

Participant ID: _____

NIOSH Thermal Spray Coating Project Workplace Survey

Thank you for your participation and taking time to answer questions about your workplace. The purpose of this survey is to help the [National Institute for Occupational Safety and Health](#) (NIOSH) better understand the thermal spray coating industry and best practices or barriers to occupational safety and health. NIOSH is a federal public health research agency. NIOSH **is not** part of the Occupational Health and Safety Administration (OSHA) and **does not** fine companies for health and safety violations.

Section 1: Point of Contact Information

First, we would like to collect workplace contact information. This information is to assist NIOSH in contacting your workplace should you request additional information from NIOSH. Nevertheless, provision of your information listed below is voluntary. **NIOSH will not directly identify you or your workplace in any of our study findings.**

Does your workplace work in thermal spray coating (TSC), including flame, electric arc, detonation gun, high velocity oxyfuel (HVOF), high velocity air fuel (HVOF), conventional plasma, high energy plasma, vacuum plasma, plasma, radio frequency plasma, or cold spray?

- Yes [continue]
- No [thank you, please exit survey] [**trigger end survey action**]
- I'm not sure [continue]

1. First Name:

2. Last Name:

3. Work phone number:

4. Work email address:

Section 2: Workplace Information

Next, we would like to learn more about your workplace.

5. Name of company:

Public reporting burden of this collection of information is estimated to average 20 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to - CDC/ATSDR Reports Clearance Officer; 1600 Clifton Road NE, MS H21-8, Atlanta, Georgia 30333 ATTN: PRA (0920-xxxx).

6. Company address:
7. Industry classification (Name/NAICS Code-6-digit):
8. How many people work at this company (including contractors)?
9. How many workers perform thermal spray coating?
10. How many other workers perform tasks related to TSC such as maintenance, pre-surface preparation, post surface cleaning or finishing?

Section 3: Production Volume

Next, we would like to learn more about the level of production at your workplace.

11. About how much time is spent daily on TSC processes?
 - £ Less than 1 hour
 - £ 1 hour and up to 2 hours
 - £ More than 2 hours and up to 4 hours
 - £ More than 4 hours
12. Has your volume of TSC work increased over the last 5 years?
 - £ No increase in production volume
 - £ Less than 25%
 - £ 25-50%
 - £ 51-75%
 - £ More than 75%

Section 4: Production Practices

*Next, we would like to learn more about the **TSC processes** and materials, tasks performed, engineering controls, and safety measures your workplace uses. Over the next few questions, you will be asked to provide the following information for each TSC process currently used at your workplace:*

- feedstock material
 - amount used annually
 - feedstock form (e.g., powder; wire/rod; liquid suspension/liquid precursor)
 - fuel, propellants, substrate materials
 - structures description of booths or enclosures
 - control technologies
 - personal protective equipment
 - housekeeping
13. Select the type(s) of **TSC processes** used at your facility. [select all that apply] [**triggers 13a to be displayed for each process checked**]
 - Electric arc
 - Flame
 - High velocity oxyfuel (HVOF)
 - Conventional plasma
 - High energy plasma

- Vacuum plasma
- Radio frequency plasma
- Detonation gun
- Cold
- Other (please describe)

13a. Do you apply the **TSC process** in [select all that apply]: **[triggers 13b to be displayed for each process checked]**

- Fixed building location
- As a portable unit in a building
- As a portable unit on a structure

13b. Select the types of **metals** feedstock material used [select all that apply]: **[displayed for each 13a response checked; triggers 13c and 13d]**

- Nickel
- Chromium
- Manganese
- Cobalt
- Aluminum
- Zinc
- Tin
- Tungsten
- Molybdenum
- Iron
- Copper
- Other (please describe)

13c. Indicate amount used annually: **[dropdown menu] [displayed for each 13b response checked]**

