

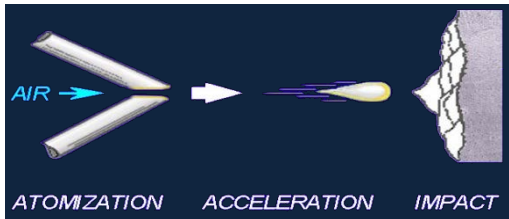
Wire Arc Spray vs. Wire Flame Spray

Which process should be used?

Both wire arc spray and wire flame spray processes are widely used for a variety of applications in the thermal spray coating industry. Typical applications include dimensional restoration, wear resistance, corrosion resistance, electrical conductivity, and many others.

Wire Arc Spray

With the twin wire arc spray process, two isolated wires are fed into a spray gun and brought to an intersection point where voltage is applied across the wires, establishing an arc. The resulting heat from this arc melts the tips of the wire. An atomizing gas,



normally air, is directed across the arc zone forcing the particles to accelerate towards the substrate. This method is commonly used for metallic, heavy coatings.

Technical Advantages:

- Low heat input into the coating and substrate results in less stress
- High bond strengths (2-3 times greater than wire flame spray)
- Ability to spray thicker coatings
- Ideal for spraying onto non-metallic substrates such as plastic, ceramic, or glass
- Denser coatings
- Complete particle melting guaranteed

Economic Advantages:

- Much higher spray rates (typically 2-3 times greater than flame spray)



- Lower operating cost (1/2 that of flame spray)

Operational Advantages:

- Wide range of operating parameters
- Reproducibility
- Instant on-off is ideal for automation
- No gases needed – only air and electricity are used

Wire Flame Spray



Wire flame spray, on the other hand, uses a single wire that is fed into a jet flame. The temperature is close to 10,000 K, melting the wire. The air stream from the jet atomizes the molten particles, propelling them onto the substrate. The technological parameters, such as feedstock, flame spray gas composition and flow rate, and energy input, play a large role in the relationship between the particles and the substrate.

Technical Advantages:

- Less oxide in most coatings
- Coatings can be easier to machine due to reduced oxide

Economic Advantages:

- Higher deposit efficiency with low melting point materials such as aluminum and zinc
- Lower initial equipment cost

Operational Advantages:

- Non-conductive wires can be sprayed
- Less fine dust created when spraying makes overspray less flammable or explosive
- More portable for on-site spraying

Conclusion

Although both processes have their strengths, wire arc spray has been rapidly replacing wire flame spray in most applications, due to several technical, operational, and economical advantages.

In summary, the wire arc spray process proves to be more advantageous. This process demonstrates greater bond strength, ability to spray thicker coatings, improved coating quality and higher spray rates. These advantages have led to wire arc spray to be the principal choice for most metallic spray materials and applications.