

How to Make Plasma Plugs

<http://www.energeticforum.com/renewable-energy/2242-water-sparkplug.html>

NOTE: These plugs are patented so you cannot do anything commercially with them.
You can only make a copy from the patent for personal use.

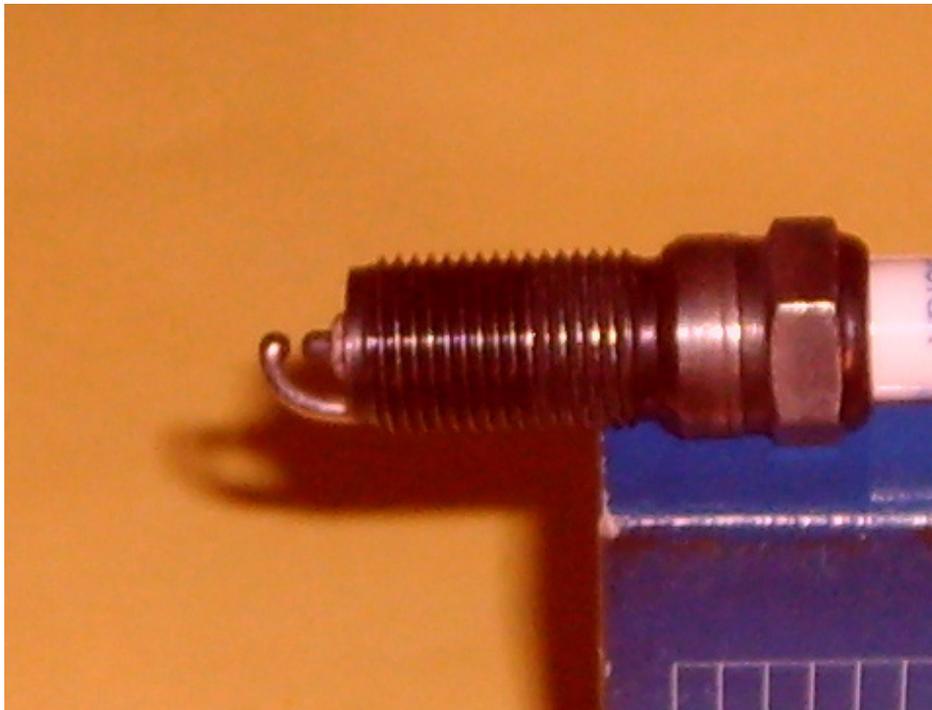
**THE HOW-TO WALK-THRU PHOTOS ARE TOWARDS THE BOTTOM – THERE ARE TWO SETS OF PICS
18 OF THEM FOR ONE REPLICATION AND ANOTHER 15 PICS FOR A DIFFERENT REPLICATION**

This first section is pulled from this document:

<http://www.panaceauniversity.org/Water%20Spark%20Plug.pdf>

This is a comment on one plug with a ball tipped ground strap:

Quote- *I made a ball tipped plug already in 1991. I suppose you are wondering why this was not mentioned years ago. I worked for the Ford motor company. I was not employed to develop spark plug technology. I just developed an idea, manufactured it, tested it in fords. The plug was great and not really any dearer to make. Upset a lot of people higher up. The plug is a double platinum ball tipped spark plug. - This Plug never got into public hands. Ian -*
End Quote



Ian's platinum ball tip spark plug- Available since 1991!

The next plug is called the "FireStorm" spark plug which was developed by Robert Krupa. These plugs were used with a Crane Cams HI 6 CDI and PS91 coil. Tests which were conducted with the FireStorm plugs showed that they would never wear out. **Robert's first FireStorm plug was made in 1996 and he has encountered strong opposition to their introduction and manufacture ever since. Robert reports that he achieved a 44% MPG increase and reduced the emission by the same percentage by using these plugs. These results are nothing to take**

lightly. As of today both these plugs **have never made it to the production line.**

Krupa's more recent patent (both 5936332 and 6060822 are his patents) is presently good till Aug. 18, 2018. It's already been 10 years since he had them patented.



Robert Kupra's plasma spark plug

The central electrode has been changed from a cylindrical post to a hemispherical dome, surrounded by four arched electrodes, each of which being positioned at a constant distance from the hemisphere. Nikola Tesla was using "orbs" on spark gaps over a hundred years ago. He found that orbs hold the highest amount of charge. (sharp points holding the least).



