

## ***Low Reynolds Number Facility***

Advances in the miniaturization of electronic and mechanical systems are now making it possible to develop Micro Air Vehicles (MAVs) for military and civilian applications such as search and rescue, drug interdiction, and anti-terrorist surveillance. Conventional aerodynamic testing methods in wind or water tunnels, however, are not suitable for testing such vehicles as they do not lend themselves to operate at the required low Reynolds number.

The NRC Institute for Aerospace Research (NRC Aerospace) has designed and built a pilot-scale facility to study the low Reynolds number flows associated with these MAVs, as well as to advance the development of High Altitude Long Endurance (HALE) vehicles and advanced flow control methods.

The 4 metre-long covered tank has a 1 m x 1 m cross section that can be filled with a mixture of glycerine and water, thereby eliminating the undesirable free surface. A mechanism located above the tank moves the model through the test medium by means of a support strut that crosses a sealed slit on the tank roof. By varying the ratio of the water-glycerine mixture and the velocity of the model, a range of Reynolds numbers between 10 and 200,000 can be obtained.



*Flapping wing model moving through test medium*

Exploratory tests conducted in the pilot facility to establish performance characteristics, adapt flow diagnostic tech-



*Aerodynamic test on a full-scale truck*

niques to the new test environment, and identify improvements have proven the value of the concept. As a result, NRC Aerospace has filed for patent protection and signed a licensing agreement with Aiolos Engineering Corporation granting them sole rights to market the technology worldwide.

In view of the pilot facility's success, NRC Aerospace received half of the funding required to build a full-scale research/production facility, which is now under construction. NRC Aerospace is seeking partners to cover the remainder of the cost, as well as to share in its use. The full-scale facility will have a 1 m x 1 m cross section and will be 25 m long. Interest in the facility has been expressed by Canada's Department of National Defence, the United States Air Force and researchers in other NATO countries. This unique facility will provide testing capabilities not available anywhere else.

*...cont'd*

**CONTACT:**

Dr. Ernest Hanff  
Aerodynamics Laboratory  
NRC Institute for Aerospace Research  
Ottawa, Ontario, Canada K1A 0R6  
Tel: (613) 993-6870 Fax: (613) 952-7677  
E mail: [ernest.hanff@nrc.gc.ca](mailto:ernest.hanff@nrc.gc.ca)

Mr. Jeff Mackwood  
Marketing and Contracts Office  
NRC Institute for Aerospace Research  
Ottawa, Ontario, Canada K1A 0R6  
Tel: (613) 990-0765 Fax: (613) 952-7214  
E mail: [jeff.mackwood@nrc.gc.ca](mailto:jeff.mackwood@nrc.gc.ca)

Or visit our Web site at: [www.nrcaerospace.com](http://www.nrcaerospace.com)

September 2005  
*Aussi offert en français*  
IAR-AL06e