**Hollow Shaft vs Solid Shaft**

| **Parameter** | **Weightage** | **Hollow shaft** |  | **Solid shaft** |  |
| --- | --- | --- | --- | --- | --- |
| space | **9** | **8** | **72** | **6** | **54** |
| complexity | **8** | **7** | **56** | **6** | **48** |
| weight | **8** | **8** | **64** | **6** | **48** |
| cost | **7** | **6** | **42** | **8** | **48** |
| Torsional load | **7** | **8** | **56** | **7** | **49** |
| stress | **7** | **6** | **42** | **8** | **48** |
| load-bearing | **7** | **7** | **49** | **6** | **42** |
| Power transfer capacity | **7** | **6** | **42** | **7** | **49** |
| bending | **7** | **6** | **42**  **465** | **7** | **49**  **435** |

**Hollow shaft or Solid Shaft depending upon the type of application, power Requirement, torque transmission requirement, weight, cost, Material.**

## **Advantage of hollow shafts:**

1. Lightweight comparable to the solid shaft of the same diameter.

2. Low rotational inertia.

3. Cheaper.

4. High tolerance to rotational imbalance due to low weight.

5. Also, hollow shafts are tolerant to high temperature because of low specific mass.

## **Disadvantage of hollow shafts:**

1. Less tolerant to over-torque.

2. Prone to bending especially when exposed to lateral stress.

Ex. boat propeller shaft.

3. Even though it is tolerant to mild imbalance, this however increases as rotational speed exceeds the critical limit.

## **Advantages of solid shafts:**

1. Suitable for high torque applications.

2. Very resistant to bending.

3. When perfectly rolled it has a very smooth operation even at high speeds.

4. High rigidity even at a small diameter.

## **Disadvantages of solid shafts.**

1. High cost.

2. It must be perfectly straight from the manufacture. A slight imbalance is not tolerable and very hard to deal with.

3. High rotational inertia especially on larger diameters.

4. On application where the shaft is exposed to very high temperatures, solid shaft made of mild steel bends even at rest. Special metal is used for this application thus adding cost.