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Lawrenceville Plasma Physics, Inc
High technology research, development and consulting in plasma physics, X-ray sources, and Focus Fusion

LPP Focus Fusion Report

February 25, 2015

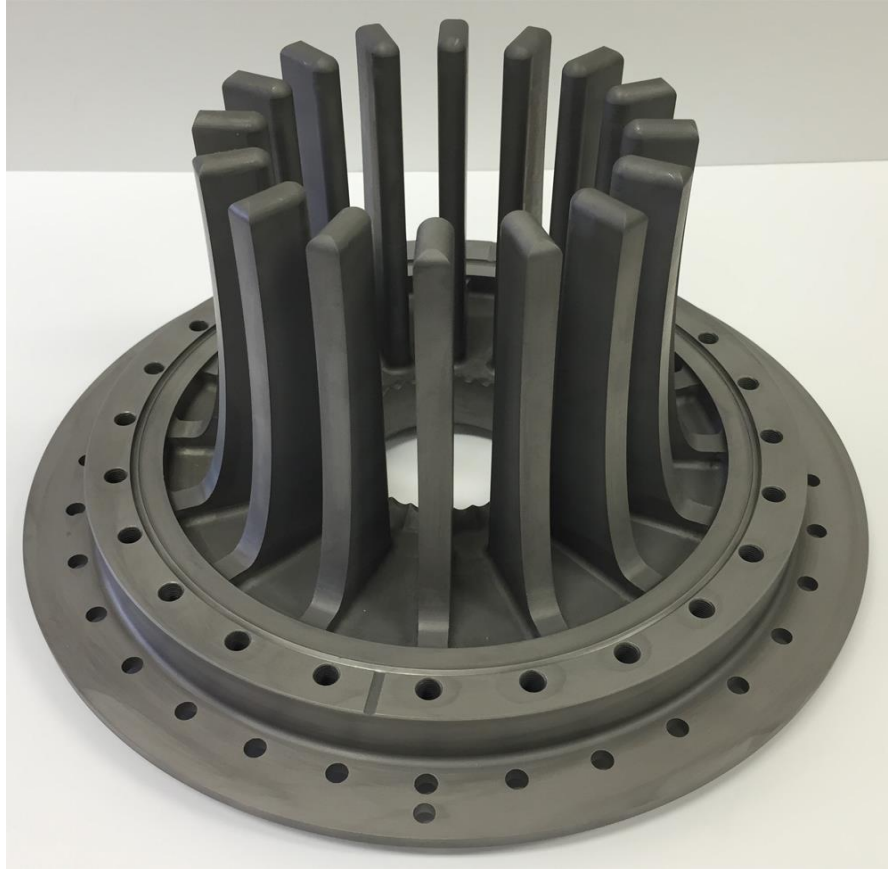
Summary:

- **Tungsten Cathode Completed, En Route to FF-1**
- **LPPFusion Upgrades Computer Network, Database, Security and Procedures**