A Fire Storm spark plug replication done for Panacea by ROBIN DAVID

The above fire storm replication plugs are made of [beryllium copper](#). Robin reports that he has run a set in his van. Robin has run have several hundred miles on them with no apparent problems, he is running a MSD ignition. The above plugs were also trialed by open source engineer Greg in his VW bug. **Greg reports his VW gained y 12%, but that was with a major modification of the ignition system.**

It is believed that Robert Kupra used crane cams HI 6 CDI and PS91 coil to fire his plugs. Panacea also installed these plugs on a vehicle. This gave us a 6% gain; Panacea used only the standard ignition coil! **This is a powerful testimony to the effectiveness of Robin's skilled replications and Kupra's plug concept in general.** Robin is now currently experimenting with chromium nickel for the new plugs. More suggestions to what alloy which could be more effective have been included on the faculty section below.

“The material for the ball is Nickel 61 ERNi-1 Tig Rod which I think is just nickel , and the outside electrodes are salvaged from old plugs”



Robin's chromium nickel fire storm spark plug replication

Robert Krupa had his Firestorm plugs and plasma diver on an engine hooked to a Dyno and apparently had the computer program to its max at 30:1 air to fuel ratio and could not continue since the program was not designed to go any higher. The engine showed no signs of loss of power at this ratio; in fact he stated to see a 100HP gain and had to shut it down.

Notes from one replication: “The spark plug I used is a long reach 3/4 inch plug NGK BP5ES with no resistor. This is what I needed for the Dodge Raider. I was learning so I used 4 - 1/4 circle segments to build the plug. I may be able to build one whole half circle ground now. Here is pictures if I can make it work. - I used steel to make the ball and 1/16 inch tig welding rod to make the cage ground. I have run them 1,000 miles and show no wear with standard ignition. I will have plasma ignition soon and will keep an eye on them. Robin's plugs are more accurate and should work better than mine but right now my plugs are doing very well with 30% better mpg and NO plasma on my 1988 Dodge Raider. Bob”





There has been some concern about how the beryllium-copper plugs are wearing. Many saw the data table I posted showing seven distinct measurement points for each plug. After about 250 miles of 'running around town' miles I pulled my #2 plug and checked it against the data table. I detected no more than about .0015" variation from the recorded data ... well within measurement error ... enough to say "0" wear. - Of more concern to me was the uniformity of the spark's excursion across the anode / electrode surfaces. So I enriched the idle mixture to get some carbon on the plug so I could "take a picture" of the spark's excursion. - All I can say is that the wear from the spark must certainly be spread out evenly. The picture I've included looks just like an inverted shadow cast from a bright light. Below is the pic: Peace, Greg

Photo showing sparking pattern keeping carbon burned off – clean



This is just an update on Firestorm wear. I have included a photo of my #2 plug. Right now the mixture is set lean ... in fact too lean ... but it had to be done. The pic shows no carbon and each of the "bands" on the dome where spark bounces around actually look almost shiny in person. There is no unusually localized wear or hot spots. In fact, when comparing measurements to the baseline data, mostly just the narrowest portions are wearing and approaching the wider spaces (within the same band) ... equalization. There is about 0.003 gap wear (ave) ... 400 miles. - Greg



(referring to new plugs compared to the above: A bigger gap size these plugs can work at are: 0.090" and have shown an equivalent plasma spark compared to the plasma ignition but with only a standard ignition coil – this is under pressure. In open air there is a difference but the pressure test is what is significant. – Greg's experience

Ash's comments: Keep in mind that any extensions made on regular plugs like copper WILL NOT work!! The only Alloys you can use for the center Semi-Sphere and the top extensions are to be made from High Chromium (25 to 30%) Fe-Cr-Al Alloys to withstand vaporization during sparking... or even High Chromium Nickel Alloys will also work. Using these alloys is critical due to the plasma created.. Copper melts at 1200 deg C.

Robin has stated that they were made of the same steel the rest of the plug is made of. Recently he has switched to a new alloy for durability. He told me the plugs are now made of an Alloy called Beryllium Copper. Info Beryllium copper - Wikipedia, the free encyclopedia.

