

Lovejoy Sintered Solutions

Your Powder Metal Engineering Resource



Overview:

Low Volume | High Densities | Complex Geometries

Lovejoy Sintered Solutions brings Low Volume OEM's Powder Metal solutions to what was only dreamed of a few short years ago. Our technology is so unique and innovative, it has won Time Magazine's 2000 Invention Of The Year!

Up to 20 sq. inch Surface Area

Lovejoy has the world's most innovative and advanced compaction technology (500 and 1000T), which is the centerpiece of our powder metal operations. This breakthrough technology features a digitally controlled and self-documenting manufacturing system that is unmatched in its ability to achieve exacting levels of precision.

Multi-Level Parts (3-8 Levels)

Individual Hydraulic cylinders are allowed to move independently of each other and therefore, are capable of producing parts with levels beyond the conventional. Three levels are easy, six are common and with our technology, eight are an everyday occurrence.

High Aspect Ratios (up to 10-1)

The ability to control each cylinder of the press allows us to generate aspect ratios not seen in the industry for parts at these densities. Lovejoy can not only press parts with aspect ratios reaching 10-1, but our presses have the ability to eject by position or by pressure. This enables the piece part to come out of the die, crack free.

Turn Several Parts Into One

Reaching 10-1 aspect ratios also enables Lovejoy engineers to re-engineer your two and three piece designs into one. Then take that gear and add a spacer, or better yet, a shaft. If you can think of it, we'll help engineer a way to make it.

7.4 g/cc Densities are here!

Extremely high densities (up to 7.4 g/cc) can be achieved in a single pressing with a variety of powder metal materials to produce parts that are precise and have unparalleled metallurgical properties for high strength and superior performance.

More Lovejoy Advantages

We are at the forefront in applying computer aided automation and technology throughout our operations. Our expertise in this area, coupled with our design capability and advanced process knowledge, enables Lovejoy Sintered Solutions to provide extremely short lead times in both the design and production stages. Give us a call or email a request for quote and become one of Lovejoy's worldwide customers.

Capabilities

- Ferrous based materials, including Soft Magnetics
- Presses from 65T to 1000T
- Minimum Part Thickness (.125" or 3.175mm)
- Maximum Part Thickness (5.5" or 139.7mm)
- Maximum Area to Press (20 Sq. Inches or 12903mm²)
- Complete Press to Sinter Automation
- Fluidization of powder resulting in consistent densities part-2-part, lot-2-lot
- Ejection by pressure allows for more precise geometries and tighter tolerances
- In-house tool and gauge design capabilities
- AutoCAD/CADRA and PRO-E
- In-house CNC turning, boring, broaching, tapping and drilling
- ISO 9001:2000 Certified since 1999



Lovejoy Sintered Solutions (LSS)

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Case Studies:

High Aspect Ratios | One-Piece Designs | High Densities

Pump Rotor



Weight: 1.225kb
(2.7lb)
Alloy: Proprietary
Steel - F005
Tensile Strength:
275.79MPa
(40,000 psi)
Elongation: 2%

Apparent Hardness: 55 HRB

Density: 7.1 g/cc (.256 lb./in.³)

Fatigue Endurance Limit: 103.4 MPa
(15,000 psi)

Secondary Operations: Turn OD/ID, Hub
and bore

Alternative Process: Machined Casting

Estimated Annual Production: 4,000

Application: These High Aspect Ratio (5-1) rotors are used in pumps that take petroleum fuels from an in-ground tank up to the gasoline pump used to fill your automobile. These pumps have three ranges: Low viscosity - High efficiency, General Purpose and High demanding applications.

The hydraulic pump rotor is used in conjunction with an idler gear and side pump cover that are also being converted from a machined casting to powder metal. As the rotor and idler unmesh, an underpressure is created and the liquid enters the newly created cavities. Liquid is then transported in sealed pockets to the discharge side.

The walls of the pump casing and the crescent creates a seal, that separates the suction from the discharge side. The rotor and idler mesh and liquid is pushed into the discharge line.

The pumps see a max capacity of 250m³/h, differential pressure of 20 bar and temperatures up to 300 degrees Celsius.

Vane Stator



Weight: .17-3.04kg
(.37-6.7lbs.)
Alloy: Proprietary
Steel - FN-0205
Tensile Strength:
413.69 MPa
(60,000 psi)
Elongation: 4%

Apparent Hardness: 76HRB

Density: 7.1 g/cc (.256 lb./in.³)

Fatigue Endurance Limit: 151.68MPa (22,000 psi)

Secondary Operations: Broach, Steam Threat,
Grind

Alternative Process: Machined Casting

Estimated Annual Production: 2,500 - 16,000

Application: These stators are used in small frame motors built into commercial lawn mowers as well as various industrial applications. The 3100 engine contains three caps weighing about 2.2 kb (5 lbs) and the 3800 engine contains four caps weighing 3.6 kb (more than 8 lbs.). Bolted to the engine block, the main bearing caps guide and retain the engine crankshaft which must be held securely in place but turn freely. The crankshaft withstands the full combustion and inertia loads of the engine.

The previous material, gray cast iron, was cast into a sand mold to produce a "loaf." This required broaching, drilling, spot facing, and milling before the loafs were cut into individual components. This produced a 60% yield of product.

Since the cast-iron engine block and the PM cap are machined simultaneously during the crankshaft diametral boring, the PM and cast-iron radii must match. This requires close control of the radial height and the horizontal radius to 0.254 mm (0.010 in.).

Gear/Shaft Assembly



Weight: .136-.544 kg
(.3 - 1.2lb.)
Alloy: Proprietary
Steel - Fe, Mo, Cu
C-925
Tensile Strength:
930.79 MPa
(135,000 psi)

Elongation: 1.5%

Apparent Hardness: 32 HRC

Density: 7.2 g/cc (.26 lb./in.³)

Fatigue Endurance Limit: 344.74MPa (50,000 psi)

Secondary Operations: Heat Treat and machine

Alternative Process: Gear Shaft Assembly or
machine from wrought

Estimated Annual Production: 36,000

Application: These parts were converted into a one-piece design from a spur gear and shaft. An economic savings of over 30% annually was realized on this difficult application.

This type of conversion, with aspect ratios reaching upwards to 10-1, can only be done on the latest in PM pressing technology available at Lovejoy.

Our 100% hydraulic presses enables Lovejoy to give customers the advantage of taking two and three piece designs and make them into a single component.

These components are part of an automatic transmission that gets assembled into golf carts. The annual usage is expected to increase from 36,000 to over 50,000 units annually.



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