- <100 lbs. per year
- 100 — 500 lbs. per year
- 500 — 1,000 lbs. per year
- 1,000 — 10,000 lbs. per year
- > 10,000 lbs. per year

13d. Indicate form used: **[dropdown menu] [displayed for each 13b response checked]**

- Powder
- Wire/rod
- Liquid suspension/liquid precursor

13e. Select the types of **alloys and intermetallics** feedstock material used [select all that apply]: **[displayed for each 13a response checked; triggers 13f and 13g]**

- Stainless steel
- Mild steel
- Nickel-chromium alloys
- Nickel and cobalt alloys
- Ni-Cr-B-Si alloys
- MCrAlY
- TiAl
- Ti3Al
- Ni3Al
- NiAl
- MoS2
- Other (please describe)

13f. Indicate amount used annually: **[dropdown menu] [displayed for each 13e response checked]**

- <100 lbs. per year

- 100 — 500 lbs. per year
- 500 — 1,000 lbs. per year
- 1,000 — 10,000 lbs. per year
- > 10,000 lbs. per year

13g. Indicate form used: **[dropdown menu] [displayed for each 13e response checked]**

- Powder
- Wire/rod
- Liquid suspension/liquid precursor

13h. Select the types of **ceramics** feedstock material used [select all that apply]: **[displayed for each 13a response checked; triggers 13i and 13j]**

- Al₂O₃
- ZrO₂
- TiO₂
- CrO₃
- MgO
- Cr₃C₂
- TiC
- Mo₂C
- SiC
- TiN
- Si₃N₄

Other (please describe)

13i. Indicate amount used annually: **[dropdown menu] [displayed for each 13h response checked]**

- <100 lbs. per year
- 100 — 500 lbs. per year
- 500 — 1,000 lbs. per year
- 1,000 — 10,000 lbs. per year
- > 10,000 lbs. per year

13j. Indicate form used: **[dropdown menu] [displayed for each 13h response checked]**

- Powder
- Wire/rod
- Liquid suspension/liquid precursor

13k. Select the types of **cermet (ceramics/metals)** feedstock material used [select all that apply]: **[displayed for each 13a response checked; triggers 13l and 13m]**

- WC/Co
- Cr₃C₂/NiCr
- TiC/NiCr

Other (please describe)

13l. Indicate amount used annually: **[dropdown menu] [displayed for each 13k response checked]**

- <100 lbs. per year
- 100 — 500 lbs. per year
- 500 — 1,000 lbs. per year
- 1,000 — 10,000 lbs. per year
- > 10,000 lbs. per year

13m. Indicate form used: **[dropdown menu] [displayed for each 13k response checked]**

- Powder
- Wire/rod
- Liquid suspension/liquid precursor

13n. Select the types of **polymers composites** feedstock material used [select all that apply]: **[displayed for each 13a response checked; triggers 13o and 13p]**

- Urethanes
- Ethylene vinyl alcohols
- Nylon 11
- Polytetrafluoroethylene
- Ethylene tetrafluoroethylene
- Polyetheretherketone
- Polymethylmethacrylate
- Poluimid
- Polycarbonate
- Polyvinylidene fluoride

- Other (please describe)

13o. Indicate amount used annually: **[dropdown menu] [displayed for each 13n response checked]**

- <100 lbs. per year
- 100 — 500 lbs. per year
- 500 — 1,000 lbs. per year
- 1,000 — 10,000 lbs. per year
- > 10,000 lbs. per year

13p. Indicate form used: **[dropdown menu] [displayed for each 13n response checked]**

- Powder
- Wire/rod
- Liquid suspension/liquid precursor

13q. Select the types of **fuel and propellant** used [select all that apply]: **[displayed for each 13a response checked]**

- Argon
- Helium
- Air
- Nitrogen
- Oxygen
- Propane
- Acetylene
- Hydrogen
- Propylene
- Kerosene
- Chemtane 2
- Methane
- Methylacetylene-propadiene propane
- Mixture
- Other (please describe)

