How To Break An Olympic Bar

By Tom Lincir, President & Founder, Ivanko Barbell Company

This article is about what can happen when an Olympic bar made of steel breaks, not necessarily what will happen, but what can happen, and how to prevent it. My work making Olympic bars over 30 years has helped me appreciate the strengths and limitations of steel, anticipate the consequences, and take measures to protect people who have full faith and trust in Ivanko equipment.

Most people think an Olympic bar can't break. At least I thought so. But 30 years experience has taught me something different. In the mid-70's, Bob Clark, the founder of Polaris Fitness Equipment, designed Ivanko's first 6 ft. Olympic bar. We made them from a mid-strength alloy, about 150,000 PSI as I remember. (PSI is the amount of force in pounds per square inch required to pull the bar apart). We chrome plated them, because that was the gold standard at the time.

Shortly after we started shipping them, a customer called and said, "Your Olympic bar snapped in two!" "How could that be?" we wondered, incredulously. "It's solid steel."

Immediately, thoughts of liability came to mind, so we took a bar and put a 45# Olympic plate on both ends, and dropped it from arms length overhead. Wow! The bar snapped in two! We couldn't believe it. After all, it was "solid steel," right?

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We tested all 200 bars in our remaining inventory. Ninety percent of them snapped! I suppose we could have written a lifetime guarantee with fine print that says, "Not valid if dropped", but instead, we scrapped all 200 bars. Before we did, we sent a few to the lab, and I asked some of my friends in the aerospace industry to help us find out why this was happening. Everyone came back with the same answer, "hydrogen embrittlement." Evidently, it happens sometimes when you chrome plate things.

Consequently, we made the decision to discontinue chrome plating Olympic bars for commercial use. In view of this learning experience, to do otherwise would be negligent.

A typical bar failure (snap). Note jagged edge. This is usually the way they break.

Years after our "Hydrogen Embrittlement" experience, the world renown strength historian David P. Webster O.B.E. (Order of British Empire) related this horrific story to me. I am trying to get more information, but the details of a tragic accident like the one I'm about to describe, more often than not, have a way of disappearing, due to pay-offs and confidentiality agreements.

Here's the story. In the late 60's in Russia, a Russian Olympic lifter was attempting a "personal best" in the clean and jerk. For those of you who aren't familiar with this lift, it requires lightning speed and technique. When a clean is done correctly it involves the coordination and explosive contraction of almost all major muscle groups. During the clean, the bar is held close to the body. In this case the Russian lifter pulled the bar about chest level when it suddenly snapped in the center. It was a jagged break. Because of the speed and mass involved, the lifter could not stop the momentum of the sharp jagged end of the bar. It drove through his Adam,s apple, severing several major arteries along the way before it finally impaled his upper sinus cavity. Because of the profuse bleeding, he died almost immediately, probably never knowing exactly what happened to him. Obviously, this is not your typical everyday experience. But things like this have happened and they could happen again.

What causes a bar made of steel to snap? If not hydrogen embrittlement, the culprit is usually an inclusion, flaw, or hairline crack. The bar will snap at one of these points of weakness. You can see most of these flaws when you examine the breaks with a magnifying glass. A center snap is rare. Usually the end of a bar will snap off (see photo). I have a collection of Olympic bars with the ends snapped off.

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Because of incidents like that described above, and others, we made the decision years ago to ultrasonic test and magnetic particle test every commercial bar to detect those with internal or external flaws, and scrap them. On average, we throw away one out of sixteen bars (6%). To our knowledge no other Olympic bar manufacturer does this. It costs money. But, once again, with the experience and knowledge we have, not to do so would be negligent. When you do the right thing, to make a safer, more perfect Olympic bar, it's often more personally rewarding than profitable.

A bar showing a typical "suicide groove". This cosmetic feature will weaken the bar at this point, and is often the precursor of bar failure.

Another cause of bar failure is what knowledgeable people in strength training call "suicide grooves". These are grooves cut into the bar for cosmetic reasons that can have dangerous

Ivanko's Stainless Steel Olympic Bar. 218,000 PSI tensile strength, ultrasonic tested for internal cracks, magnetic particle tested for external cracks, and never peels, chips, or rusts.

consequences. They are perhaps the most stupid and dangerous practice among Olympic bar manufacturers. This method involves completely knurling the bar, then coming back afterwards and making hand spacing marks by cutting off the knurling and cutting grooves into the bar! They probably think it looks nice, but the grooves reduce the diameter at that point, and consequently the strength of the bar. Over the years I've seen dozens of bars snap off at these weak points.

The greatest Olympic bar manufacturers like Schnell Barbell (Germany) and Eleiko Barbell (Sweden) didn't just fall off the turnip truck. They have evolved over the last 40 plus years. What they do is to constantly improve and perfect their Olympic bars. I feel even with Ivanko's 30 plus years, we are still on a learning curve. The people with 40 years under their belts are undoubtedly ahead of us on that learning curve. The people with less experience are behind. Each and every year we learn some new bar manufacturing techniques. Perfection is an elusive goal, not something you learn overnight.

I have received a number of telephone calls from customers and competitors telling me I'm giving out too much proprietary technical information in these articles. That may be, but when it comes to the risk of injuries or worse, I feel duty bound to pass this information on. Younger companies and equipment buyers may not have been aware of these safety issues and the preventive technical and manufacturing practices to address them. I have always believed that what buyers demand, suppliers will deliver. If buyers have high standards, they'll get safer, more indestructible products. If buyers accept lower standards, that's exactly what they'll get. Of course, some may go on with business as usual, because it takes time and money to do the right thing.

Strength coaches, individual buyers, health clubs, etc., often ask, "How much should I spend for a good Olympic bar, one that will not bend?" What they should be asking is, "How much should I spend for a bar that will not break?"

Future Article Topics

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Ivanko Barbell Company was founded by Tom Lincir in 1967, and it is the leading provider of professional and commercial grade barbell and dumbbell products worldwide. Your comments or questions are welcome. Write Tom Lincir at Ivanko Barbell Company, P.O. Box 1470, San Pedro, CA U.S.A. 90733.