

PROCESS IDENTIFICATION ANSWERS

	ITEM	KEY FEATURES
1	Sand casting	Aluminum ($\rho = 2.7$) 11 lbs (cast iron, $\rho = 8.9$, would be 36 lbs!), rough surface, see surface machining to get tolerance and surface finish, intricate geometry, cores
2	Die casting	Zinc – appearance, soft easy to scratch with pen knife, smoother surface, ejector pins, relatively simple geometry, two sided tooling , under cut is machined
3	Investment casting	Turbine part high temperature (Ti ? Ni ?) Titanium ($\rho = 4.5$, Ni $\rho = 8.0$) seems like Ti intricate geometry, smooth surface
4	Injection molding	Shape, two parts and assembly issue, parting lines, ejector pins, gate marks, molded in gasket material
5	Thermoforming	Simple shape, different surfaces on top & bottom, edge
6	Casting – probably polymerized in mold	Too thick for injection molding (also no parting lines, ejector pins, or gate marks)
7	P/M	Simple shape, ferrous, no tool marks
8	Forging	Function of part, trimmed flash, ferrous
9	Stamping/weld/plate	Surface (nickel plated), edge, simple shape
10	CNC machining	Machining marks
11	Selective laser sintering	Complex geometry, material (rougher than stereo lithography)
12	3-D printing	Material, shape, Z-corp appearance part (bearing)
13	Stereo lithography	Material, complex geometry (internal features), smooth surface
14	Wrench lug/LOM (laminated object mfg)	Looks like laminated wood
15	Compression molding/BMC	gate marks, material (thermoset), shape (matched dies)
16	Pultrusion	Material (glass – Polyester or epoxy), shape
17	Hand lay-up	Carbon fiber/epoxy resin, shape
18	Blow molding	Material (PE), shape
19	EDM (die sinking)	Hard material, intricate shape
20	Extrusion/cut	Aluminum, shape, surface, function
21	Abrasive water jet	Material, shape, edge
22	Wire EDM, grind, braze	Material, shape, edge (carbide brazed to tool steel)
23	Czochralski process (crystal pulling)	Silicon, function, wafers are now 12 in (300 mm)
24	Die cast	Aluminum, smoother surface, parting lines
25	P/M	Simple shape, ferrous, no tool marks, compound die
26	Stamping, assembly	Material, shape, many individual pieces
27	Injection molding	Shape, parting lines, ejector pins, gate marks

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29	Diaphragm forming and Autoclave curing	Carbon fiber/epoxy resin (0/90/ \pm 45), double curvature shape formed between rubber diaphragms
30	Textile processes, RTM	Carbon fiber/epoxy resin, shape (preform is woven, reinforcing Kevlar fibers are stitched in to add transverse strength)