Cardinal's Impact: Case Study

How Redesigning Workstations Brought Airborne Beryllium Exposures Reliably Below the OSHA Action Level

CHALLENGE:

In a plastic injection mold fabricator's polishing department in Fremont, Ohio, workers found themselves exposed to airborne beryllium (Be) dust frequently above the Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit (PEL) of 0.2 (µg/m3).

An airborne beryllium exposure assessment was conducted on 17 full-shift operator breathing zones during polishing (i.e., grinding, sanding, and buffing) of internal injection mold cavity surfaces containing CuBe Alloy 25 to reveal an exceedance of 43.5% above PEL.

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BASELINE PERSONAL BREATHING ZONE AIR SAMPLE RESULTS
BEFORE CONTROLS WERE PUT IN PLACE

Number of Samples	Range µg/m^3	Percent Exceedance[1] of 0.2 µg/m^3	$UTL_{95,95}$[2] µg/m^3
17	0.012 - 0.900	43.5	2.62

[1] Percentage of exposures expected to exceed 0.2 µg/m³. A percent exceedance of < 5% is considered "Well Controlled".

[2] Upper Tolerance Limit – one can be ninety-five-percent confidence that fewer than 5% of measurements are above the UTL(95/95). The goal is to control airborne Be exposures to levels where the UTL is below the PEL.

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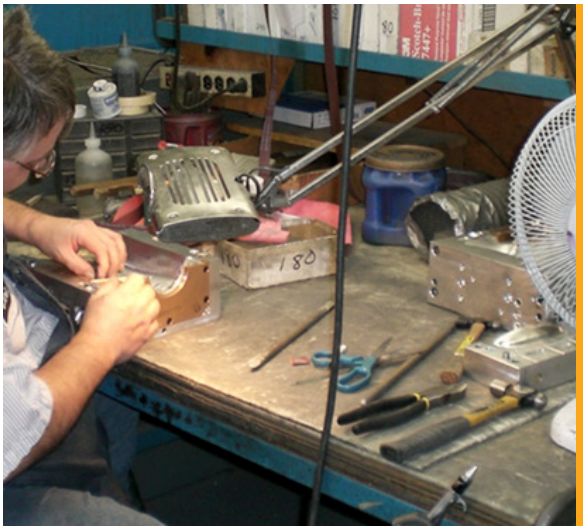
SOLUTION:

To best control beryllium breathing exposure, Cardinal Compliance Consultants redesigned the polishing workstations using the experience of operators, plant management and design criteria recommended by the American Conference of Industrial Hygienists® (ACGIH®) Industrial Ventilation Manual, 26th Edition.

Details of the Redesigned Polishing Workstation Included:

- A centralized, variable frequency drive (VFD) Donaldson Torit dust collection system was installed to accommodate 10 polishing stations.
- Partially enclosing style hoods were installed, designed with a top and sides to reduce the effects of cross-drafts. Designed to be a combination of back draft and down draft slot hood, this style maximized laminar air flow, significantly reduced the influence of eddies at the front of the hood (where the pieces are worked) and eliminated “dead” zones in the top of the hood.
- Each station was changed to activate by a single power switch, turning on lighting, all pneumatic and electrical power, and opening the hood blast gate.
- Tools were interlocked to the ventilation system so that they will not operate unless the blast gate is open, minimizing risk of overexposure.



Before Controls

After Controls

IMPACT:

After the redesign of the polishing workstations, 28 full-shift air samples were collected in the breathing zone of operators performing polishing on internal injection mold cavity surfaces containing CuBe Alloy 25. The controls put in place by Cardinal reduced airborne beryllium exposures below OSHA's Action Level (AL) of 0.1 µg/m3.

BASELINE PERSONAL BREATHING ZONE AIR SAMPLE RESULTS AFTER CONTROLS WERE PUT IN PLACE

Number of Samples	Range µg/m³	Percent Exceedance[1] of 0.2 µg/m³	$UTL_{95,95}$[2] µg/m³
28	0.0084 - 0.0577	0.27	0.088

[1] Percentage of exposures expected to exceed 0.2 µg/m³. A percent exceedance of < 5% is considered "Well Controlled".

[2] Upper Tolerance Limit – one can be ninety-five-percent confidence that fewer than 5% of measurements are above the UTL(95/95). The goal is to control airborne Be exposures to levels where the UTL is below the PEL.

Impact of Solutions included:

- Employee's can now work confidently in their redesigned space knowing that their air quality is significantly improved.
- The new hoods improved lighting to allow the operator better visibility, allowing polishing work farther from the part.

ABOUT US:

Cardinal Compliance Consultants is a comprehensive environmental, health, and safety (EHS) consulting firm, committed to going anywhere we're needed. Working with businesses to exceed regulatory compliance and citation defense, training and program development, to safety staffing solutions, Cardinal is passionate about making sure your team feels confident in their ability to return home safely every night.

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