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CoolSlot™ Card Guide Performance Measurements

Performance Data

Hybricon Corporation • 12 Willow Road • Ayer, Massachusetts 01432
Tel: (978) 772-5422 • Fax: (978) 772-2963
Web: www.hybricon.com • E-Mail: info@hybricon.com

CoolSlot™ Card Guide Measurements

by: Joseph W. Plunkett
Hybricon Corporation

In an effort to confirm previous simulations results (see Sullivan and Plunkett), measurements were performed using the Cambridge AccuSense Air Temperature Monitor 24. These tests were performed in two different 21 slot enclosures with 0.8" pitch, one populated with ordinary card guides, and one populated with the new CoolSlot Card Guides. The test setup was as follows: a one U (1.75") spacing was used from the bottom of the enclosure to the test bench, three Mechatronics F1238x12B fans spaced at two U (OD) above the card cage provides a draw-through air supply, and the sensor array was placed in slot 19. Slot 19 was chosen due to its 'average' performance; as opposed to slot 1 or slot 11, which are generally the min and max performers, respectively. Six sensors were arranged on a piece of FR4 as shown in Figure 1.

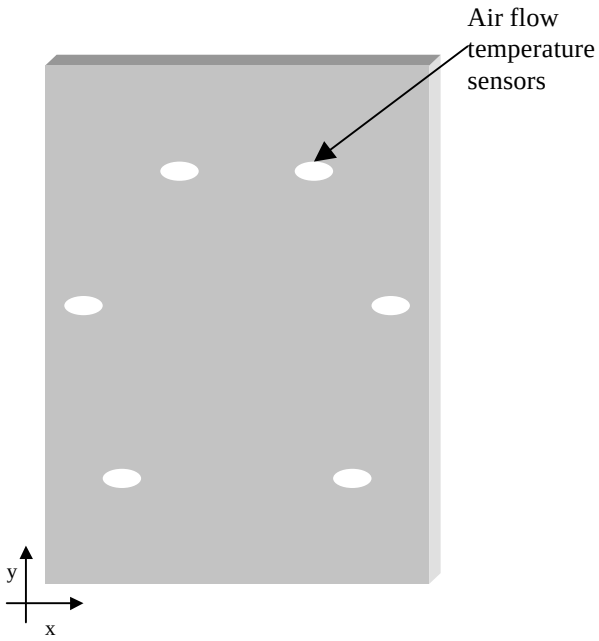

Figure 1 Sensor locations on a 6U x 160 mm board.

Due to the sensor mounting technique, the positions of the sensors are not symmetrical. Their exact positions are given in Table 1below.

Table 1 Sensor locations (from edge of board).

	Left (front of enclosure)		Right (rear of enclosure)	
	x (in)	y (in)	x (in)	y (in)
Top	1 7/8	7 13/16	1 15/16	7 7/8
Middle	1/4	4 15/16	5/16	4 15/16
Bottom	5/8	1 3/4	5/8	1 3/4

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A total of 192 measurements were taken at each probe for each enclosure. These measurements were collected at a rate of one sample per second and the average air flow recorded in each sensor is shown in Table 2.

Table 2 Average air flow for each case.

	rear top	rear center	rear bottom	front top	front center	front bottom
ordinary card guides	798.3	435.0	339.3	671.3	100.7	101.7
CoolSlot card guides	666.7	463.7	561.7	556.7	331.7	326.3

These measurements confirm the qualitative performance of the CoolSlot card guides as found previously through simulation. It is apparent that the bottom front and rear edges of the board receive a much higher rate of air with the CoolSlot card guides in place. This is due to their aerodynamic shaping. Of course, since the law of mass conservation binds the air supply, the CoolSlot card guide reduces the velocity of the air through the center regions of the board. Still, with the CoolSlot card guide in place the top probes still measured in excess of 500 lfm in that region. Furthermore, since the CoolSlot card guide distributes the airflow more effectively, a higher average velocity across the entire board results; 484.4 lfm as opposed to 407.7 lfm with the ordinary card guides.

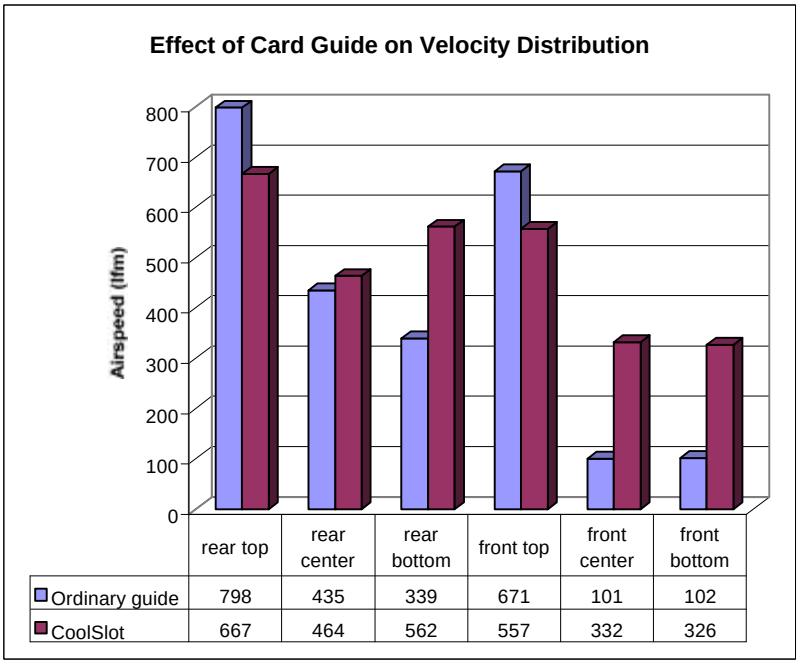

Figure 2 Comparison of air speeds.

In conclusion, it has been shown that the CoolSlot card guide provides a superior distribution of air. While the CoolSlot card guide does reduce the velocity of air by an average of 16.7% through the center of the board, the 45.9% higher average velocities in the typically under-ventilated edges of the board make the trade-off highly advantageous for the user.