March 19th, 2012

Johnson Controls

76 Armstrong Road

Battle Creek, MI 49037

David Simet

Ref: Robotic Cell Testing

Dear Dave:

 After visiting your plant and performing testing with the larger fan, here are the results and recommendations.

Airflow with existing fan: 1050 CFM

 This was measured at the pickup slots at the back of the cell

Airflow with the larger exhaust fan: at 45 Hertz 1300 CFM. As the fan was increased the ductwork could not handle the high negative pressure and thus we could not pull a higher CFM. We measured 5500 CFM at the fan and only 1300 CFM inside the cell.

 The robotic cell is 918 cubic feet (8.5’ x 9’ x 12’). Based on testing and observations 7500 CFM is needed to evacuate the cell properly. This will produce 8 air changes per hour. In addition, an air knife would be needed to assist in directing the air to the back of the booth where the pick-up points are located. See drawing for locations and airflow patterns.

Design parameters:

 Keep the fresh air intake in the current location. This will allow the air being pulled in and over the welding surface to push the air to the back of the cell.

 Keep the air knives on the laser eye and above the welding surface. Not only will it keep sparks off of the laser it will also help direct the air down towards the floor and to the back of the cell.

 Add an Air Knife below the welding table and point towards the back of the cell. This will push the air to the back of the cell and into the pick-up points.

 There needs to be three pick-up points. Two to be located on the floor (in the corners) and one to be located above the door. The floor pick-up points will pick the air being pushed towards them and the one above the door will pick up any air form the ceiling. The three pick-up points will be ducted together outside the cell and into one duct run going to the collector.

We also recommend that a roll media is installed before the collector. This is will capture the oily smoke. We also recommend that a roll media is installed before the collector. This is will capture the oily residue and keeping it off of the filters thus extending the filter life.

We also recommend that a Spark Eliminator be installed. This will help prevent any sparks reaching the filters.

Sincerely,

Bob Venezia

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