13r. Select the types of **substrate** material used [select all that apply]: **[displayed for each 13a response checked]**

- Aluminum
- Cobalt
- Copper
- Nickel
- Stainless steel
- Mild steel
- Polymer
- Iron
- Titanium

- Other (please describe)

13s. Is this TSC process conducted in a temporary containment (e.g., containments using tarps), an enclosed structure (e.g., booths or glovebox), or in a non-enclosed, restricted area? [select all that apply]: **[displayed for each 13a response checked]**

- Glove box
- Field portable glove box
- Fully enclosed booth
- Partially enclosed booth
- Temporary containment
- No booths
- Restricted area, non-enclosed
- Other (please describe)

13t. Select the types of **exhaust ventilation** used for this process [select all that apply]: **[displayed for each 13a response checked]**

- Mechanical exhaust ventilation [select all that apply]: **[subcategories displayed if selected]**
 - HEPA filter
 - Dry filter
 - Wet scrubber
 - Water curtain
 - Other (please describe)
- Portable exhaust ventilation [select all that apply]: **[subcategories displayed if selected]**
 - HEPA filter
 - Other (please describe)
- No mechanical exhaust ventilation

13u. Select the **Personal Protective Equipment (PPE)** available at your workplace [select all that apply]: **[displayed for each 13a response checked]**

- NIOSH-approved N95 respirator
- Half-face respirator **[subcategories displayed if selected]**
 - Particulate filter
 - Organic vapor cartridge
 - Combination
 - Unsure
- Full-face respirator **[subcategories displayed if selected]**
 - Particulate filter
 - Organic vapor cartridge
 - Combination
 - Unsure
- Powered air-purifying respirator (PAPR)
- Other PPE (select all that apply) **[subcategories displayed if selected]**
 - Gloves
 - Protective glasses or goggles
 - Coveralls
- Other (please describe)

13v. Select the enclosures and TSC equipment that are cleaned in your workplace [select all that apply]: **[displayed for each 13a response checked]**

- Glove box
- Booth
- Other enclosures
- Temporary containment

- Other (please describe)

13w. Indicate how often this enclosure or equipment is cleaned. [dropdown menu] [displayed for each 13v response checked]

- Daily
- Weekly
- Monthly
- Annually
- Not cleaned

14. Select the housekeeping methods currently used in your workplace? [select all that apply]:

- HEPA-filtered vacuuming
- Dry sweeping
- Compressed air
- Wet sweeping
- No housekeeping procedures
- Other (please describe)

15. Which **surface preparation tasks** do you perform before TSC is applied? [select all that apply]

- Roughening
- Deburring
- Chamfering
- Radiusing edges
- Preheating
- Masking (high temp tape, paint-on, metal shadow)
- Abrasive grit blasting
- Other surface repair
- Bond coating
- Wet abrasive blasting
- Dry abrasive blasting
- Stripping coating
- Other methods

16. Which **surface cleaning methods** do you apply before or after TSC is applied? [select all that apply]

- Solvent-based degreasing [**subcategories displayed if selected**]
 - Methylene ketone
 - Acetone
 - Acetic acid
 - Phosphoric acid
 - Polyphosphates
 - Orthosilicates
 - Other (please describe)
- Thermal cleaning
- Other (please describe)

17. Which **surface finishing method** do you apply after TSC is applied? [select all that apply]

- Surface finishing [**subcategories displayed if selected**]
 - Grinding
 - Vibratory finishing
 - Lapping

- Brush finishing
- Diamond belt
- Turning
- Heat treating [**subcategories displayed if selected**]
 - Vacuum heat treat
 - Heat tint
 - Furnace treat in air
 - Furnace treat in inert
- Sealing [**subcategories displayed if selected**]
 - Sealant infiltration
 - Release/non-stick
 - Paint/urethane
- Densification [**subcategories displayed if selected**]
 - Shot peening
 - Heat treatment
- Gauging and inspection [**subcategories displayed if selected**]
 - Thickness
 - Roughness
 - Fluorescent penetrant
 - Temperature
 - Hardness
 - Microstructure
 - Density
- Other (please describe)

