareness, increase capabilities and make it feasible from design to manufacturing of a product to make remanufacturing a feasible alternative, many of the products we have will be even better candidates for remanufacturing, and many of the larger companies will look for suppliers that will work with them,” stated Nasr.

“So it’s a win from every angle. We believe this will be a truly revolutionary change in the way we do things. Remanufacturing never really had the R&D focus that it deserves. We hope this will make a lot of this happen.”

Impact on Consumers
Nasr sees the consumers as winners, as well. They benefit from more economical products as material use is extended, when products are better designed to be remanufactured, and better technology becomes accessible, driving up the economic value. Another consumer benefit is the constant aim to make sure the products are green and not causing harmful impacts – a growing consumer interest.

The REMADE Connection
The Reducing Embodied-Energy and Decreasing Emissions or REMADE Institute pools the knowledge, experience, interests and resources of a consortium of 106 interested members. Their aim is to turbo-charge research and development into sustainable, green, lean, innovative, and competitive product manufacturing, reuse and remanufacturing. It is one of 15 such consortiums in the Obama Administration’s Manufacturing USA initiative, harnessing R&D resources in different fields to create the U.S. industries and jobs of the 21st century.

Among the members of the REMADE Institute:
26 universities, ranging from RIT in Rochester, New York, and Massachusetts Institute of Technology, MIT, in Boston, Yale University in New Haven, Connecticut, and Carnegie Mellon University in Pittsburgh, Pennsylvania, to state universities in California, Oklahoma and Utah.


44 companies, ranging from Automotive remanufacturers, such as Cummins, Level Seven, Delphi, CoreCentric Solutions, Southern Core Recycling to Davies Office, Caterpillar, Cisco and Nike.

26 industry trade associations and foundations, including the Automotive Parts Remanufacturers Association, APRA, the Motor & Equipment Remanufacturers Association, MERA, the Remanufacturing Industries Council, RIC, the Ellen MacArthur Foundation.

Three states: Colorado, New York and Utah.
APRA thanks Reman World for this article.
There will always be the need …

by Mohammad Samii

No matter what direction the electrical rebuilding industry takes—no matter how many more websites and eBay stores develop that sell rotating electrical units to everyone—there will always be the need for the know-how and the skills that are provided by a small segment of this industry. This segment may include the local generator shop, a custom rebuilder or an auto-electric shop. Even though this segment of the industry where some of us work, has shrunk, I doubt that it will ever completely disappear … because this segment meets certain demands and fills niches of the marketplace that a national auto parts chain cannot.

Here is a typical case. We had a 1927 Ford Model T starter that needed to be rebuilt as part of a restoration project that the owner was doing to his antique car. These starters are sometimes available on various websites that specialize in such cars. But, by-and-large, most rebuilding and servicing of such units are done at the local level, if a reputable and competent rebuilder is nearby. The shipping charges for this relatively heavy starter and the prepaid core charge (usually requested in advance by the seller) create issues that can be compounded if there is any complaint or warranty claim later. (Figure-1)

This Model T starter needed a field coil and a comm-end bushing. Its armature and brushes were fine. I placed a call to a very competent colleague, Joe Mazzone (Buckeye Auto Electric in Plainsville, Ohio), who specializes in such starters. He directed me to our own familiar J&N. They had the 261-14047 field coil in stock. (Joe has been very helpful to me in the past and has helped me many times when I had a question or needed direction.)

The special comm-end bushing (that was badly mutilated by a previous rebuilder) was also available through some specialty parts houses where Joe directed us. (Figure-2) The whole thing was serviced and put together to the great satisfaction of our customer. He was aware of the market value of a quality rebuilt starter for his Model T Ford, so the price was not an issue. Units like this are examples of the type of niche work that almost any small rebuilder can do. Big-box stores may have a hard time meeting this kind of challenge. Internet stores may offer cheap prices, but if their unit does not work, it still can require a skilled rebuilder to get it going.

