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LOG OF MEETINGDIRECTORATE FOR ENGINEERING SCIENCES

1998 NOV 25 P 2:05

SUBJECT: SnowthrowersDATE OF MEETING: September 9, 1998PLACE: Cold Regions Research and Engineering Laboratory,  
Hanover, NHLOG ENTRY SOURCE: Roy W. Deppa *RWD*COMMISSION ATTENDEES: Roy W. Deppa, Division of Mechanical  
EngineeringNON-COMMISSION ATTENDEES:

Dr. Samuel Colbeck, CRREL

Mr. John Bourzoun, CRREL

SUMMARY:

The meeting had been requested by Roy Deppa to discuss the mechanism of snow clogging in snowthrower discharge chutes. Originally this was to be a joint meeting with representatives of several manufacturers. The Northwest Airlines strike prevented the Toro representatives from attending, so the plans were changed and only Roy Deppa visited CRREL.

Although CRREL has extensive cold-room facilities, the chamber most likely to be of use to the project is a ground-level room about 25 by 40 feet with a large exterior door. This chamber has a temperature capability from -65 to +120F, with cycling capability of about 24 hours. As an example, it is currently being used for exposure tests of deliberately-fragile concrete pavement for application as airport runway extensions to capture airliners that overshoot the runway. It has also been used to test optical devices in falling snow conditions, using artificial snow made in the room. While CRREL has produced artificial snow for this type of test, it is not clear that large enough quantities can be produced as deposited snow to test full-scale snowthrowers.

Due to the difficulty of producing large quantities of wet snow, Dr. Colbeck proposed use of a scale model(s) snow thrower. Such a device could be electrically powered and stationary, with the snow fed into it via a conveyor. Dr. Colbeck feels that scaling the device (perhaps 1/2 or 1/3 scale, for example) would allow valid characterization of the range of snow properties that produce clogging. As he says, the snow doesn't change; the

physics involved is essentially microscopic and should not be affected by use of a scale model device.

The discussion focused on a number of things that might influence the clogging mechanism, and we discussed a few ideas that could be tested. The proposed joint government/industry research project could pursue these ideas with guidance from the industry experts in snowthrower design. Dr. Colbeck provided enough copies of several of his publications to provide one per company.

Based upon the discussions so far, the first two issues to be addressed are:

Issue 1: Understanding the physics of wet snow and its adhesion to the surface of the discharge chute including the cohesive action that allows the clog to grow (if that's the mechanism). This assumes we know how the clogging happens. Gaining and sharing this understanding of snow physics might lead to some ideas for "cut and try" testing as a minimum.

Issue 2: Developing the laboratory capability to study the clogging mechanism, which requires a large cold room and snowmaking capability and instrumentation. This issue still needs to be discussed by the industry people with CRREL staff to see what is feasible.

Dr. Colbeck offered to meet with a larger group for a detailed discussion to address the first issue immediately. The second issue is more difficult, but there may be alternatives that become more attractive to the team as the discussion progresses.

If these two issues can be dealt with (or an alternative approach), the natural outgrowth should be a research project that involves manipulating some design variables through building and testing some prototype assemblies.