They may look like Copper but not really just that. He has been testing and developing these for some time now. However it would be interesting to see how a high Nickel content Stainless version of this plug would perform as some have reported nickel could have a catalysis effect on water in the combustion chamber?

Platinum-Rhodium Thermocouples are commercially available in various wire sizes and these have good wear resistance at

high temperatures as well and are available in wire form and can be flattened for this application. There is another rare Thermocouple Alloy made from Tungsten - Rhenium Alloy which can withstand temperatures of over 2500 deg C and can be used here but it's pretty difficult to find in retail.

The tips exposed to sparking usually fall under "Spark Plug Alloys" but there is a catch here as the previously developed alloys were for sparking only and not for use under Plasma conditions.

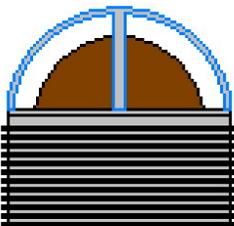
When you choose an Fe-Cr-Al alloy or Ni-Cr-Al Alloys check for the rare-earths used in these Alloys they should be of Yttrium, Zirconium, Hafnium and Cerium. The Rare Earths actually form a protective oxide layer on the surface of the exposed material and this thin film stabilizes at high temperatures and protects the rest of the material from the volatiles

In order to achieve longer service times and reduce fuel consumption in the automotive industry, spark erosion resistant but expensive platinum alloys are used for spark plug electrodes. The necessity of reducing costs and maintaining high quality materials lead to the investigation of cheaper iridium alloys for this application. Iridium has a high melting temperature but the volatile oxide IrO_3 is stable above $1000^{\circ}C$, which accelerates electrode erosion. Therefore iridium can replace platinum only when it is protected against oxidation, for example through alloying, so that the alloying element oxidizes and forms a protective oxide layer at the electrode surface.

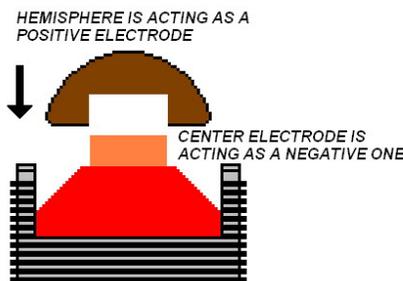
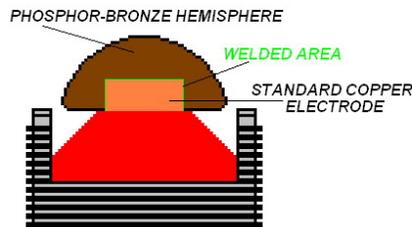
Fe-Cr-Al-Y (25% Cr, 5% Al and Y stands for Yttrium) alloy is commercially available as an Electric Resistance Alloy in Wire and Strip forms which can be modified and used for this application – Ash

HOW TO SECTION

**END PRODUCT -
Firestorm sparkplug**

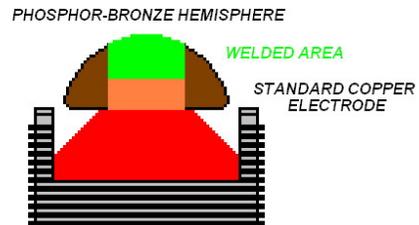


First method of production



WHEN YOU CONNECT THEM AND RUN ELECTRICITY THEY WILL WELD ON THE CONTACTING SURFACES

Second method of production



HEMISPHERE IS HEATED UP IN ORDER TO EXPAND. THEN, IT'S PLACED ON TOP OF THE CENTRAL ELECTRODE IN ORDER TO SHRINK AND MAKE THE INITIAL SEAL ON THE CONTACTING AREA. AFTER COOLING DOWN, THE REMAINING SPACE IS FILLED WITH WELD TO ENSURE THE ADHESION OF TWO PARTS.