Tungsten Cathode Completed, En Route to FF-1

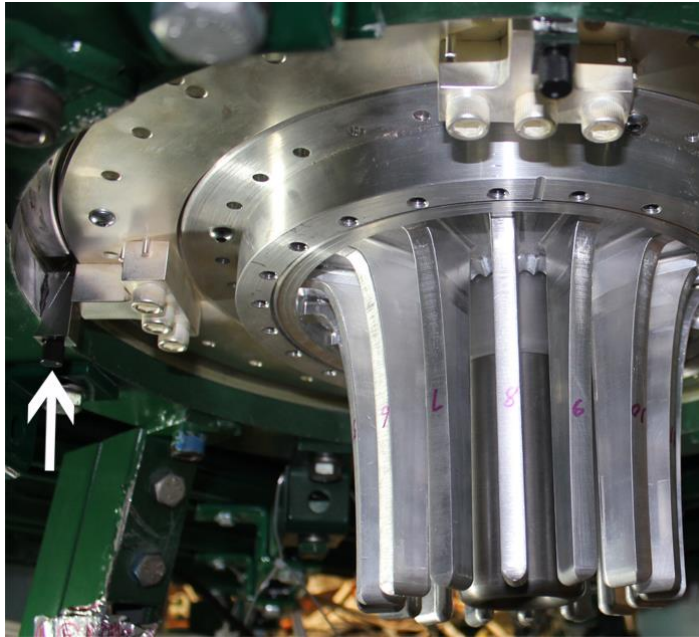
The critical tungsten monolithic cathode, key to LPPFusion's next set of experiments, has finally been completed and shipped. It arrived at Tungsten Heavy Powder headquarters in San Diego, California on Monday, Feb.23 from their manufacturing facilities in China. It is expected to arrive at LPPFusion's Middlesex, NJ laboratory around March 2. "For a long time, this cathode has been in the future," said LPPFusion Chief Scientist Eric Lerner," and the future has finally arrived." As described in the [December LPP Focus Fusion report](#) the great difficulty of manufacturing the part from pure tungsten to exacting requirements caused long delays, which have now ended.

After carefully testing and measuring the cathode, the LPPFusion team expect to install it in the FF-1 plasma focus device and begin experiments during March. The tungsten electrodes (the anode is already installed) are expected to totally stop vaporization of the electrode materials due to arcing, since they are each made of a single piece of metal, with no joins for arcs to form. In addition the tungsten material, which has the highest melting point and one of the highest boiling points of any material, is expected to eliminate additional vaporization from high energy (runaway) electrons during the earliest moments of the electrical discharge. Together, this should end the large amounts of impurities in the plasma, allowing the achievement of far higher fusion yields.



*The freshly machined tungsten cathode, shown here in THP's San Diego facility,
that will be used in the new experiments*

Preparations for the new experiments have continued, with a successful test of the new adjustors. With the aluminum model standing in for the tungsten cathode, Lerner, Chief Research Officer Hamid Yousefi and Consulting Engineer Anthony Ellis succeeded in using the micrometer adjustors to center the cathode on the anode to an accuracy of 25 microns (one thousandth of an inch). In addition, a new gantry has been purchased and will be installed to help handle the tungsten cathode, whose concentrated 35 kg mass makes it too difficult to lift and position manually.



Arrow is pointing to one of the four micrometer adjustors used to center the cathode on the anode. The aluminum model is here standing in for the soon-to arrive tungsten cathode.

LPPFusion Upgrades Computer Network, Database, Security Procedures



Chief Information Officer Ivy Karamitsos

LPPFusion has completed a major upgrade of our IT infrastructure. This will make it easier to rapidly analyze our data and to share it among ourselves as well as to plan future improvements in our FF-1 device. A number of steps were taken under the supervision of Chief Information Officer Ivy Karamitsos.

First, the data generated by our experiments and processed by Electrical Engineer Fred Van Roessel's JavaFusion program has been loaded into a database. The database, designed by volunteer and LPPFusion shareholder Hennign Burdack and implemented by Karamitsos, allows researchers to access within seconds whatever sets of data, from whatever files, they require. Previously data stored in Excel files could take a long time, sometimes impracticably long, to assemble. When the next experiments start, data will be processed after each shot, producing values of basic plasma parameters like ion temperature and density. The processed data will then be fed into the database at the end of each day's shots, ready for further analysis.

Second, with the help of security consultant Tom Heffernan, LPPFusion has built a new powerful network architecture with the latest server and security features available. The server configuration keeps everything and everyone backed up, and provides easy internal sharing of technical data, which will considerably increase productivity and cut down administrative tasks. Equally important, since most security breaches involve some sort of human error, Karamitsos has compiled and circulated a new set of user policies and procedures which have brought our user security awareness higher than ever. If fully adhered to, the combined defensive user

driving with the newly hardened IT infrastructure will further enhance the IT system security against social engineering and other online and offline attacks.