



## CEMA CONVEYOR CHAIN SECTION

### CONVEYOR CHAIN FACT SHEET 2007-01

#### THE CRITICAL PIN – REDUCING FATIGUE FAILURES

Fatigue is one of the most common causes of premature pin failures. Although all parts of a chain are essential, scarcely any part has as much effect or is as important as the chain pin. Therefore, knowledge of the way to improve the pin to reduce the fatigue factor is very important.

Fatigue occurs by the slow growth of a crack which usually starts at the weakest point of an area where the loads are the highest. (Engineers call this a stress concentration.) There are, however, many ways to strengthen this weakest point and thus reduce the possibility of a crack developing.

If you recall when we rapidly bent a piece of wire in our hand it became warm and eventually broke. We explained this as an example of a fatigue break. Now, suppose we were to notch the steel and put a slight crack in it prior to the rapid bending. You're right, it would break even faster.

There is a simple fact about fatigue and that is, you cannot have fatigue failure when the part is in compression. Although there are several methods to achieve this, the most effective is the induction hardening of pins which puts the surface of the chain into a state of compression. You can put compressive stresses in the part by shot peening, but the depth of effectiveness will be limited, so induction hardening becomes the fastest, most effective, practical method.

Induction hardening won't solve the problem indefinitely. There is no practical method that will eliminate fatigue problems forever, but we do know that induction hardening does improve the part and is the most effective method of improving the durability of chain pins.

If your chain operates in a corrosive environment, induction hardening the pins is one of the best methods of protecting the pin against corrosion fatigue failures. You can shield the pin from corrosive elements by plating the pin, but to be effective the plating must be resistant to wear and corrosion. Once the plating wears away, it loses its effectiveness.

If you want to improve the resistance to fatigue, specify chain with induction hardened pins.