Robert's Replication





01/31/2009

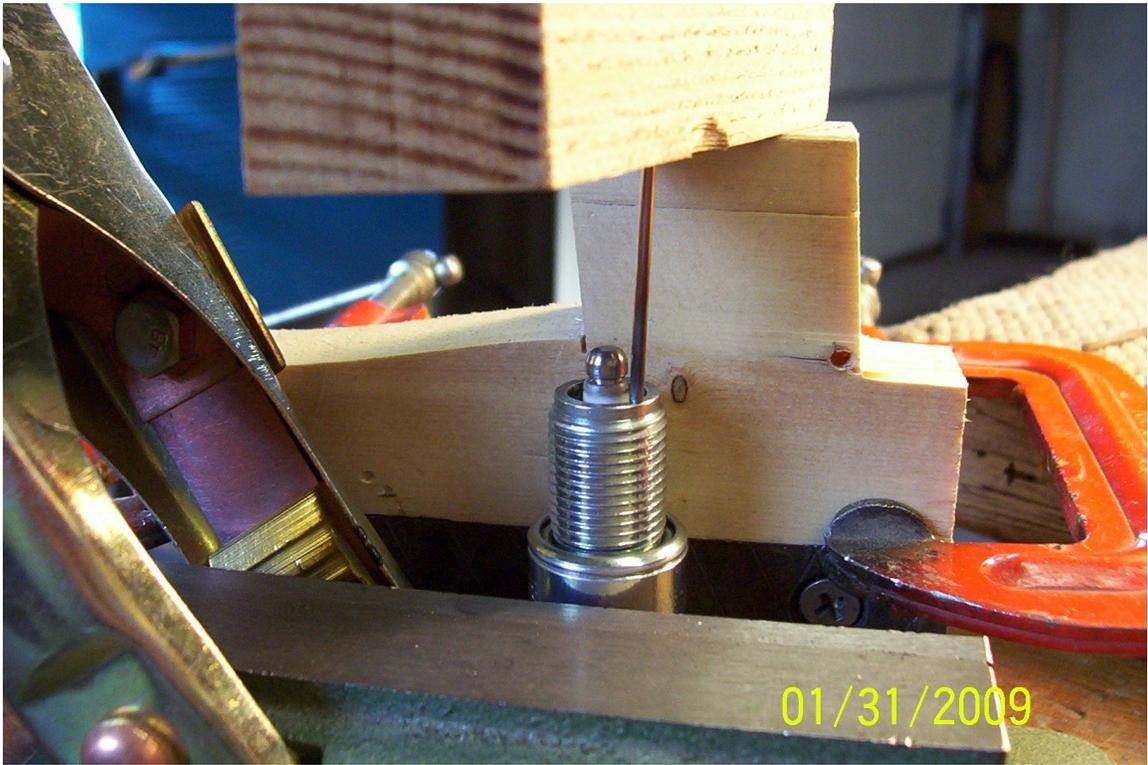


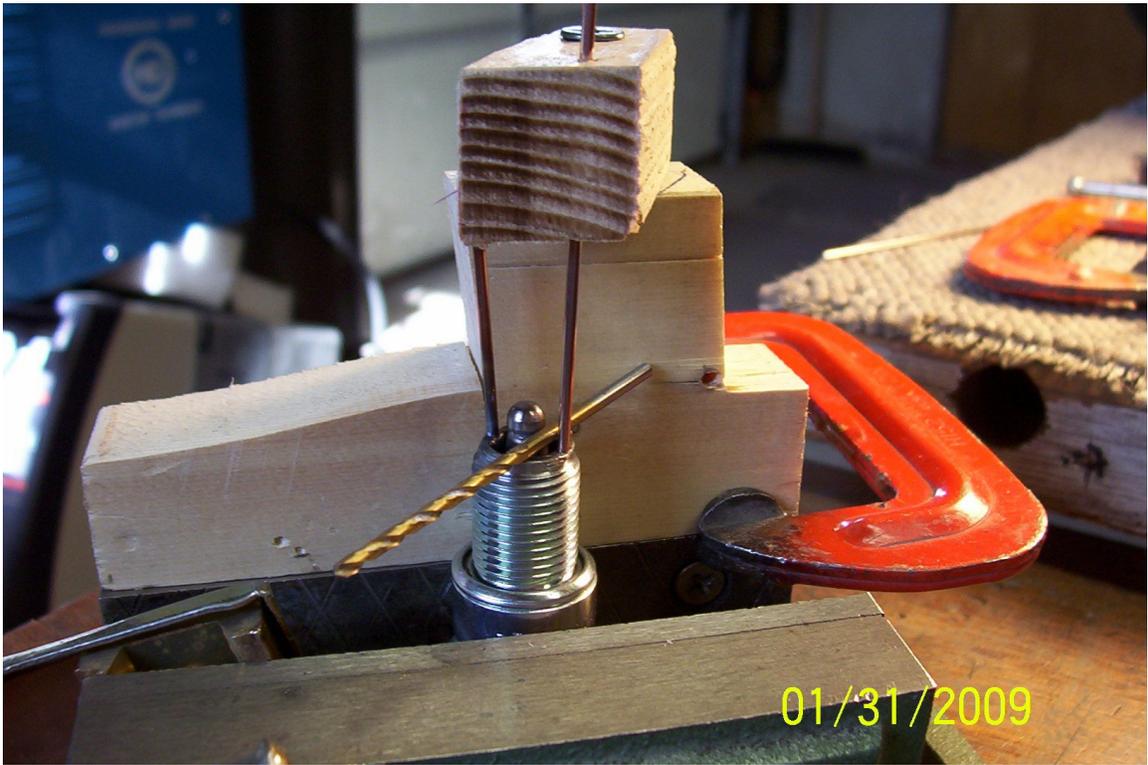
