Brass: The Cost-Effective Choice

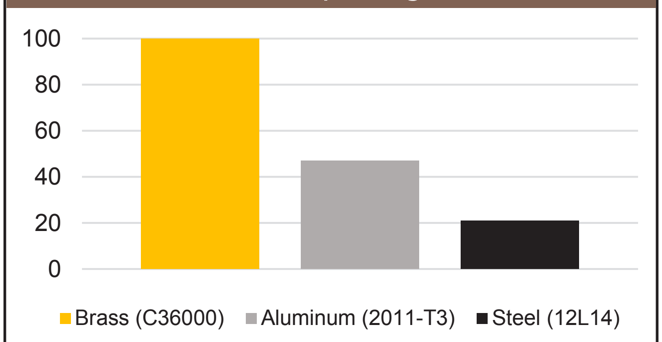
Superior Machinability

Performance and cost are critical factors when selecting materials for screw machine products. The superior machinability of brass offers higher productivity and lower per-part cost compared to other materials.

The Standard by Which Others are Judged

While all brasses are intrinsically easy to machine, the addition of small amounts of lead to brasses further improves this property and the well-known "free cutting brass" (UNS Alloy C36000) is universally accepted as setting the standard by which all other materials are judged when machinability is being assessed. Higher machining speeds and lower rates of tool wear mean that overall production costs are minimized, tolerances are held during long production runs and surface finish is excellent. For comparison, C36000 brass is about ***five times*** more machinable than leaded steel.

Universal Machinability Ratings (ASTM E618)



First Cost vs. Finished Cost

The off-the-shelf price of brass may sometimes be higher than alternative materials, but the raw material cost is only part of the overall cost picture. Brass turnings can be reclaimed for 75-85% of the original brass value (steel scrap has little value) creating an advantageous net material cost for customers while improving control over raw materials costs.

And while brass easily meets the yield strength requirements for small component parts, its superior machinability means higher productivity and lower per-part cost. When you're buying screw machine parts, you're really paying for machine time. The faster the cut, the lower the cost. What's more, brass naturally resists corrosion, eliminating the need for costly protective electroplating or coatings which can add more than 20 cents per pound of product.

The numbers say it all. In terms of finished part cost, the example below demonstrates that ***free-cutting brass is >37% less expensive than 12L14 leaded steel.***

Finished Part Cost Comparison

Production Data*

	Brass (UNS 36000)	Steel (AISI 12L14)
Part Weight	0.013 lbs	0.01196 lbs
Turnings Ratio**	63%	63%
Cycle Time	3.65 sec/part	7.66 sec/part
Efficiency Factor†	0.80	0.70
Material Cost[1]	$3.19/lb	$0.76/lb
Turnings Value[1]	$2.53/lb	$0.12/lb
Total Cost/1,000 Parts[1]	**$138.47**	**$219.68**

* Data on inserts for molded plastic obtained from Midwestern machine shop in 2014

** Percentage of raw material used to make parts

† Accounts for tool changes, restocking time, maintenance

1. Costs of both brass and steel fluctuate with market conditions, but the assumptions made here are consistent with prices that have existed in recent years. There is no intent to imply that the prices assumed here are current; however, they reasonably represent the metals' relative market prices.

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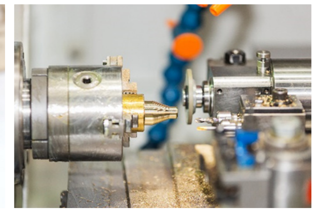

Total Weight of Raw Materials

Brass: $\frac{13\ lbs}{1{,}000\ parts}$ X $\frac{1}{(1-0.63)}$ turnings ratio $= \frac{35.14\ lbs}{1{,}000\ parts}$

Steel: $\frac{11.96\ lbs}{1{,}000\ parts}$ X $\frac{1}{(1-0.63)}$ turnings ratio $= \frac{32.32\ lbs}{1{,}000\ parts}$

Raw Material Cost

Brass: $\frac{35.14\ lbs}{1{,}000\ parts}$ X $\frac{\$3.19}{lb} = \frac{\$112.10}{1{,}000\ parts}$

Steel: $\frac{32.32\ lbs}{1{,}000\ parts}$ X $\frac{\$0.76}{lb} = \frac{\$24.56}{1{,}000\ parts}$

Net Material Cost

Brass: $\frac{\$112.10}{1{,}000\ parts} - \left(\frac{\$2.53}{lb}\right.$ turnings value X $\frac{22.14\ lbs}{1{,}000\ parts}$ $\left.\text{turnings weight}\right) = \frac{\$56.09}{1{,}000\ parts}$

Steel: $\frac{\$24.56}{1{,}000\ parts} - \left(\frac{\$0.12}{lb}\right.$ turnings value X $\frac{20.50\ lbs}{1{,}000\ parts}$ $\left.\text{turnings weight}\right) = \frac{\$22.10}{1{,}000\ parts}$

Machine Shop Labor Cost

Brass: $\frac{3{,}650\ sec}{1{,}000\ parts}$ X $\frac{1\ hr}{3{,}600\ sec}$ X $\frac{1}{0.80}$ efficiency factor X $\frac{\$65}{hr}$ labor $= \frac{\$82.38}{1{,}000\ parts}$

Steel: $\frac{7{,}660\ sec}{1{,}000\ parts}$ X $\frac{1\ hr}{3{,}600\ sec}$ X $\frac{1}{0.70}$ efficiency factor X $\frac{\$65}{hr}$ labor $= \frac{\$197.58}{1{,}000\ parts}$

Total Cost per 1,000 Parts

Brass: $\frac{\$56.09}{1{,}000\ parts}$ Net Material Cost $+ \frac{\$82.38}{1{,}000\ parts}$ Labor Cost $= \frac{\$138.47}{1{,}000\ parts}$

Steel: $\frac{\$22.10}{1{,}000\ parts}$ Net Material Cost $+ \frac{\$197.58}{1{,}000\ parts}$ Labor Cost $= \frac{\$219.68}{1{,}000\ parts}$

Fabricating this part from brass is *37% cheaper* than steel!