

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. The estimated time to complete this survey is 10-30 minutes.

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

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

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* must provide value

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NIOSH Thermal Spray Coating Project Workplace Survey

Section 1: Workplace Information

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

Name of Company

Company Address

Industry Classification (Name/NAICS Code-6-digit)

About how many people work at this company (including contractors)?

About how many workers perform thermal spray coating?

About how many other workers perform tasks related to TSC, such as maintenance, pre-surface preparation, post surface cleaning, or finishing?

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Section 2: Production Volume

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

About how much time is spent daily on TSC processes?

Has your volume of TSC work increased over the last five years?

Do you apply the TSC processes in:

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

Select all that apply.

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Section 3A: Production Practices (TSC Processes)

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 (PPE)
- Housekeeping

Do you use the **electric arc** TSC process at your facility? Yes No

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For the **electric arc** TSC process, please select the types of **metals** feedstock material used.

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

Select all that apply.

Metal	Indicate amount used annually	Indicate form used (select all that apply)
Nickel	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

Metal	Indicate amount used annually	Indicate form used (select all that apply)
Chromium	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

Metal	Indicate amount used annually	Indicate form used (select all that apply)
Other (please describe) <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

For the **electric arc** TSC process, please select the types of **alloys and intermetallics** feedstock material used.

- 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)

Select all that apply.

Alloys and Intermetallics	Indicate amount used annually	Indicate form used (select all that apply)
Stainless steel	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

Alloys and Intermetallics	Indicate amount used annually	Indicate form used (select all that apply)
Other (please describe) <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

For the **electric arc** TSC process, please select the types of **ceramics** feedstock material used.

- Al2O3
- ZrO2
- TiO2
- CrO3
- MgO
- Cr3C2
- TiC
- Mo2C
- SiC
- TiN
- Si3N4
- Other (please describe)

Select all that apply.

Ceramics	Indicate amount used annually	Indicate form used (select all that apply)
Al2O3	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

Ceramics	Indicate amount used annually	Indicate form used (select all that apply)
Other (please describe) <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

For the **electric arc** TSC process, please select the types of **cermet (ceramics/metals)** feedstock materials used.

- WC/Co
- Cr3C2/NiCr
- TiC/NiCr
- Other (please describe)

Select all that apply.

Cermet	Indicate amount used annually	Indicate form used (select all that apply)
WC/Co	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

Cermet	Indicate amount used annually	Indicate form used (select all that apply)
Other (please describe) <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

For the **electric arc** TSC process, please select the types of **polymers composites** feedstock materials used.

- Urethanes
- Ethylene vinyl alcohols
- Nylon 11
- Polytetrafluoroethylene
- Ethylene tetrafluoroethylene
- Polyetheretherketone
- Polymethylmethacrylate
- Polyimid
- Polycarbonate
- Polyvinylidene fluoride
- Other (please describe)

Select all that apply.

Polymers Composites	Indicate amount used annually	Indicate form used (select all that apply)
Urethanes	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

Polymers Composites	Indicate amount used annually	Indicate form used (select all that apply)
Other (please describe) <input type="text"/>	<input type="text"/>	<input type="checkbox"/> Powder <input type="checkbox"/> Wire/rod <input type="checkbox"/> Liquid suspension/liquid precursor

For the **electric arc** TSC process, please select the types of **fuel and propellants** used.

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

Select all that apply.

If other fuel and propellants are used, please specify.

For the **electric arc** TSC process, please select the types of **substrate materials** used.

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

Select all that apply.

If other substrate materials are used, please specify.

For the **electric arc** TSC process, is this TSC process conducted in a temporary containment (e.g., containment using tarps), an enclosed structure (e.g., booths or glovebox), or in a non-enclosed restricted area?

- Glove box
- Field portable glove box
- Fully enclosed booth
- Partially enclosed booth
- Temporary containment
- No booths
- Restricted area non-enclosed
- Other

Select all that apply.

If other types of containment are used, please specify.

For the **electric arc** TSC process, please select the types of **exhaust ventilation** used for this process.

- Mechanical exhaust ventilation
- Portable exhaust ventilation
- No mechanical exhaust ventilation

Select all that apply.

For the **electric arc** TSC process, please select the type(s) of **mechanical exhaust ventilation** used.

- HEPA filter
- Dry filter
- Wet scrubber
- Water curtain
- Other

Select all that apply.

If other types are used, please specify.

For the **electric arc** TSC process, please select the type(s) of **portable exhaust ventilation** used.

- HEPA filter
- Other

Select all that apply.

If other types are used, please specify.

For the **electric arc** TSC process used, please select the **Personal Protective Equipment (PPE)** available at your workplace.

- NIOSH-approved N95 respirator
- Half-face respirator
- Full-face respirator
- Powered air-purifying respirator (PAPR)
- Other PPE
- Other

Select all that apply.

Please describe other PPE available.

For the half-face respirator, please select type(s) of filter(s) used.

- Particulate filter
- Organic vapor cartridge
- Combination
- Unsure

Select all that apply.

