

# Research Programs

## Die Solder Reduction

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### Introduction

Die soldering is a phenomenon affecting aluminum die casting operations. Soldering occurs when the cast metal forms a bond with the surface of the die, which is generally made from steel, and remains stuck after the ejection of the part. Soldering leads to machine downtime and a higher rate of scrap parts, and is one of the three leading causes of lost production at SPX Contech's Pierceton, IN aluminum squeeze casting plant. Any reduction in die soldering can save a significant amount of money by eliminating this lost production.

### Objectives

The objectives of the project are:

- Develop a predictive model for identifying areas where soldering will be a problem during the design phase.
- Analyze the effectiveness and of various die coatings/surface treatments and alternative materials at resisting die soldering, and the costs/benefits of using them as a means of preventing soldering.

### Methodology

The objectives will be achieved through two project phases. In phase 1, industry standard data mining practices will be followed to develop predictive models for soldering problem areas. Several algorithms for generating predictive criteria will be followed, with the results translated into guidelines for identifying where soldering will be a problem before it becomes one.

In phase 2, die coatings/surface treatments and alternate materials will be tested in a laboratory method which simulates the conditions experienced by the die in an industrial die casting setting. While the method has not yet been designed, the important parameters taken into account include temperature, pressure and drag forces. Reactions at the interface will be analyzed to determine the ability of each case to resist soldering.