Unintended Consequence!

A friend of mine who runs a mobile diagnostic service, and who is also a well-known industry instructor, was called to a job to look at the problem of a blown injector fuse in a 2003 Jeep Liberty with a 3.7L engine. There was no history of major repair on the vehicle, but a factory “reman” alternator was installed a few months before. Now, fuse #26, which feeds the injector, was blowing. This in turn stopped the motor from running. The individual injectors were checked and found to be sound. The injector wiring harness seemed to be fine and intact as well.

By his diagnostic work and tracing the wiring related to this particular fuse, he determined that this fuse circuit also branches off and sends the output of the ASD (Auto Shutdown) relay to power up the PCM. The ASD relay, a well-known item in Chrysler products, is a power relay that feeds many essential circuits including: ignition, fuel pump, injector, O2 sensor heater, the PCM and other items.

In an article I wrote for the APRA Global Connection, dated November, 2014, I explained the details of this particular Chrysler charging system and classified the above vehicle’s...
system as “System-2”. The article is archived and is easily searchable by date (2014-11) on the “Electrical” part of the APRA-Tech portion of the APRA’s website, under “Auto Electric Corner”.

Simply stated—in “System-2”, the PCM applies power to F1 (circuit K125, as Chrysler calls it) and toggles the F2 to ground (circuit K20) to control the alternator field—thus controlling the output (Figure-3). What my friend found was that when the alternator plug was disconnected (of course the system will stop charging at this time), the fuse did not blow and the engine kept running. But as soon as he plugged in the alternator, the injector fuse blew and obviously stopped the engine. The ASD relay’s output which passes through fuse #26, feeds power to the injectors and to the PCM. The PCM controls the alternator field. (Figure-4)

At this point, it became obvious that some internal problem with the alternator was causing this! A replacement alternator was installed, and the problem went away. That is where I came into the picture!

My friend sent me the faulty alternator for investigation to see what was really causing the problem. Upon disassembly, I realized first that the flat washer between the bearing and the rotor was missing. This by itself would not cause the problem. But looking closely, I realized that when they replaced the slip ring, they did not tuck the leads away properly. There was a very small amount of rub-through between the bearing and the slip-ring lead. The wire finally pushed through the insulation and was touching the SRE bearing’s inner race. This caused the ground which blew the fuse to the PCM (which was the same fuse that fed the injectors!)

My personal belief has always been, that the difference between quality work that will function properly and will last, versus a unit that is put together hastily and suspected to be a warranty return, is usually just a few dollars (if not pennies) and only a few more minutes. It does not take much longer to do a job properly and to spend a little more money for quality parts to make a first-class unit.

The above case was not solved by the parts store providing another replacement unit. It required additional labor and the diagnostic service fees of an expert. It also incurred tow charges. This all added up to a lot more than the price of a replacement alternator. I am not even taking into consideration the consequences of a disgruntled customer and their effects on that business.

Well…that’s all for this issue. Until I see you, keep up the good work!
More than 100 years ago, as horseless carriages were being introduced to the American motoring public, hundreds of automobiles were produced by hundreds of car companies.

Since nobody knew what a car should look like the variety of cars seemed endless. Some cars appealed to the practical buyer while other models were plush and aimed to attract the attention of the affluent motorists.

After a few years the various car companies sorted out where they each fit in the hierarchy of the automobile world.

The top tier of automobiles soon was dominated by three separate manufacturers. The names of the three all started with the letter “P” and they came to be known as the prestige three.

Peerless built cars from 1900 to 1931 while Packard was in business from 1899 to 1958. Pierce-Arrow sold cars from 1901 to 1938.

Reggie Nash, the sixth and current owner of a 1934 Pierce-Arrow seven passenger Model 840A limousine reports that his car was purchased new at the Pierce-Arrow dealership in Richmond, Virginia by a retired railroad executive.
Eventually his sister acquired the car and kept it until well after World War II. The third and fourth owners, like the first two, kept the car well protected in the Shenandoah Valley.

