

# Application Note

**SCENARIO:** Joe, responsible for injection molding production at FormaPlastics Company, had just learned about the plant's poor power factor and high harmonic levels from Mike, his facility engineer. The staff at FormaPlastics determined that the injection-molding operation was the source of both problems. Although Mike concluded that an automatically

switched capacitor bank was needed, he was concerned that installing switched capacitors could magnify the existing harmonics and affect operations. Joe was worried that magnified harmonics would wreak havoc on his production line. Joe and Mike investigated to determine what the best solution would be for FormaPlastics.

## Reactive Power Compensation Products

### Key industries that benefit from Harmonic Mitigation Products

- Automotive
- Food/Beverage/Brewery
- Municipal Water and Wastewater Treatment
- Paper Processing/Printing/Publishing
- Petrochemical
- Pharmaceutical
- Rubber and Plastics
- Semiconductor Manufacturing
- Steel
- Textiles

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#### **PROBLEM:**

### Poor Power Factor and Harmonics Present

#### *Addressing the Problem*

Mike began by reviewing the plant's single-line electrical drawings to identify the extent of electronics present and the level of harmonic content that might exist. Previously, FormaPlastics had purchased a special handheld instrument to find power system problems, and a power analyzer, which Mike used to evaluate company's power system, including the harmonic spectrum.

Although new equipment at FormaPlastics was supposed to be energy efficient, Joe saw that harmonics still could be a problem simply because of the nature of injection molding.

Joe knew that the more drives and electronic equipment present, the worse the harmonics problem was likely to be.

Mike's collected data was used to produce a final report that confirmed his initial assessment: they needed to deal with the harmonics in the plant so that the capacitors could work efficiently. Mike and Joe investigated, and found out that switched capacitors with iron-core reactors lessened harmonics and resonance.

#### **SOLUTION:**

### Installing a detuned power factor correction system from Staco Energy to protect the automatically switched capacitor bank from damage related to harmonic content

#### *Collecting the Data*

To protect the capacitors, Mike decided on a detuned system that included iron-core reactors to cut down on amplified harmonics. The system featured heavy-duty, overrated capacitors for improving power factor, and the accompanying reactors offered harmonic suppression. Joe was pleased to learn that the reactors even provided some filtering of the 5th and 7th harmonic orders, which are common in injection molding operations.

Mike went one step further. He decided to include an active harmonic filter which would offer additional protection from harmonic problems,

up to the 51<sup>st</sup> order. This decision also assured Mike and Joe that the company's future equipment expansion would also be covered.

Today, the automatically switched capacitor bank at FormaPlastics operates at maximum efficiency in the injection-molding production area, and Mike and Joe no longer worry about the effects of power factor or harmonic problems. FormaPlastics reached its original objective—to improve power factor—through the detuned system, which has saved the company an average of 18 percent on its monthly electric bills. Payback for the new equipment is expected to take just 19 months.