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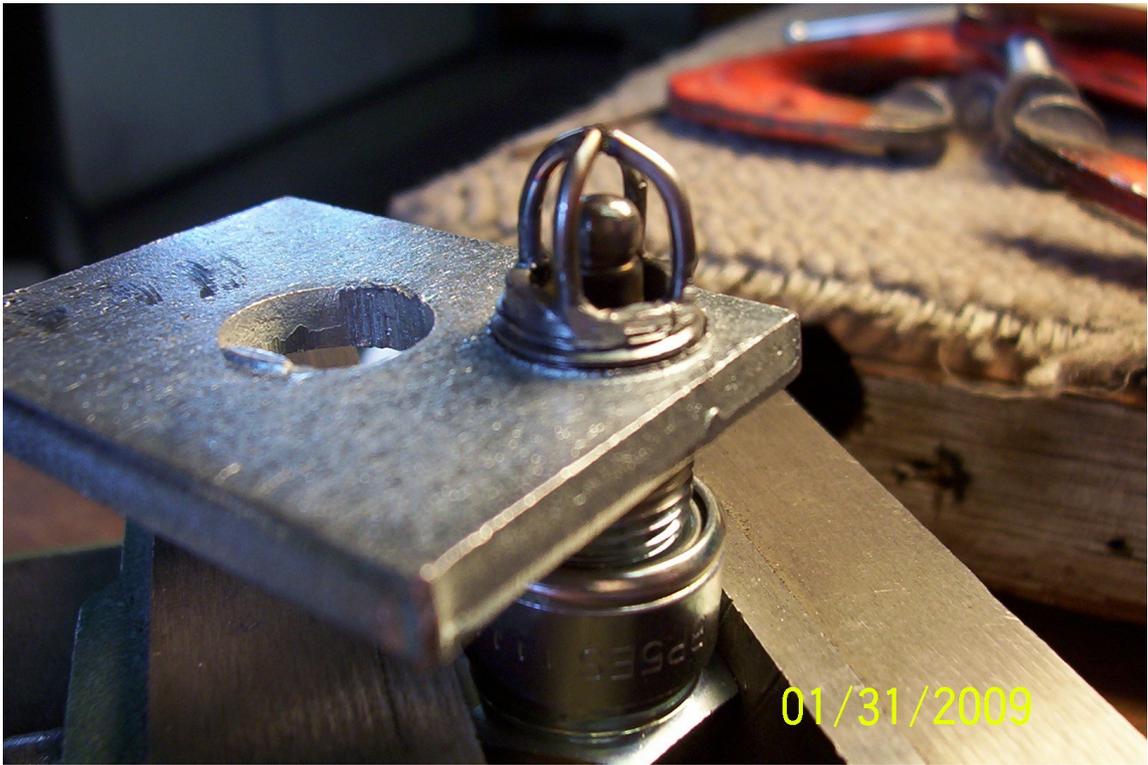












Robin's Replication