The fifth owner brought the Pierce-Arrow back to Richmond. Almost 30 years later Nash bought the car.

Originally the limousine rolled out of the Pierce-Arrow factory in Buffalo, New York coated with blue paint. Somewhere along the line it was repainted a two-tone green.

Since then the well-preserved automobile has been resprayed again, this time with a Maroon Light body and a Maroon Dark on the fenders. The two similar colors are separated by Fireglow pin striping.

The base price of the expensive Pierce-Arrow was $3,350 which was bumped up to $3,739.50 with the addition of extras such as:

- Artillary wheels/sidemounts/truck * rack...........$150.00
- Two-tone paint......................................................90.00
- Leather front seat..............................................50.00
- Metal side mount covers.................................32.00
- Chrome radiator shutters....................................25.00
- Rear foot rest hassocks......................................25.00
- Mirrors atop side mounts.................................17.50

Most everything else on the 6,000-pound luxurious limousine was considered standard equipment. A 384-cubic-inch straight-eight-cylinder engine develops 140 horsepower. Although Nash has driven his Pierce-Arrow about 10,000 miles he says it was designed to be chauffeur-driven. That explains why the front seat for the chauffeur is upholstered in durable leather while the rear seat behind the division window is covered in more comfortable cloth.

The rear seat is adjustable and in the ceiling above the right end of the seat is a microphone. Above the driver's seat is a speaker so the passenger in the rear compartment can communicate with the driver as the car motors along on its 144-inch wheelbase.

Nash, who does his own driving, says the shoulder-wide three-spoke steering wheel is easy to operate as long as the car is moving, even slightly. Mechanical brakes are up to the task of stopping the heavy car.

Both front and rear compartments have clocks. Running lights help illuminate the way after the sun goes down.

The only painful part of owning such an exquisite car is when it comes time to refill the fuel tank. Nash says his wonderful car delivers between five and eight miles per gallon.
As I think back about all the bizarre wiring issues I have encountered over the years, there is one that sticks out in my mind. We had a 1998 Ford Contour come into the shop with a transmission wiring harness that had been completely chewed up by mice. I mean every wire in this harness had exposed copper running the length of the harness for at least two feet in one spot, and I can recall at least 10 wires shorting out against each other, causing multiple codes and drivability issues. I asked myself why this mouse (or these mice) would choose to feast on this poor, unsuspecting wiring harness?

After a quick Google search, I found that some car companies were using biodegradable soy-based wire insulation. They are no longer using plastic nonbiodegradable wire insulation, and that has to be more environmentally friendly, right? One would certainly assume! It is more than likely more economical as well. Unfortunately it is also more inviting and tastier to all the rodents of the world. What could be better than a nice cozy warm engine bay to build your nest in, and have a free meal to boot!

Well, enough talk about those mischievous mice. Let us get to the issue at hand. Recently a young lady had a 2005 Ford Taurus towed into our shop. The complaint was that it suddenly quit moving. As most of you in the transmission business probably already know, the torque converters in these cars have been known to break, causing the vehicle to just suddenly stop moving. Naturally after verifying that it did not move and the odometer showing 187,419 miles, I wanted to automatically blame it on the internals of the transmission, given their long history of failure. However, I also know the foolishness of just assuming this, so some quick testing still needed to be done before condemning the transmission. Over the years I have found the easiest and most efficient way to verify a bad transmission on a Taurus that does not move is to simply disconnect the solenoid connector, since it is right there at the top of the transmission, wide open for all to see and very easily accessible. If the vehicle still will not move, then it is probably safe to assume the problem is in the transmission, or possibly a broken half shaft.

