

### Engineering an Industrial Central Vacuum for Mar's Petcare

**Overview:** Air Dynamics Industrial Systems Corp. manufacturers another turn-key vacuum cleaning system for World's Leading Pet Food Maker - Mar's Pet Care. The Industrial Vacuum Cleaning System is used by sanitation workers to collect and dispose of pet food kibble and combustible organic dust.

#### The Application

When the Worlds' largest pet food producer needed a housekeeping system for their facility they turned to Air Dynamics Industrial Systems Corporation. Air Dynamics successfully competed for the procurement of the industrial central vacuum system. The statement-of-work included special requirements to uphold MARS corporate guidelines and standards for capital equipment procurement.

*It was understood that the supplier was expected to be an expert in the field of industrial duty central vacuum cleaning systems.* After over two decades engineering vacuum systems, Air Dynamics Industrial Systems Corporation exceeded this requirement.

#### The Challenge

In order to meet the requirements of MAR's, Air Dynamics Industrial Systems Corporation designed their system specifically for the needs of the client. The combustible dust sanitation system included pneumatic conveying system design



**Above: Air Dynamics' Central Vacuum Unit**  
**Below: Side view of PP22**



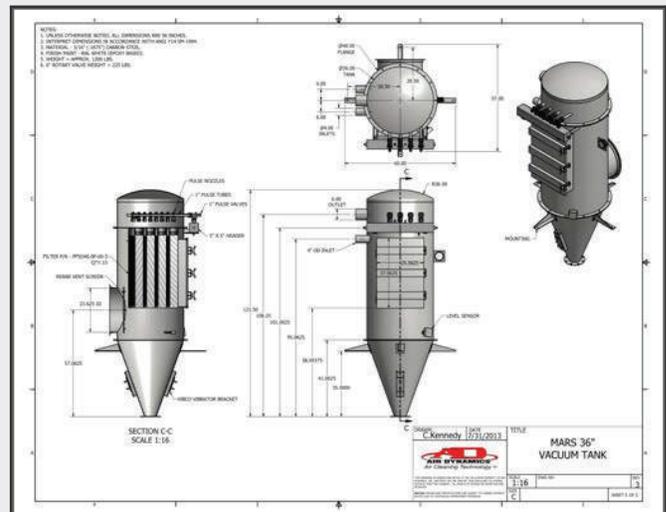
experience, familiarity with NFPA guidelines, OSHA's Safety Directive CPL-03-00-008 (Combustible Dust National Emphasis Program), and the Code of Federal Regulations - 29 CFR 1910.22, 29 CFR 1910.176 (c), 29 CFR 1910.272.

The owners' procurement team included a Project Manager, Technical Project Manager, and Technical Buyer. The Air Dynamics team required a Project Leader Commercial, Project Leader Technical and Senior Site Supervisor. The central vacuum cleaning system was designed to serve six simultaneous operators at 50 locations across four processing areas over an 800-foot span of the facility.

### Principle of Operation

To meet OSHA's mandate, the industrial vacuum system was installed as a housekeeping and sanitation system to collect and safely dispose of pet food kibble, combustible organic dust and a preventative measure for organic dust that may become contaminated with salmonella. Cleanliness and food safety are ingrained in every facet of every MARS Pet care facility; it's a high priority that everyone including suppliers, take seriously. The system was designed to meet all sanitation, safety, technical and performance requirements while minimizing total energy demand. In addition to design, the project required

manufacturing, delivery, start-up and commissioning of the complete housekeeping vacuum system. Key aspects of the central vacuum system were; 3-D CADD design and layout of the vacuum piping system, filter/receiver, deflagration protection/isolation, hopper discharge, industrial vacuum producer, follow National Fire Protection Association Guidelines, provide OSHA safety devices, compliance with the National Electrical Code, automation controls and instrumentation, intrinsically safe industrial vacuum cleaning tools and attachments and vacuum system spare parts.



