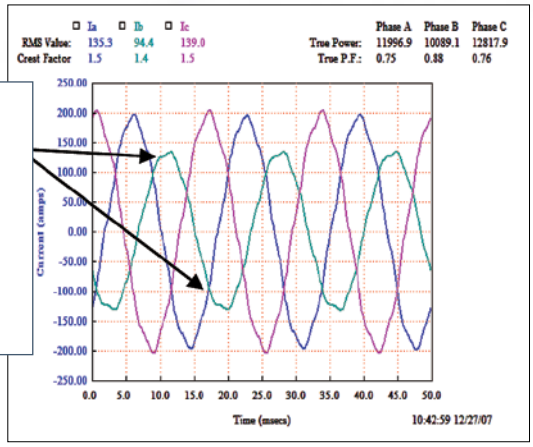
Eliminate Skin Effect & Proximity Effect

Discover how eliminating skin effect & proximity effect improved the production process by 48%

The Nakanishi Metal Works plant located in Osaka, Japan is home to more than 300 press machines and is responsible for manufacturing approximately 7.5 million retainers each month. EP Japan selected one 800 ton press machine, for a power quality study. This press machine could complete 23.5 presses per 4 minute cycle.

After measuring the current waveforms it was obvious the phases were imbalanced. Load imbalance is defined as the imbalance in the current distribution to the load. In a three phase electrical signal, the magnitude of the current in all three phases should be equal.

Figure 1: *Due to skin effect and proximity effect phase b has significantly less current than phases a & c.*



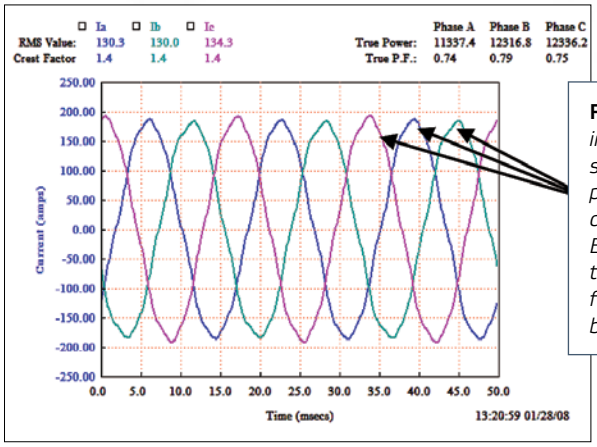


Figure 4: *After installing EP, skin effect and proximity effect are removed. Balancing the current levels for phases a, b & c.*

Current should flow through the center of the conductor, however noise causes the flow of current to be pushed to the circumference of the wire. This is known as skin effect.

As the current flows through the skin of the wire it creates frictional energy also known as heat. Generated heat from the wire will leave the wire through its plastic insulation. This leads to proximity effect, which is defined as the jumping magnetic field from one conductor to another conductor nearby.

This creates an imbalance in the load as seen in figure 1 and is responsible for decreasing the performance of equipment and wasting energy.

After three months of filtration the press machine was able to complete 35 presses per 4 minute cycle. **This is an increase of more than 48 percent!** Almost as impressive was the 14% reduction in heat losses.

Environmental Potentials' patented waveform correction technology eliminates noise and maintains the sinusoidal nature of the waveform.