Optimal Coating Geometries

Objective:

This is a guide for what geometries are typically coated and what sort of challenges may be faced on the production end for various common design choices. The more difficult the geometry to coat the more effort, tooling and part specific process may be needed to provide an acceptable coating coverage and thickness.

This is also intended to provide some basic trouble shooting for common issues.

Simple Geometries to Coat.

Geometries that are easy and simple to coat fall into one or more categories:

1. Short travel distances for the powder through move through in confined spaces.
    a. Short stacks with low tooth count for motor stators
    b. Generally large flat parts
2. Coating that has no internal features to cover.
    a. Example: OD of rods and cylinders
3. Armatures with medium to large slot openings
    a. .050” wide or more for .750” of slot depth or less

Difficult Geometries & Mitigation Options.

1. Motor stator stacks with high aspect ratios. (Stack length to pin dia that fits in a slot, typically around 10x)
    a. Adjusting air volume and lower voltage
    b. Coat part from both ends if possible (Generally can be done with motor stators)
2. Sharp inside corners (generally results in poor coverage)
    a. Adding a radius of .020-.050” removes this issue
    b. Increasing coating thickness
    c. Coating and backing in multiple thinner layers
3. Very small parts.
    a. Reducing the voltage and air flow to control more precisely the amount of powder.
4. Complex geometries
    a. Coat in multiple thinner layers to build up to the required thickness
5. Large heavy parts are generally more of a logistical issue of moving the part for proper coverage and curing.
    a. Part specific tooling will likely be needed.

Common Issues & Common Solutions:

1. Powder bridging over small gaps
    a. Powder being contaminated with small threads or lint. Common from rags that may be used to help clean the powder off of parts and/or tooling
        i. Replace powder and remove offending material that is contaminating the part.
    b. Small gap that has the powder build over
        i. Gap should be clean of the powder before curing. (Dental picks work well)
2. Part has a dull / rough surface
    a. Moisture has been absorbed by the powder. (Most common)
        i. Replace powder and review proper storage from the powder manufacture.
3. Powder is chipping off/ poor adhesion
    a. Surface contamination
        i. Review cleaning and drying procedures for part. Oil from hand, lotions, creams, cutting fluids from previous process.
    b. Moisture in powder
        i. See 2a in common issues & common solutions
4. Powder in un-wanted locations
    a. Proper masking (Ideal)
        i. Tooling should be designed to mask off areas that powder is not desired using a slip fit of .005” or less to start with. Adjust fit to meet masking requirements and processing requirements
    b. Clean up
        i. Using light brushes or the pad of a finger work well for simple clean up were some light spots of powder on the surface are not cause for part defect rejection. (Not recommended for gears and other meshing/ running surfaces.)
5. Bubbles in coating
    a. Out gassing
        i. Liquid trapped in part prior to coating.
            1. Pre bake and cool part to drive the liquid out
            2. Use acetone or other low vapor point cleaner to clean part, as appropriate for your part material.
        ii. Coating a part that has adhesive on it that out gasses under the curing cycle of the powder
            1. Switch adhesive?
            2. Coat in multiple layers.
    b. Sharp corners
        i. See 2 in Difficult Geometries & Mitigation Options.