THROTTLE PLATE

FIELD OF THE INVENTION

[0001] The invention relates generally to a throttle plate which is part of a throttle assembly, where the throttle plate includes at least one feature, or material deformation area, such as a rib or a plurality of ribs, and the throttle plate is made with reduced cost and weight, and is still able to be used with existing manufacturing and assembly processes.

BACKGROUND OF THE INVENTION

[0002] Throttle assemblies are generally known and are typically used to control the flow of air into an engine. Most throttle assemblies typically have a valve which is mounted to a shaft, where the shaft is rotated (by an actuator) to change the position of the valve and therefore control the flow of air into the engine. These types of valves must withstand exposure to certain pressures and temperatures. These valves also must past a “backfire” test, where the valve is exposed to a sudden burst of pressure from the engine. In order to pass this test, the valve must have a minimum structural robustness and rigidity. For larger valves, there is an increase in cost of manufacture because of the needed increased structural rigidity to withstand the backfire test. The required flat thickness also adds inertia loading to the actuator componentry, impacting performance and durability of the throttle assembly.

[0003] Accordingly, there exists a need for a valve for a throttle assembly, which uses a larger valve, that is able to withstand a backfire test, is also lightweight, and may be manufactured with minimal or no increased cost.

SUMMARY OF THE INVENTION

[0004] In one embodiment, the present invention is a valve, such as a valve plate, which is suitable for use with a throttle assembly, and is able to withstand a backpressure test. The valve plate of the present invention is also able to be used as a replacement for existing valve plates, without requiring any changes to the other components of the throttle assembly, or the manufacturing processes of the throttle assembly. In an embodiment, the valve is a valve plate which includes a flat plate, and a plastic material overmolded onto the valve plate. The plastic material includes at least one rib, and in one embodiment includes a plurality of ribs, allowing for a thinner and lighter weight plate which is manufactured as a lower cost.

[0005] In an embodiment, the valve of the present invention is a two-piece valve plate having an overlap portion. In this embodiment, the two pieces of the throttle valve overlap at the portion of the valve plate which interfaces with the shaft of the throttle assembly. The remaining portion of the plate surface includes at least one ribbed feature, and in one embodiment includes a plurality of ribbed features which reduce material usage and therefore reduce weight and cost, but also provide the required strength and rigidity.

[0006] Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0008] Figure 1 is a perspective view of an embodiment of valve plate, according to embodiments of the present invention;

[0009] Figure 2 is a top view of an embodiment of a valve plate, according to embodiments of the present invention;

[0010] Figure 3A is a perspective view of a first half of an embodiment of a valve plate, according to embodiments of the present invention;

[0011] Figure 3B is a perspective view of a second half of an embodiment of a valve plate, according to embodiments of the present invention;

[0012] Figure 4A is a side view of a first half of an embodiment of a valve plate, according to embodiments of the present invention;

[0013] Figure 4B is a side view of a second half of an embodiment of a valve plate, according to embodiments of the present invention;

[0014] Figure 5 is a side view of a first half and second half of valve plate during assembly, according to embodiments of the present invention;

[0015] Figure 6 is a side view of an embodiment of valve plate, according to embodiments of the present invention;

[0016] Figure 7 is a perspective view of an alternate embodiment of valve plate, according to embodiments of the present invention;

[0017] Figure 8 is a perspective view of another alternate embodiment of a valve plate next to a shaft, according to embodiments of the present invention;

[0018] Figure 9A is a first sectional side view of another alternate embodiment of valve plate, according to embodiments of the present invention; and

[0019] Figure 9B is a second sectional side view of another alternate embodiment of valve plate, according to embodiments of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] The following description of the preferred embodiment(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

[0021] A throttle plate or valve plate according to the present invention is shown in the Figures generally at 10, where the throttle plate 10 may

be used as part of a throttle assembly for controlling air flow into an engine. The throttle plate 10 includes a first half 12 and a second half 14. The first half 12 of the throttle plate 10 and the second half 14 are of generally the same shape. Each half 12,14 includes an assembly flange 16a,16b. The assembly flange 16a includes two assembly apertures 18a,18b, and the other assembly flange 16b also includes two assembly apertures 20a,20b.

[0022] The assembly flanges 16a,16b are each integrally formed with a flange portion 22a,22b, respectively, and each flange portion 22a,22b includes at least one deformation area. In this embodiment, the deformation areas are a singular rib 24a integrally formed as part of the flange portion 22a of the first half 12, and a singular rib 24b integrally formed as part of the flange portion 22b of the second half 14.

[0023] In this embodiment, the thickness 26a,26b of the assembly flanges 16a,16b is substantially the same the thickness 28a,28b of the flange portions 22a,22b in the areas of the flange portions 22a,22b which are unoccupied by the ribs 24a,24b. It may be seen in Figures 4A, 4B, 5, and 6 that the assembly flanges 16a,16b are also offset from the flange portions 22a,22b.

[0024] During assembly, the halves 12,14 are assembled such that the assembly flanges 16a,16b are in contact with one another, and the assembly apertures 18a,18b of the assembly flange 16a are in alignment with the assembly apertures 20a,20b of the assembly flange 16b. Fasteners (not shown) are inserted through the apertures 18a,18b,20a,20b to attach the plate 10 to a shaft.

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