Technical Bulletin

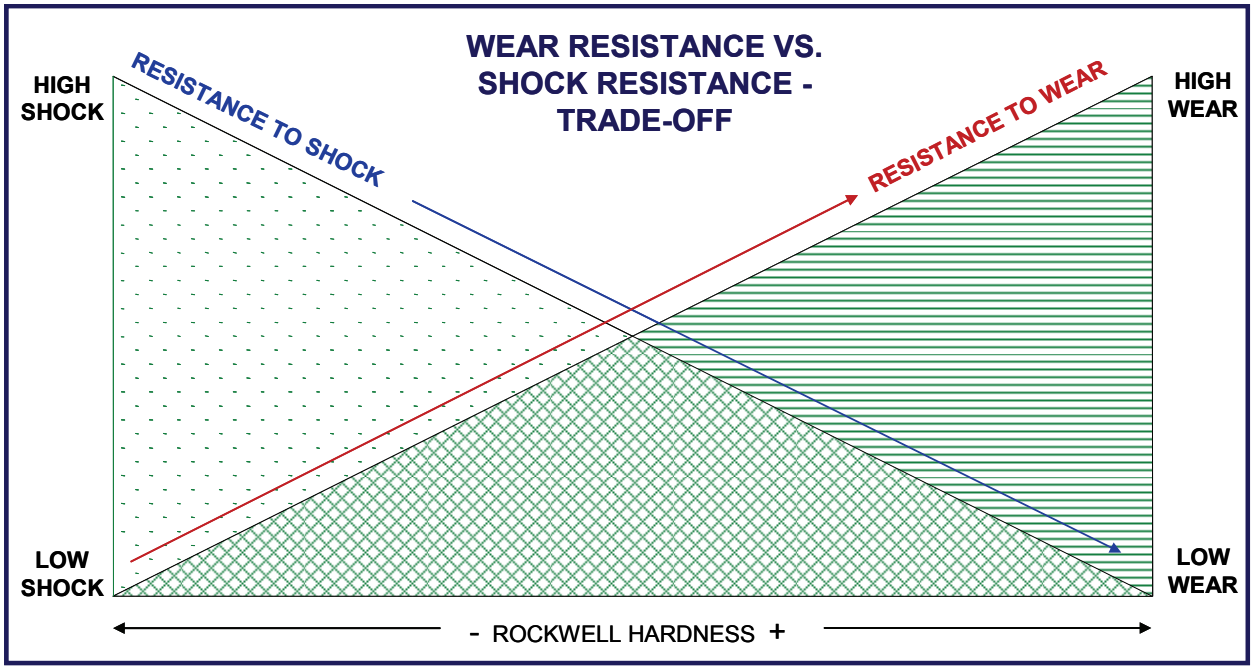
HYDE™
Industrial Blade Solutions

Key Factors To Consider When Selecting Steel For Use In Industrial Blades

When designing industrial blades for an application, it is important to know what the desired objectives are and to choose the right steel to meet those objectives. Different applications have different requirements and present different challenges, and no one steel will "do it all".

The single most important consideration when selecting what steel to use for industrial blades is "wear resistance" vs. "shock resistance". Wear resistance is directly related to the blade's life expectancy. The higher the wear resistance, the longer the blade will last. Shock resistance is the blade's ability to withstand sudden impact at the cutting edge.

There is a direct correlation between wear resistance and shock resistance – as one property increases, the other decreases. The trade-off is due to the fact that wear resistance is gained through adding hardness and brittleness, thus reducing shock resistance. Although typically we want a blade to last as long as possible, certain applications introduce "shock" to the blade, and for those, shock resistance has to be a major consideration.



Food processing is a perfect example of how this trade-off comes into play. Food processing tends to be high volume oriented, so blade life is important, to reduce change-overs and downtime. That said, we don't want blades chipping as they hit something hard in the cut, such as a bone or small stones, and possibly leaving bits of metal in the finished product. What is the proper balance between wear resistance and shock resistance?

Another factor that need to be considered is corrosion resistance. Many applications require that the blade being used be resistant to corrosion. Food processing applications are again a great example of this – we certainly don't want our food to be processed with a rusty blade!

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Steels are classified according to the elements used in production. The basic steel types, and how they stack up to the key factors, are:

Carbon Steels (e.g. 1050, 1074, 1095) – contain varying amounts of carbon, as well as other elements. Carbon increases a blade's ability to be hardened and improves resistance to wear. High carbon steels are commonly used for blades and knives.

Alloy Steels (e.g. 4130, 52100) – contain certain percentages of key alloying elements such as vanadium, molybdenum that improve performance. Depending upon the final metallurgy, specific alloy steels can offer enhanced wear resistance or shock resistance.

Tool Steels (e.g. A2, D2, M4, S7) – contain tungsten, cobalt and other alloying elements that improve performance. Tool steels are typically used in applications that require high wear resistance.

Stainless Steels (e.g. 316, 420, 440B, 17-4 PH) – contain a minimum of 12% chromium, which enhances rust resistance. Different grades of stainless promote wear resistance and shock resistance to varying levels.

Carbides – contain large amounts of tungsten held in a binder material, offering high wear resistance. Carbide blades are great where extremely long life is beneficial, but tend to be poor performers in shock applications.

If you want to evaluate your cutting application to ensure the industrial blades you're using have properly accounted for these important factors, call Hyde IBS. We've got the experience and the know-how to help you choose the right steel for virtually any application.