Well, guess what? My initial assumption was, well, dead wrong. After disconnecting the solenoid connector, the transmission actually went into gear and would move, indicating a possible external wiring issue. Of course this would be the case, or I would not be writing about it, right? Now it was time to grab the scanner. A quick readout of the history codes revealed a whole plethora of problems. The codes almost too numerous to list were as follows:

- P0300 – Random misfire detected
- P0316 – Engine misfire detected on startup
- P0430 – Bank 2 catalyst efficiency below limit
- P0442 – Evap system leak detected
- P0713 – Transmission fluid temperature sensor high input
- P0740 – Torque converter clutch fault
- P0743 – Torque converter clutch electrical fault
- P0750 – Shift solenoid A fault
- P0753 – Shift solenoid A elec-
trical
• P0760 – Shift solenoid C fault
• P0763 – Shift solenoid C electrical
• P1744 – Torque converter clutch system performance.

Whenever I see this many random codes all in one place, I start bracing myself for a blockbuster-selling horror story of wiring mayhem!

The search was on. A thorough visual inspection of the underhood wiring revealed a hidden mess of chafed, corroded and blackened wiring hiding beneath what used to be 1-inch round plastic conduit (Figure 1).

Located between the front edge of the engine and the right side of the firewall near the right strut tower (Figure 2), the wiring harness was totally grounded out and melted against an aluminum air conditioning tube that had to be physically and forcibly pried apart. After observing the nightmare of chafed wiring, I knew it would take the rest of the day to repair, and I turned my eyes to see the grooves that the wiring had actually implanted into the aluminum A/C tubing like a bunch of corn rows (Figure 3). I am surprised the Freon did not all leak out.

After giving the wiring harness a makeover, the transmission lives to see another day. The nice young lady was extremely pleased that she did not have to buy a transmission and that she only had to purchase a wire repair plus a transmission fluid and filter change. I guess the point I am trying to make with this story is to remember that not all failures that appear to be the same are created equal, and that the same old familiar road does not always lead down a straight path. Sometimes curves appear out of nowhere, forcing you to dig deeper with your diagnosis. I actually kind of enjoy the challenge, though. Challenges keep us thinking, and after all, life would certainly be boring if you had to go to work and do the same repetitive things day after day.

Oh and by the way, the rodent eating soy-based wire insulation problem I mentioned at the beginning of this article can now be easily avoided or at least deterred. Companies now offer a form of electrical tape treated with capsaicin, which is the same stuff found in hot peppers that turns chili into 3-alarm-fire chili, thus deterring the mice and other rodents from having a free meal. Honda sells 20-meter rolls of it for around $36. The more you know …

Troy Hopp has been in the automotive repair industry his entire career and has been with Certified Transmission since February 2010. He has an Applied Science Degree in Automotive Technology from Western Iowa Tech and is an ASE Master Certified Technician.

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The carbon brush, as we know it, was first patented in 1885. Prior to that, bundles of copper wire were clamped together like a paint brush, and the “bristles” rubbed against the rotating commutator (see Figure 1). The term “brush” correctly described the assembly. But because of high friction and short life, it wasn’t long before a carbon block replaced the copper bristles. The name “brush” stuck though, and ever since, the carbon blocks have been known as “brushes”. Early on, motor designers learned that a small amount of lead added to carbon brushes served as a lubricant and greatly increased brush life. So, for well over 100 years, most carbon brushes have contained lead. But under European environmental law, lead has been outlawed from use in motors installed in vehicles since 2005. To stay on the right side of the law, it is vital for remanufacturers to ensure that the replacement brushes they are using are lead free. In recent years, there are a lot more brush-using electric motors to keep track of (see Figure 2). DC motor use has skyrocketed to as many as 150 motors per vehicle on some luxury cars. While some of these motors are brushless, the vast majority are conventional brushed motors. A brushless motor costs more than twice as much as its conventional counterpart, and in the ultra-competitive world of auto manufacturing, that price differential will ensure continued use of brushed motors.

