Additive build platform and gantry accuracy

additive-build-platform

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Application template; not a claim of a completed customer project.

Scope

Substrate flatness, powder-bed plane and gantry motion directly affect layer thickness uniformity.

Equipment and configuration guidance

• Autocollimator and bridge

• Substrate flatness kit

• Temperature and atmosphere log

Principle and calculation

Layer margin ≈ substrate flatness + gantry straightness + drift + recoater error; state whether RSS or worst case.

On-site checklist

• Measured after preheat

• Substrate and mounting face

• Before/after thermal cycle

• Combination method stated

Limitations

Substrates warp during thermal cycles; cold measurement is not the build state.

Detailed teaching example

Worked build-plate and layer allowance example

Scenario and task

Teaching example: nominal layer 50 µm against plate flatness 30 µm, gantry straightness 15 µm and thermal drift 10 µm combined in quadrature.

Preparation and measurement steps

01. Confirm substrate size, preheat state and recoater travel.

02. Measure substrate flatness and mounting-face parallelism after stabilisation.

03. Check gantry straightness and synchronisation for powder uniformity.

04. Record change across thermal cycles and decide on compensation.

Teaching example readings

• Combined requirement 35 µm, i.e. 70% of the nominal layer.

• Remaining allowance 15 µm for recoating and melt-pool variation.

• Worst-case addition would demand 55 µm and exceed the layer.

Calculation procedure

RSS = $\sqrt{(30^2 + 15^2 + 10^2)}$ = 35 µm; worst case is 55 µm. Agree the combination rule in advance.

Example result and interpretation

Quadrature leaves margin, worst case does not: slow down or adjust layer thickness at the first layer and at the edges.

Example verification checklist

• Measure the plate after clamping; clamping changes the form.

• Drift grows with time; size the allowance for the longest build.

• Layer thickness and recoater accuracy are separate figures.

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