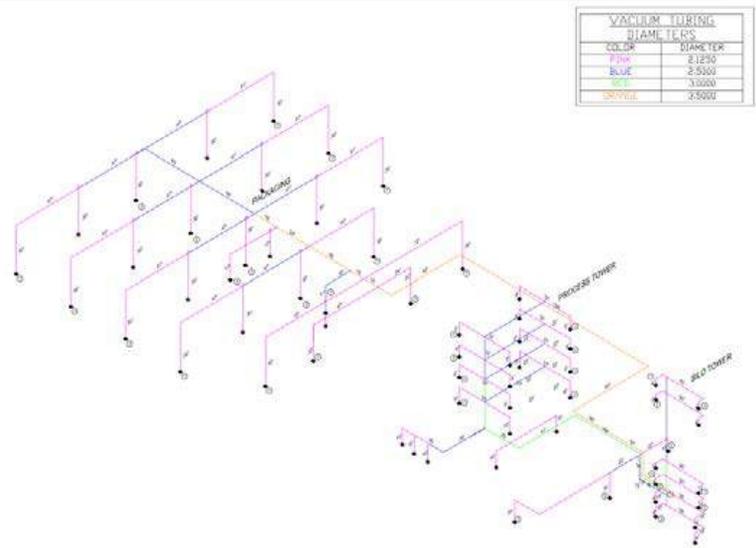
### Providing the Best Solution, by Designing the Best Product

The heavy-duty vacuum system designed by Air Dynamics Industrial Systems was designed to withstand the pressures of a deflagration and comply with NFPA guidelines for preventing or protecting against dust explosions. All aspects of the vacuum systems structural design (mechanical engineering) and

vessel integrity/pressure design criteria of the vacuum system were subject to review by the client's safety consultants and professional engineers. The main filters were selected to provide greater than 99.9% efficiency at half a micron while the safety filter was selected to provide 99.9% efficiency at one micron.

Operator controls include HOA (hand/off/auto) selector switches and visual run indicator lights to facilitate troubleshooting and maintenance. Automation in the electrical design scheme provides operator-less sensing of the receiver level with indicator light and automatic shutdown upon bin full, breach of the explosion vent, high differential pressure, loss of rotation of the discharge valve or other faults. Special totally enclosed fan cooled motors were required to reliably operate the industrial vacuum system in a high ambient temperature of 122 degrees Fahrenheit (50° C).

The combustible dust housekeeping vacuum system was designed to operate six hours per day, seven days a week, 52 weeks a year, with a minimum service life of 10 years. Air Dynamics Industrial Systems Corp. guaranteed the noise level in an open room, measured three feet from any part of the equipment; to be less than 80 dB(A); normal volume of a conversation is about 72 dB(A).



Example of the piping layout for central vacuum system

The compact design of the vacuum system required a four by four foot area while the vacuum producer required a three foot by seven foot area.

The vacuum system endured a series of customer tests and inspections to ensure the vacuum system was performing optimally, with specifications initially set forth by the client. After startup and commissioning, all requirements in the statement of work were met. The Site Acceptance Evaluation included Inspection and Review of the Fit and Finish, Sub-systems Testing, Mechanical Standards, Electrical Standards, Industrial Hygiene and Occupational Safety requirements. The state-of-the-art central vacuum cleaning system is currently serving this facility "where the operators say the vacuum system works really, really well!", as reported by Larry Cloar, at MARS.

System requirements included, but were not limited to, as-built 3D CADD layout drawings, electrical drawings, operation and maintenance manuals, and summary of expected total cost of ownership, spare parts, maintenance costs, and energy consumption.

The central vacuum piping network consisted of purpose-built vacuum tubing and fittings, 30' operator hoses, metal industrial vacuum tools and attachments. The product is conveyed through the system piping at 6,500 FPM minimum conveying velocity. Start-up services included programming, system balancing, commissioning, and operator training. Warranty support included a one-year warranty period - excluding normal wear items.

### **Conclusion**

Air Dynamics Industrial Systems partnered with the people at MARS to provide a system that ultimately serves to protect the people at MARS, the plant infrastructure, and assist the plant sanitation workers to produce a safer product while protecting future earnings for the company.

Founded in 1991, Air Dynamics Industrial Systems Corporation designs and manufactures Turn-key Industrial Vacuum Cleaning Systems, Portable Industrial Vacuum cleaners and Pollution Control Systems.



**Central Vacuum System installed at MARS facility**



**Central Vacuum System - Side View**

### **Contact Information**

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