Brush and motor manufacturers have found other materials, including zinc and silver, to substitute for lead. These materials work well for normal-load motors, but under high-load conditions, such as in a starter motor, brush wear is higher than the leaded-brush equivalent. Researchers found that adding a phosphous compound was one solution to creating a lead-free brush. This not only matched, but exceeded the life expectancy of a carbon-lead brush.

Another unique solution was to create a two-layer brush for high-load starters (see Figure 3). Two-layer brushes consist of a low resistance layer (a material containing much copper) and a high-resistance layer (a material containing less copper). Two-layer brushes can improve the motor life without the loss of motor efficiency and power, because they reduce commutation sparks through the effect of resistance-commutation by adding a high-resistance layer at their trailing end and keep contact resistance low by a low-resistance layer at their front end.

APRA board member, Phillip Falk, who also represents D&V Electronics, researched carbon brush design. He compiled over 300 pages of brush information! Falk gave a summary of his findings at the 2016 APRA BigR show. The information shown above is just a sample of the fascinating
and helpful items that Falk presented. APRA-Tech was there and recorded the entire seminar. It is available online as an interactive e-learning tool (see Figure 4). Also available online are all of the reference materials that Falk discovered, including reports and engineering specifications from brush manufacturers Mersen, Morgan, Schunk and others.

Topics covered:
- The evolution of brushes from copper wire to carbon blocks
- Why use carbon?
- Why lead-free?
- Two-layer brushes
- Brush composition and physical properties
- Extended testing comparisons of different materials
- Brush design considerations and manufacturing
- Causes and results of poor commutation
- Brush spring force measurement
- Cutting and abrasive tips
- The correct surface finish

Figure 4 Falk’s interactive presentation as seen on APRA-Tech

APRA members can view the entire presentation and download the reference materials from the APRA-Tech website. After logging in at apra.org select “APRA Tech-Member Access” from the top menu, then select Electrical/Seminars.

As an APRA member, this wealth of knowledge is available to you 24/7. If you are an electrical rebuilder and are not an APRA member, this APRA-Tech feature alone is worth the investment in joining.

The APRA-Tech website is a constantly-growing source of technical information pertaining to remanufacturing. It includes: training videos, technical manuals, technical seminars and much more.

A free fourteen-day trial membership to APRA-Tech is available for non-members at: www.apra.org/?page=14DayFreeTrial.
AC service in a car life cycle

By Bo Hansen, Airstal

Airstal Technical Service Bulletin

The functionality and lifetime of an Automotive AC system are generally depending on 4 critical points:

- Regularly AC maintenance – such as yearly leak test and inspection of the refrigerant oil
- Insight in Automotive AC systems – such as regularly training and access to service bulletins
- The spare parts that are being used during the AC repair must be of an acceptable quality
- The right equipment – and of course that equipment also need regularly maintenance and calibration

The 4 above mentioned points are what the customer expects from the workshop when he brings his car into the work shop for an AC service.

Most customers uses independent “all make” workshops and there is nothing wrong with that – but there is a big difference of what an AC service includes in an independent workshop and that's probably where the problems start.

Looking at the life cycle of a Car it can be divided into 4 different stages (like the 4 seasons)

1. The car is from zero to 5 years old:
   - The car has a low mileage ⇒ the AC system works ok
   - Most cars are serviced at the OEM dealership ⇒ regularly maintenance takes place
   - The condenser is clean and free from corrosion ⇒ good airflow through the condenser
   - There are no signs of wear in the AC compressor ⇒ clean AC circuit
   - All hoses and pipes are in good condition ⇒ low leak rate

2. The car is from 5 to 10 years old:
   - Most car owners decide to quit the OEM service and go to an IAM (Independent after Market) workshop.
   - In most cases the condenser has not been changed during the first 5 years and it's now time to take a closer look to see if it is corroded or some fins are missing
   - Also AC lines and pipes need to be carefully inspected for corrosion and damages and replaced if needed
   - Also electrical connectors and plugs need to be inspected and preserved in order to secure a proper electrical connection within the entire electrical circuit
   - The receiver drier must be changed every second year
due to the fact that there are more debris inside an older system than there is on a newer system
   - An oil sample must be taken out of the system every second year – this can be done by connecting a simple sight glass (with a built in filter) between the low side and high side service port. Observe the colour of the oil – grey oil means it's time to replace the condenser and send the compressor for reman.

