



800 Ton Press Machine Case Study

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



Background



Based in the Shibuya district of Tokyo, EP Japan has been providing power quality solutions to the Japanese market for more than seven years. EP Japan has been assisting the top companies in Japan to identify power quality problems and implement solutions.

Nakanishi Metal Works Co., LTD has been operating for more than 70 years and has offices in 15 countries. NKC manufactures bearings, conveyors and window sashes for automobiles. The plant in Osaka, Japan was the location chosen for a power quality study. This plant has more than 300 press machines of tonnage varying from 2 to 1500.



The Situation

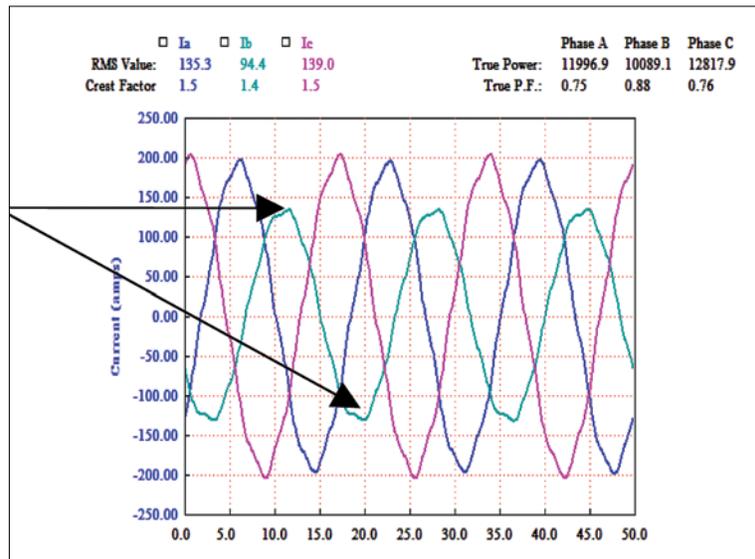


The NKC plant located in Osaka, Japan is home to more than 300 press machines and is responsible for manufacturing approximately 7.5 million retainers each month. EP Japan selected one 800 ton press machine, for a power quality study. This press machine could complete 23.5 presses per 4 minute cycle.

“We knew that EP’s waveform correction technology could help improve the production process at NKC,” said President of EP Japan, Yoji Yamamoto. “Power quality problems such as skin effect and proximity effect decrease productivity.”

Mr. Yamamoto measured the current waveforms and noticed 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.



“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, said Yamamoto. “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.



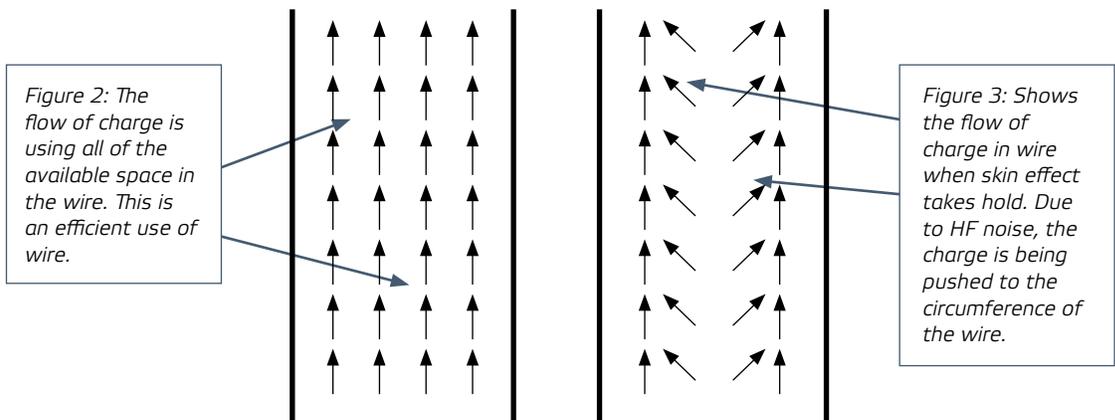
The Solution

While every electrical environment is unique, power is used the same way so the first step is to analyze the readings.

“After analyzing the measurements, I was certain EP’s waveform correction technology would improve the performance and life cycle of this press machine,” said Mr. Yamamoto. “I selected one EP-2500 and one EP-2000. The EP-2500 went on the distribution panel and the EP-2000 went on the equipment panel.”

Environmental Potentials’ waveform correction technology filters every angle of the waveform and does not shunt harmful noise to ground but rather converts it into heat. Both the EP-2000 and the EP-2500 have the same level of noise filtration, however the EP-2500 offers 80kA of protection while the EP-2000 offers 12.5kA of protection per phase.

Designed for industrial and commercial applications the EP-2500 is perfect for downstream panels in heavy industrial environments and strong enough for the main panel in most commercial facilities. The EP-2000 is ideal for point of equipment applications in heavy industrial environments and downstream panels in commercial applications.

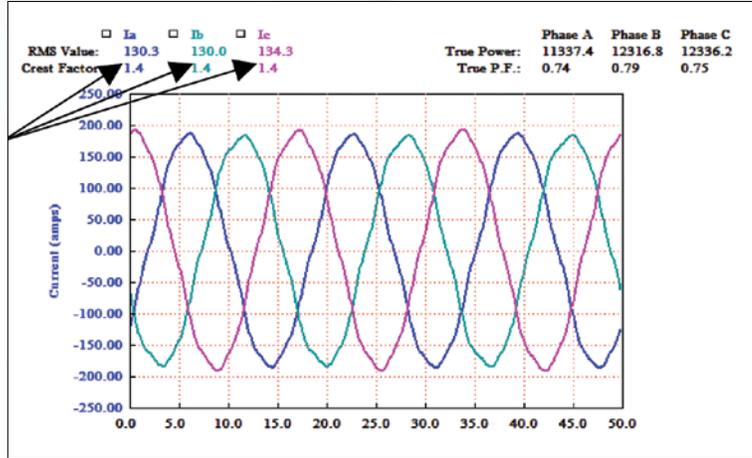




One month after installing the two filters Mr. Yamamoto again took waveform and high frequency noise readings. The filtration significantly improved the quality of power going to the press machine.

The Results

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



Phase A has 130.3 amps; phase B phase 130.0 amps while phase C has 134.3 amps. 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!**

High frequency noise in the range of 1kHz-1.5MHz is responsible for skin effect and proximity effect in wire. Skin effect and proximity effect are major contributors to heat losses and imbalance in current distribution.

Environmental Potentials' patented waveform correction technology is the safest and most efficient method of removing harmful noise from the system. EP waveform correctors are powerful low pass filters, which not only remove noise but also maintains the sinusoidal nature of the waveform.

Contact and authorized Environmental Potentials distributor to discover how waveform correction technology can help you.



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