Integrated System to Control Primary PM 2.5 from Electric Power Plants

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One of the major tasks of this project is to design and fabricate an Advanced ElectroCore field prototype system. The system is designed to handle 5,000 acfm of exhaust gas from a coal-fired power plant. The system consists of the Advanced ElectroCore module, a water-cooled precharger and a dry scrubber. The system is shown in Figure 1. LSR has completed the design drawings for the ElectroCore module and the water-cooled precharger. The design drawings for the dry scrubber are nearly complete. Merrick Environmental Technology, Inc. has completed most of the fabrication drawings for the ElectroCore module and for the water-cooled precharger. From the original schedule, the design task (Task 2) should have been completed by 15 July 2000. It now looks like this task will be finished by mid-October thereby putting the project about two months behind schedule. Much of the delay is due to design changes that will make this field prototype easier to transport and erect. These changes will make the unit much more valuable as an ElectroCore system sales tool at the end of this project.

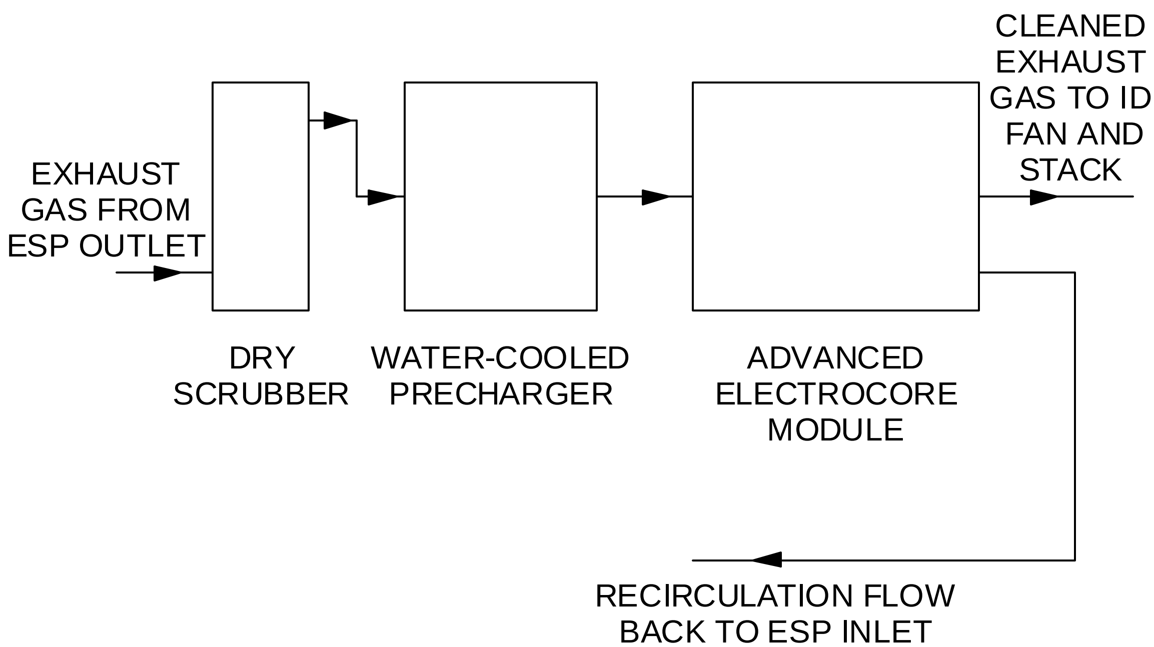


Figure 1: Schematic of Advanced ElectroCore Field Prototype

Advanced ElectroCore Design Drawings

The production drawings are being done by Merrick Environmental Technology, Inc. Producing the drawings involves taking the design drawings, done at LSR Technologies, and developing detailed part drawings and finally an overall assembly drawing. In the process of going from design to production, issues involving cost and manufacturability are considered. For example, design drawings of the Advanced ElectroCore module showed an outer support frame with stiffeners made of relatively light gauge material. Tim Mallory at Merrick suggested that it would be more cost effective to use heavier stiffeners in the outer frame and make the frame simpler by reducing the amount of cross bracing required. The cost of the heavier material was more than offset by the labor saved in constructing the simpler frame. Insight into these kinds of practical matters has made the Merrick a very valuable member of this project team.

Similar improvements have been made in the design of the water-cooled precharger. The original design concept came from a paper entitled *Proof or Concept Testing of ESP Retrofit Technologies for Low and High Resistivity Fly Ash* by George Rinard of the University of Denver; Marlin Andersen, a consultant from Hopkinsville, Kentucky; and by Ralph Altman of the Electric Power Research Institute. Given the basic geometry, LSR adapted the design to give the required particle residence time and to make the cross-section compatible with the requirements of the downstream Advanced ElectroCore module. Merrick then took the design drawings and determined the best method of supporting the unit. As with the Advanced ElectroCore module, it was decided to top-support the precharger. Top supporting the unit allows it to expand and contract with changing gas temperature without inducing thermal stresses.

