

**Cougar** has all the advantages with few or none of the limitations of other tool steels. If impact or shock is not a significant concern, it is well worth considering **Cougar** for the best combination of wear resistance, safety and accuracy in thermal treatment. **Consider Cougar as an upgrade for D-2 tool steel.**

### WHY COUGAR?

You specify a tool steel for either wear resistance, safety in hardening, dimensional stability in hardening, tough-ness (resistance to shock), or resistance to dramatic temperature change.

In most applications, other than where impact and shock contribute to die failure, **Cougar** will rapidly become your Tool Steel of choice. Specify **Cougar** for extremely long run dies and die configurations where dimensional accuracy is demanded.

Water hardening tool steels are not recommended for thin sections or sharp corners. They are subject to more distortion than most other tool steel grades.

**Cougar's** dimensional stability makes it an excellent replacement for water hardening tool steel.

*"You will not find a tool steel that will maintain shape in heat treatment better than Cougar."*

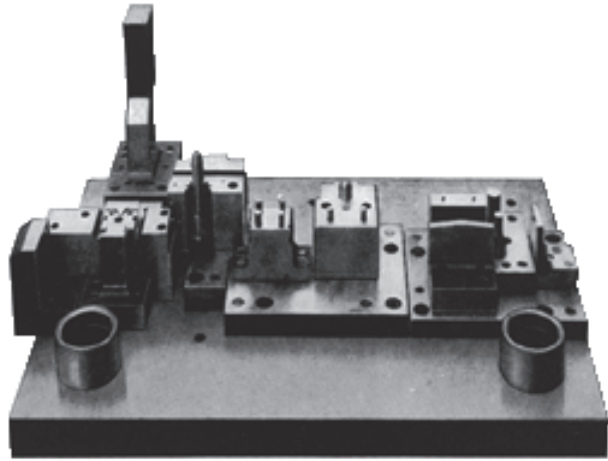
Oil hardening tool steels are modifications of the water hardening grades with improvements to minimize distortion and remove some of the guess work out of hardening. **Cougar** provides deeper and safer (higher) hardening than oil hardening grades.

A-2 is a "general grade" Air Hardening Tool Steel.

**Cougar** consistently outperforms A-2 .

Consider **Cougar** when you need a predictable high quality tool steel that will give you consistently higher hardness and less-distortion, in non-shock applications.

*"There is no advantage to a lower priced, general tool room grade of tool steel, if the finished part shrinks, warps, cracks, and does not make it into service!"*



### Available Sizes and Shapes\*

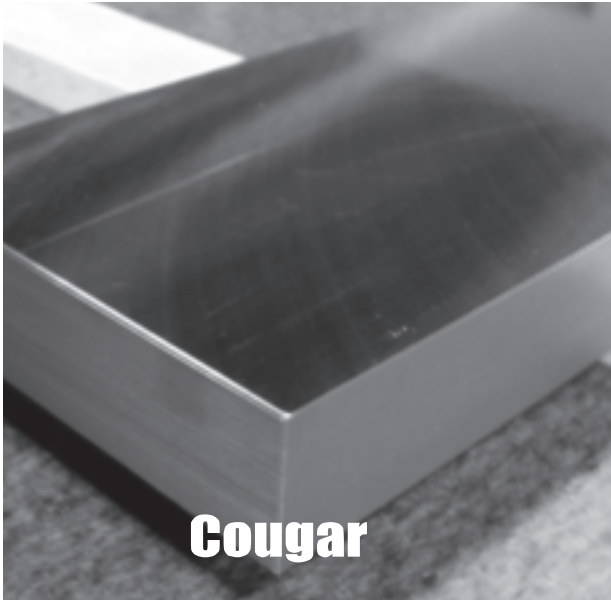
Rounds - 1/2" up to 12"
Squares - 1/2" up to 6"
Flats - 1/4" to 6" thick and 3/4" to 12" wide

\*All stock is offered in the de-carb free and oversized condition for final clean-up.

### Typical Applications

Blanking Dies	Piercing Dies
Bending Dies	Thread Rolling Dies
Forming Dies	Stamping Dies
Header Dies	Cold Extrusion Dies
Progressive Dies	Coining Dies
Tube Dies	Cold Drawing Dies
Shears	Punches (low impact)
Forming Rolls	Cutter Knives
Slitter Knives	Ring Gages
Scraper Blades	Cams

**Past Protected Trade Name Of North American Steel Company – Dexite™ Krome Wear**



## Advantages

Dimensional Stability

Safety In Hardening Compared To Other Tool Steel

Ultimate Hard-Carbide Wear Resistance

Best Choice For Long-Run Die Applications

Excellent Compressive Strength

Readily Machinable, Compared To Other Highly Alloyed Tool Steels

Galling Resistance At High Hardness

Will Accept Gas-Nitriding For Additional Hardness

Delivered SPHEROIDIZED ANNEALED For Ease Of Machining

## Surface Condition\* Pre-Machined (As Supplied)

Ground Top and Bottom (+.015"/+.035" oversize)
Sides Saw Cut (+.125" oversize)
Length Saw Cut (+.250" oversize)

Available in Precision Finish, Flat Ground Stock

## Heat Treatment (The Benchmark of Cougar)

To minimize de-carb utilize; Neutral packing material – neutral salt bath or, Atmosphere Furnace

**Annealing** – 1600°F /1650°F, furnace cool (229 BHN average) Hold at temp 1.5/hrs per inch of greatest cross section. Cool slowly in furnace (20 degrees/hr) to 900°F. Note: If the part will require heavy machining, it is a good idea to first rough machine the annealed part with allowance. Then perform a sub-critical anneal at 1200°F to 1250°F (to relieve machining stresses) – slow cool and finish machine.

**Hardening** – at 1850°F. Hold at 1850°F 1.5/hr per inch of greatest cross section. Cool in still air to 150°F. Temper at once. **CAUTION:** If over heated to 1900°F or higher, all High Carbon, High Chrome steels will shrink and lose hardness.

**Preheating** – 1200°F/1250°F is not required if you have performed the sub-critical anneal mentioned above.

**Tempering** – 400°F for highest abrasion resistance  
– 700°F for good abrasion resistance with greater resistance to shock  
– **450°F for best combination of hardness to toughness.**

Minimum suggested tempering time is 2 hours per inch of greatest cross section. Temper immediately after hardening and increase tempering temperature slowly until desired temperature is achieved. **Do not normalize.** Slight contraction in size when tempered below 900°F, and if overheated to above 1900°F. Another temper at 950°F/1000°F may restore the size. If not hardening in a vacuum furnace, **prevent de-carb by packing in inert material.**

**Machining** – Machinability rate of approx. 30 to 40% of a 1% carbon WH tool steel. Using H.S. tools utilize an approx. turning speed of 40 to 50 sfpm.

**Grinding** – Due to Cougar s excellent abrasion resistance, start with minimum stock removal. Limit grinding operation to a “finishing” process. Utilize soft wheel with large grain. Flood with coolant.