Section 5: Industry Practices

18. What industries do you do business with (i.e. manufacture or repair parts for or sell to)? [select all that apply]

- | | |
|--|--|
| <input type="checkbox"/> Aero gas turbines | <input type="checkbox"/> Iron and steel casting |
| <input type="checkbox"/> Agriculture implements | <input type="checkbox"/> Iron and steel manufacture |
| <input type="checkbox"/> Architectural | <input type="checkbox"/> Land based gas turbines |
| <input type="checkbox"/> Automotive engines | <input type="checkbox"/> Marine manufacture and repair |
| <input type="checkbox"/> Business Equipment | <input type="checkbox"/> Metal working |
| <input type="checkbox"/> Cement and structural clays | <input type="checkbox"/> Medical |
| <input type="checkbox"/> Chemical processing | <input type="checkbox"/> Mining, construction and dredging |
| <input type="checkbox"/> Copper and brass mills | <input type="checkbox"/> Nuclear |
| <input type="checkbox"/> Computers | <input type="checkbox"/> Oil and gas exploration |
| <input type="checkbox"/> Defense and Aerospace | <input type="checkbox"/> Offshore Applications |
| <input type="checkbox"/> Diesel engines | <input type="checkbox"/> Printing equipment |
| <input type="checkbox"/> Electrical and electronics | <input type="checkbox"/> Pulp and paper |
| <input type="checkbox"/> Electrical utilities | <input type="checkbox"/> Petrochemicals |
| <input type="checkbox"/> Food processing | <input type="checkbox"/> Pumps/motors |
| <input type="checkbox"/> Forging | <input type="checkbox"/> Railroad |
| <input type="checkbox"/> Glass manufacture | <input type="checkbox"/> Rock products |
| <input type="checkbox"/> Hydro-steam turbines | <input type="checkbox"/> Rubber and plastic manufacture |
| | <input type="checkbox"/> Refineries |

- | | |
|---|------------------------------------|
| <input type="checkbox"/> Screening | <input type="checkbox"/> Utilities |
| <input type="checkbox"/> Ship and boat manufacture and repair | <input type="checkbox"/> Other |
| <input type="checkbox"/> Steel and rolling mills | <input type="checkbox"/> Other |
| <input type="checkbox"/> Textile | <input type="checkbox"/> Other |
| <input type="checkbox"/> Transportation non-engine | <input type="checkbox"/> Other |

19. Does your workplace have a written Respiratory Protection Program?

- Yes (Ask question 21)
- No (Skip to question 22)
- Don't know (Skip to question 22)

20. Are workers fit-tested for the selected respiratory protection?

- Yes (Ask question 21)
- No (Skip to question 22)
- Don't know

21. Is respirator training provided to production workers?

- Yes
- No
- Don't know

22. Are medical evaluations ever provided for workers?

- Yes (If yes, open frequency options below)
 - At hire
 - Annually
 - Other:
- No
- Don't know

23. Has air monitoring for particles (metals or dust) and/or gases ever been performed at your company?

- Yes
- No
- Don't know

Section 6: Future Participation

24. Would you be interested in helping NIOSH learn how to better protect worker health and safety by partnering with NIOSH to perform industrial hygiene sampling or medical surveillance of production workers? This would be entirely free to the company. **If you choose to participate, NIOSH will protect your identity, your coworker's identity, and the name of your company to the extent allowed by law.**

- Yes
- No
- Maybe

Thank you for your participation and for taking the time to answer these questions. If you have questions about the survey or would like to speak with someone at NIOSH, please contact: Emily Lee elee2@cdc.gov or Abbas Virji MVirji@cdc.gov.