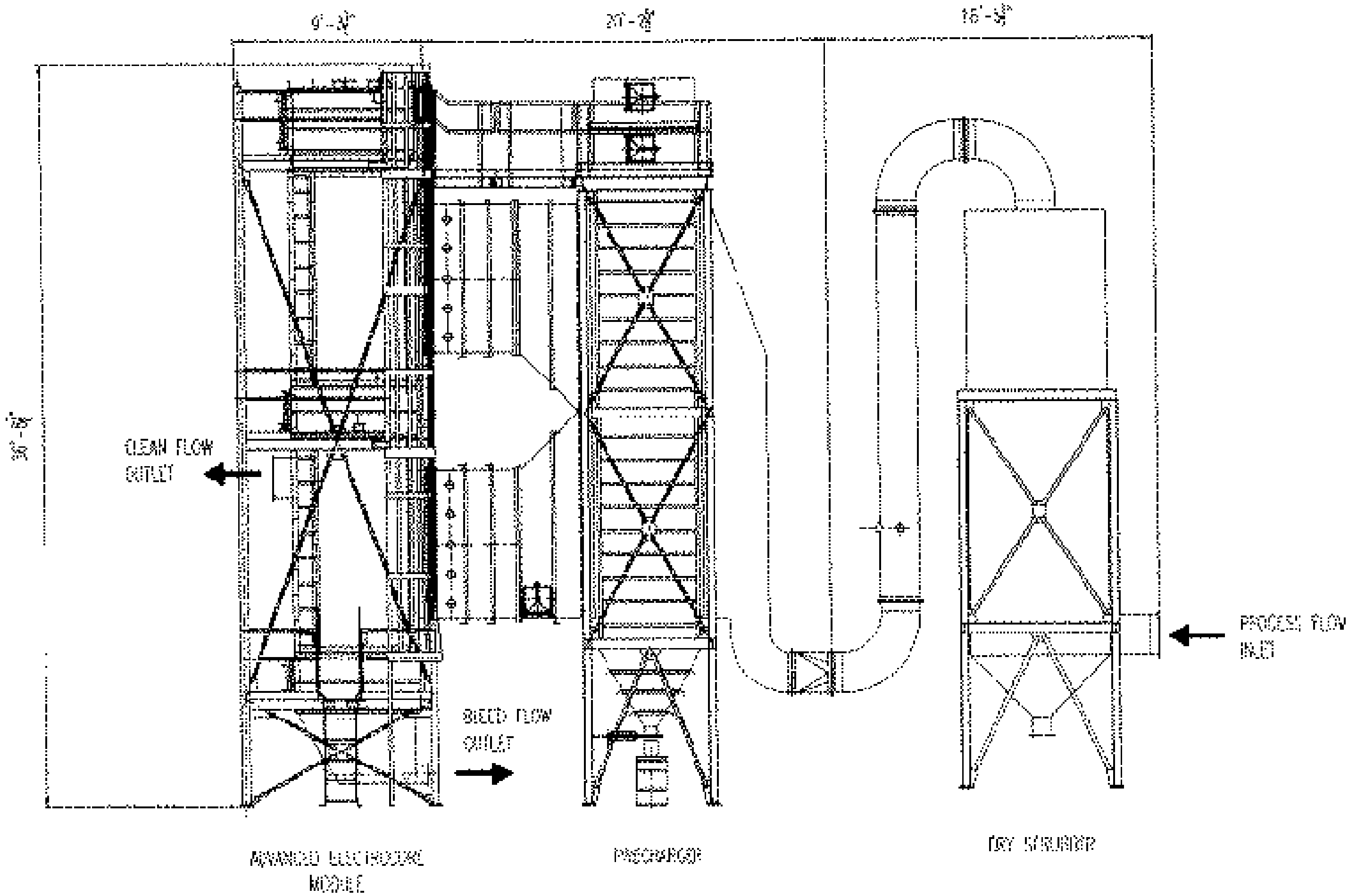
It was also decided to construct the gas-touched surfaces out of Type 304 stainless steel. Stainless Steel provides protection against corrosion and means that the unit will not have to be painted. The frame from which the unit is hung will be carbon steel and will be painted to protect the steel. Upon receipt of appropriate approvals, LSR plans to paint the logos of the U.S. Department of Energy, the Electric Power Research Institute and the U.S. Environmental Protection Agency on the field prototypes to acknowledge the support of these organizations. A general arrangement drawing of the assembled system is shown in Figure 2.

One important consideration in designing the field prototype is making the unit easy to transport and install. At the conclusion of this project, LSR would like to use the prototype as a mobile demonstration unit. The objective is to take the unit to the plants of potential customers and treat a 5000 acfm slipstream from the plant to demonstrate the effectiveness of the technology. LSR believes that this will be an important sales tool and will help speed the commercial development of the both the conventional and Advanced ElectroCore technologies. This strategy proved helpful in developing LSR Core Separator system technology. LSR build and tested a 6,600 acfm Core Separator system in a biomass application and when the project ended, LSR used the unit to demonstrate the technology to potential Core Separator system customers.

Work Planned For Next Period

In the next period LSR will visit nearby fabricators and select one, based on competitive bids, to build the Advanced ElectroCore module, the water-cooled precharger and the dry scrubber. It has not been determined at this point whether one shop will receive the job for all three components or where it will be split among more than one fabricator. Splitting the order may allow us to save time and help catch up to the original schedule. Construction will be started on the three components but they are not expected to be completed until mid-January or early February of 2001.

Also, EPRI has advised that some of its member utilities may be able to contribute more funds to this project for additional testing. The effect of this change would be (1) an increase in the performance period of the contract, (2) more cost-sharing from industrial participants, and (3) the same financial commitment from DOE. When and if these additional funds materialize, LSR will advise DOE for possible contract modification.



ADVANCED ELECTROCORE SYSTEM LAYOUT

FIGURE 2