Winter 2010

AIRFLOW SCIENCES CORPORATION

The Airflow Update

V-22 Osprey Cabin Cooling System Upgrade

When Boeing was contracted by the Navy to upgrade the ECS cooling system on the V-22 aircraft, they were concerned about getting sufficient aircraft time to test out and adjust

the design of the system. The upgrade included a new cabin distribution system designed to provide more efficient cooling to troops seated in the cabin. While all the cabin air had previously been added near the top of the aircraft, the new system would include ductwork to provide cooling air to each flight seat. Tests had shown that providing cooling air to each seat reduced passenger stress considerably. Being able to test and verify the performance of the ductwork was considered key to the success of the upgrade program.

In order to ease aircraft time limitations, Boeing contracted with Airflow Sciences to construct a mock-up of the V-22 ducting system in ASC's lab. The mock-up consisted of a structural framework to hang the ducting, a Plexiglas representation of the cockpit, and supply fans to provide the flow through the system. Instrumentation was added to collect pressure and flow data at key points in the system. A flow measurement system was used to determine the flow balance between the cabin outlets.

In addition to balancing the cabin ductwork, tests were performed to assess the effects of different operating conditions on the flows

through the system. One unexpected outcome from the test program was the identification of several duct components that were not robust enough to withstand the negative pressures that would occur during certain operating modes. As those ducts would be located within enclosed

bulkheads, that problem would not have been identified through a more traditional on-aircraft test program. Boeing is now working with their supplier to update those duct components.

Boeing engineers are very happy with the test program and plan on implementing all of ASC's design recommendations.

New Leaders

Robert Mudry has taken over the position of President as of July 1, 2009. Rob has been with ASC for over 20 years, starting as a summer intern in 1988. The new title will not affect his active role in engineering projects, and he will continue to oversee flow modeling and testing projects for power industry clients. Past president Robert Nelson, with ASC since 1976, is moving to a semi-retirement phase, and will continue working on a part-time basis as company C.F.O. and flow modeling project manager. Other ASC officers include Andrew Banka (V.P.), Brian Dumont (Engineering Director), and Dr. Kevin Linfield (Engineering Director).

ASC Continues to Grow...

Engineer Craig Rood and wife Lindsey welcomed their first child, daughter Evelin in August. Lab Technician Walt Jambeck and new wife Amy were married in August.
Best wishes on your exciting new future!

Capturing Large Particle Ash

With more power plants installing SCR systems for NOx control, the possibility of large particle ash (LPA) plugging the catalyst is a new reality. The formation of LPA is believed to be affected by burner performance, presence of over fired air (OFA), ash properties of the coal being

burned, and furnace flow patterns. As seen in the figure above, LPA can often be characterized as particles greater than 5 mm in size. This type of ash can quickly plug air preheater baskets and SCR catalysts resulting in significant increases in pressure loss that require frequent operation at reduced load and costly outages to perform cleaning.

Options to prevent LPA fouling most often include screens and aerodynamic baffles, both of which have their pros and cons. Properly designed baffles can drastically increase LPA capture efficiency, and offer consistent capture over time. The design process must balance ash capture, pressure drop, and peak local velocities (which can cause erosion). Screens filter out LPA using wire mesh or fine perforations. They can be quite effective, but specific design procedures are required to minimize the potential for screen pluggage and wear due to erosion.

Which design is right for your plant? ASC has performed over 100 studies of LPA situations and can make the right recommendations for your design. ASC utilizes testing and flow modeling analysis to help solve LPA issues. Field testing can obtain velocity data, video of online ash behavior, and particle samples. Laboratory analysis is used to determine the particle's size distribution, specific gravity, drag coefficient, and rebound characteristics. Computer flow modeling is used to predict flow velocity patterns, ash particle trajectories, capture efficiency of the ash hoppers, pressure loss, and the potential for erosion. The figure below shows an example of catalyst pluggage due to LPA. Working with plant personnel, a solution involving baffles, screens, or a combination of both can be designed to help alleviate the pluggage and pressure drop issues.

ASC's President Robert Mudry, P.E. and

Engineering Director Dr. Kevin Linfield, P.E. have been invited to speak at industry conferences on numerous occasions regarding LPA issues and would be pleased to discuss any LPA concerns you may have.

See ASC's website for two presentations discussing the following case studies: Alabama Power's, Miller Plant and Progress Energy's Roxboro Unit 3.

Contacting ASC

General Info:
www.airflowsciences.com
asc@airflowsciences.com

Headquarters:
12190 Hubbard Street
Livonia, MI 48150-1737
Tel. (734) 525-0300

Western Region Office:
P.O. Box 22637
Carmel, CA 93922-0637
Tel. (831) 624-8700

Southeastern Region Office:
3709 Foster Hill Dr. North
St. Petersburg, FL 33704-1140
Tel. (727) 526-9805

Airflow Events

We hope to see you at future trade shows and conferences:

EUEC - Energy & Environment Conference
Feb 1-3, Phoenix, AZ

NOx Combustion & Round Table
Feb 9-10, Chattanooga, TN

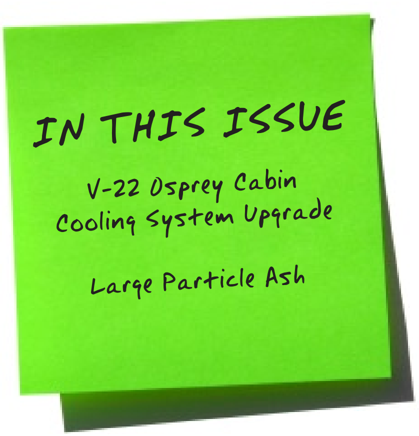
ICAC Annual Conference
April 21-24, Fort Meyers, FL

Electric Power Conference & Expo
May 18-20, Baltimore, MD

Your Office
Looking to host a seminar on modeling, fluid flows, or heat transfer?

We make house calls!

AIRFLOW SCIENCES CORPORATION
The Airflow Update



Airflow Sciences Corporation
12190 Hubbard Street
Livonia, MI 48150-1737
Tel. (734) 525-0300

Mr. Kevin W. Linfield, Ph.D., P.E.
Engineering Manager
Airflow Sciences Corporation
12190 Hubbard Street
Livonia, MI 48150-1737
USA

Visit our website at:
www.airflowsciences.com