For the full-face respirator, please select type(s) of filter(s) used.

- Particulate filter
- Organic vapor cartridge
- Combination
- Unsure

Select all that apply.

Please select other PPE used.

- Gloves
- Protective glasses or goggles
- Coveralls

Select all that apply.

For the **electric arc** TSC process, please select the enclosures and TSC equipment that are **cleaned** in your workplace.

- Glove box
- Booth
- Temporary containment
- Other

Select all that apply.

Please describe other type of enclosure or equipment cleaned.

Glove box: please indicate how often this enclosure or equipment is cleaned.

Booth: please indicate how often this enclosure or equipment is cleaned.

Temporary containment: please indicate how often this enclosure or equipment is cleaned.

Other: please indicate how often this enclosure or equipment is cleaned.

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[After completing the group of questions above related to the electric arc TSC process, REDCap will move to the next question, asking if respondents use different type(s) of TSC processes]

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Do you use the **flame** TSC process at your facility? Yes
 No reset

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use the **high velocity oxyfuel** TSC process at your facility? Yes
 No reset

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use the **conventional plasma** TSC process at your facility? Yes
 No reset

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use the **high energy plasma** TSC process at your facility?

Yes

No

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use the **vacuum plasma** TSC process at your facility?

Yes

No

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use the **radio frequency plasma** TSC process at your facility?

Yes

No

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use the **detonation gun** TSC process at your facility?

Yes

No

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use the **cold** TSC process at your facility?

Yes

No

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question as follows]

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Do you use any **other** TSC process at your facility?

Yes

No

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[If the answer is Yes, REDCap will trigger questions 13b – 13w above. If the answer is No, REDCap will move to the next question]

Section 3B: Production Practices (Others)

Select the **housekeeping methods** currently used in your workplace.

- HEPA-filtered vacuuming
- Dry sweeping
- Compressed air
- Wet sweeping
- No housekeeping procedures
- Other

Select all that apply.

Please indicate any other housekeeping procedures used.

Which **surface preparation tasks** do you perform **before** TSC is applied?

- 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

Select all that apply.

Please indicate any other surface preparation tasks you perform.

Which **surface cleaning methods** do you apply **before** or **after** TSC is applied?

- Solvent-based degreasing
- Thermal cleaning
- Other

Select all that apply.

Please indicate any other surface cleaning method applied.

For solvent-based degreasing, please select type(s).

- Methylene ketone
- Acetone
- Acetic acid
- Phosphoric acid
- Polyphosphates
- Orthosilicates
- Other

Select all that apply.

Which **surface finishing methods** do you apply **after** TSC is applied?

- Surface finishing
- Heat treating
- Sealing
- Densification
- Gauging and inspection
- Other

Select all that apply.

For surface finishing method, please select type(s).

- Grinding
- Vibratory finishing
- Lapping
- Brush finishing
- Diamond belt
- Turning

Select all that apply.

For heat treating method, please select type(s).

- Vacuum heat treat
- Heat tint
- Furnace treat in air
- Furnace treat in inert

Select all that apply.

For sealing method, please select type(s).

- Sealant infiltration
- Release/non-stick
- Paint/urethane

Select all that apply.

For densification method, please select type(s).

- Shot peening
- Heat treatment

Select all that apply.

For gauging and inspection method, please select type(s).

- Thickness
- Roughness
- Fluorescent penetrant
- Temperature
- Hardness
- Microstructure
- Density

Select all that apply.

Please describe other surface finishing method.

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Section 4: Industry Practices

What industries do you do business with (i.e., manufacture or repair parts for or sell to)?

- Aero gas turbines
- Agriculture implements
- Architectural
- Automotive engines
- Business equipment
- Cement and structural clays
- Chemical processing
- Copper and brass mills
- Computers
- Defense and aerospace
- Diesel engines
- Electrical and electronics
- Electrical utilities
- Food processing
- Forging
- Glass manufacture
- Hydro-steam turbines
- Iron and steel casting
- Iron and steel manufacture
- Land-based gas turbines
- Marine manufacture and repair
- Metal working
- Medical
- Mining, construction, and dredging
- Nuclear
- Oil and gas exploration
- Offshore applications
- Printing equipment
- Pulp and paper
- Petrochemicals
- Pumps/motors
- Railroad
- Rock products
- Rubber and plastic manufacture
- Refineries
- Screening
- Ship and boat manufacture and repair
- Steel and rolling mills
- Textile
- Transportation non-engine
- Utilities
- Other

Select all that apply.

Please indicate other type of industry you do business with.

Does your workplace have a written Respiratory Protection Program?

- Yes
 No
 Don't know

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Are workers fit-tested for the selected Respiratory Protection Program?

- Yes
 No
 Don't know

[reset](#)

Is respirator training provided to production workers?

- Yes
 No
 Don't know

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

- Yes
 No
 Don't know

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Section 5: Future Participation

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.

- Yes
 No
 Maybe

reset

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.

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.**

First Name

Last Name

Work Phone Number

Work Email Address

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.

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