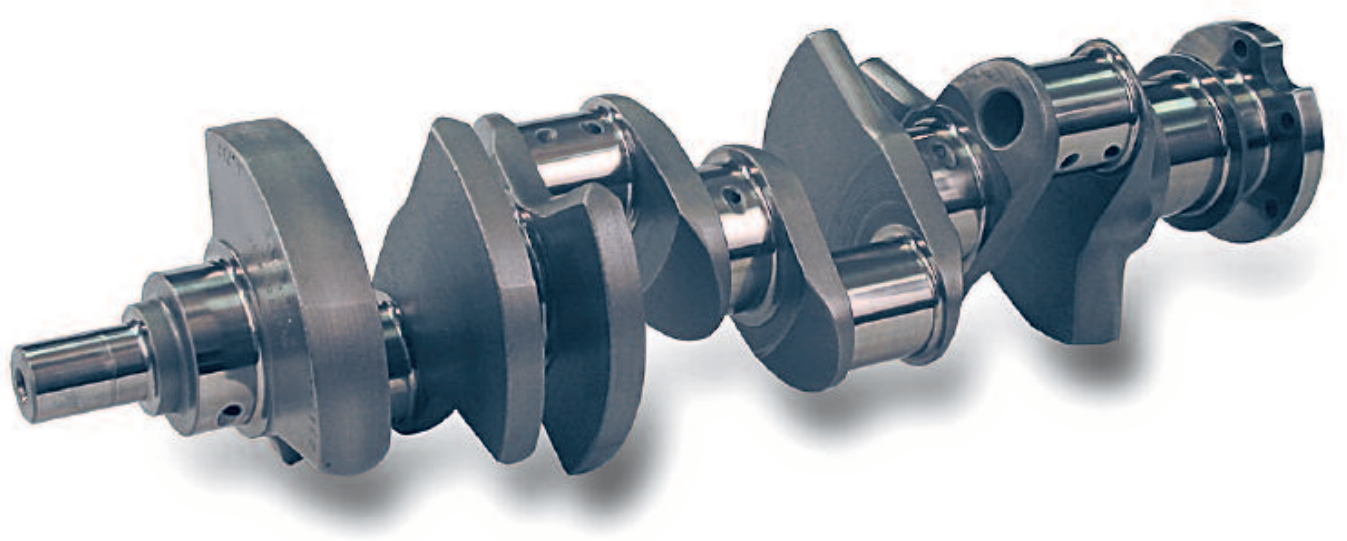
# REAL PERFORMANCE CRANKS ARE NITRIDED

***Some in our industry induction harden their crankshafts or as it is sometimes referred to, "tough" harden the cranks.***



***You can expect to hear the following claims when reference is made to this method:***

- The cranks are stronger.
- The cranks have less bearing journal wear.
- You can regrind a damaged crankshaft without having to re-heat treat.

***So . . . Just what is induction hardening?***

- Induction hardening goes back to ancient times when the sword makers heated up the sword cherry red and threw it into a bucket of water to quench it hard. How many sword fights have you seen in the movies where the sword, with one blow, breaks in two.

***IMAGINE THAT IS YOUR CRANKSHAFT INSTEAD OF A SWORD!!!!*** Fast forward. Some manufacturers use an open flame "torch" to heat the journal cherry red this only heats the journal 3/4 of the circumference. Others use an electric induction coil that heats the complete journal diameter. Some only harden the throws . . . others harden the throws and the mains.

***"They all have the following in common"***

Every journal that has been heated cherry red has been heated above the critical temperature used to bring the core metal of the crank to it's maximum strength. Since this induction heating is done on all the journals and since the temperature is not controlled, and since the crank has thick and thin sections when it is dumped in the water or gycol, the crank now has major stress areas throughout, a result of uneven cooling.

***Result . . .***

- Uncontrolled flexing.
- Main cap walk.
- Uneven wear pattern on main bearings.
- Premature cracking and breakage.
- The use of expensive alloy steels is a waste of money and meaningless. Induction hardening by the heating process took all the strength and good properties of the chromoly away that you thought you were purchasing.
- For sure you do not see any NASCAR team using induction hardened cranks.

***So . . . Why do crank makers use induction hardening when they know they are not giving their customers the performance crank they are paying for?***

***The answer is simple . . . the process is cheap.***

It requires very low energy cost. It is done in a matter of minutes. It requires unskilled labor, very inexpensive low tech equipment, no expensive gases. And more important to the racer, it can be done to any metal without fear of scrapping the crank. But, how do you know you are getting the chromoly you paid for?

### *So . . . What the heck is NITRIDING?*

The nitriding process, unlike induction hardening, is done in an oven. The cranks are suspended in a closed chamber which is lowered into the furnace for heating. At a determined temperature, amonia and nitrogen gas is introduced into the chamber and circulated all around the cranks and chamber. This heated gas reacts with the carbon on the surface of the crank at a depth of approximately .010, making the surface hard.

### *Nitriding is done at a temperature that is less than the critical temperature which, unlike induction hardening retains maximum strength of the core of the crank.*

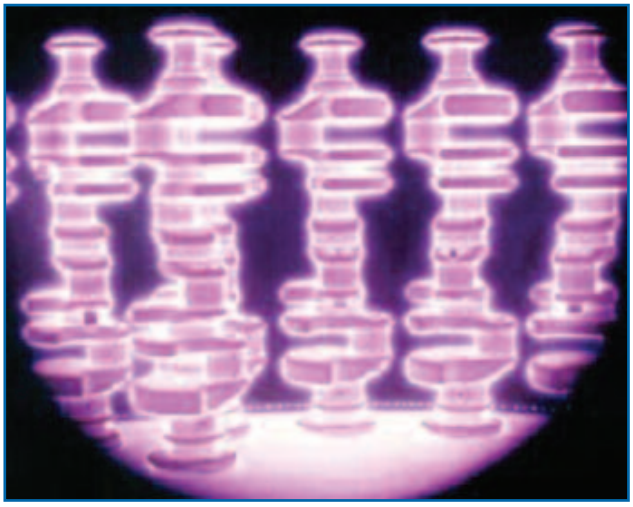
Nitriding treats the crank evenly from top to bottom and side to side. It sets up a surface tension that stiffens the crank and increases the fatigue life by 18% to 20%. Induction hardening sets up stress risers that lowers the fatigue life.

The process is expensive. The equipment is very high tech and is computer controlled. It has high energy and labor cost. Typical cycle time is 24 or more hours in the furnace. It uses expensive ammonia and nitrogen gas. The process is designed for each specific alloy steel. If the steel is not to spec, the crank will come out of the oven bent, broken or swollen. In reality, the nitride process is SCAT's 100% check of the steel to make sure that each crank a customer receives is exactly what we say it is.

### *Are there any down sides to nitriding? And the answer is yes, there are two.*

***1)*** If you have a failure and the crank requires regrinding to restore surface hardness, you must re-nitride the crank. But then the crank is new again. Some say you should have more confidence in yourself than planning to re-build before you have even run the engine for the first time.

***2)*** Cost . . . You know the saying . . . You get what you pay for. There is no question a nitrided process is more costly. SCAT is committed to excellence and therefore will not compensate the quality of our crankshafts by using an inferior heat treating process to save money. By using Hi-tech equipment and processing we are able to furnish our customers the finest performance cranks at an affordable cost.



***Ion Nitriding Shown - What you can see here is that the ENTIRE crank is getting treated evenly throughout.***