*(All cars today are equipped with parallel flow condensers that cannot be flushed ⇒ 100% replacement is needed)*

Before we continue to the next stage of the life cycle of the car I would like that you all very carefully read and remember this sentence:

“Lack of regular maintenance is the number 1 reason of all breakdowns”

3. The car is from 10 to 15 years old:
   - Now the cars has been through a lot of (no AC related) repairs and services – and there is a high risk that these repairs have had a negative effect on the functionality of the AC system, such as:
     - Bended AC pipes...
     - Maybe the plastic flaps (sitting on each side of the condenser) that lead the air through the condenser are missing or broken...
     - Maybe a heat shield that should protect the compressor against heat from the exhaust manifold is missing ⇒ higher discharge temperatures...
     - maybe the front bumper has been removed a couple of times and that may have resulted in a damaged electrical connector to the ECV (The Electric Control Valve)
     - Etc, etc.
   - Maybe the car owner does not follow the normal service intervals anymore and some problems begin to accumulate (a lot of small problems form into one big and very expensive one)
   - Maybe the car has changed owners a few times and some service procedures were not followed – such an exchange of the receiver drier every second year.
   - Maybe also the system leak test was not done on regular basis ⇒ low refrigerant charge ⇒ too high heat load ⇒
The refrigerant oil will lose its lubrication features → compressor lock up
• Maybe heavy corrosion or dirt on the condenser → too high discharge pressures → compressor lock up

4. The car is from 15 to 20 years old:
• Now the mileage is very high
• Typically there is corrosion inside many electrical plugs and many ought to be replaced with new ones.
• Almost every spare part has now been replaced in the AC system and in most cases the replacement parts are NON OE (Copy parts) with other (lower) performance parameters than OE parts.
• The max performance of the AC has probably dropped to 80% compared to when the car was new (due to the use of low performance copy parts)
• Many car owners decide to live without the AC in the car and just roll down the window when it gets hot.
• Now it will be necessary to replace all components in the AC system in case it should be brought back to as good as new condition.

The above mentioned car life cycle (20 years) is a typical picture of how lack of good service procedures lead to a total polluted and broken AC system...

So what can be done to keep the AC system healthy through the entire life cycle of the car?

The best choice would be to avoid workshops that offer what they call "free AC Check"

Choose an AC specialist rather than a universal workshop – unfortunately many universal workshops buy themselves an AC service station and put and "AC specialist sign" on their building. There are unfortunately many of such “specialists” all over the world

A proper AC check takes at least 1 hour and it contains a long check list of critical points that has to be carried out at least every two years.

So be careful if anyone offers "free AC Checks" – in most cases the only thing you will get is a refill or “top up” – which they will charge you for of course. (Approx 80% of all free AC Checks are simply just a refill, nothing else...sad but true.)

An AC system is not a maintenance free system – and please don’t expect too much (if anything at all) of a free AC check

Unfortunately the independent Automotive Aftermarket is often more sales focused rather than service focused...

And how about the Service equipment...?

• Service equipment ALSO need regularly service such as calibration, replacement of internal filters, cleaning of internal valves, leak test, etc
• If the service equipment is restricted or contaminated it will also contaminate the AC systems that its being hooked up to

We are all in the same boat...Reman products are being installed by independent workshops; if something goes wrong somewhere in the distribution chain it will hit us all.

As one clever man once wrote:
“Personal quality is the precondition in order to carry out all other aspects of quality”

Which means, let’s start from ourselves – then we are also able to improve the work that we do for others. ■

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