



## ***Eliminating Unscheduled Plant Shutdowns With a Reliable Loss-in-Weight Feed System***

***Manufacturer – 3Sigma  
Product – Metal Powder  
Case History #107***

### **Background**

A southeast metals manufacturer needed to improve an existing process. Material is pneumatically conveyed to a bin which refills a loss-in-weight feeder which continuously feeds a calciner, which operates at 2000F. Due to confidentiality agreements we cannot provide detailed customer information. We may be able to schedule a conference call upon request.

### **Existing Problem**

- The customer used an Acrison screw feeder to feed his calciner.
- Due to the very fine nature of the metal powder (250 PCF @ 1 micron) it would work its way past the screw feeder's air purge seal which would result in a system failure.
- The fine metal powder would degrade the seal, heat and brazen causing the screw to "lock up".
- At other occasions the screw would twist up like a pretzel within the feeder.
- **Every 30-45 days the customer experienced an unplanned shutdown which would cost tens of thousands of dollars** as they would have to cool the calciner and reheat it (2,000F) to disassemble equipment. The reheat would take approximately one day with huge energy costs.

### **The Solution**

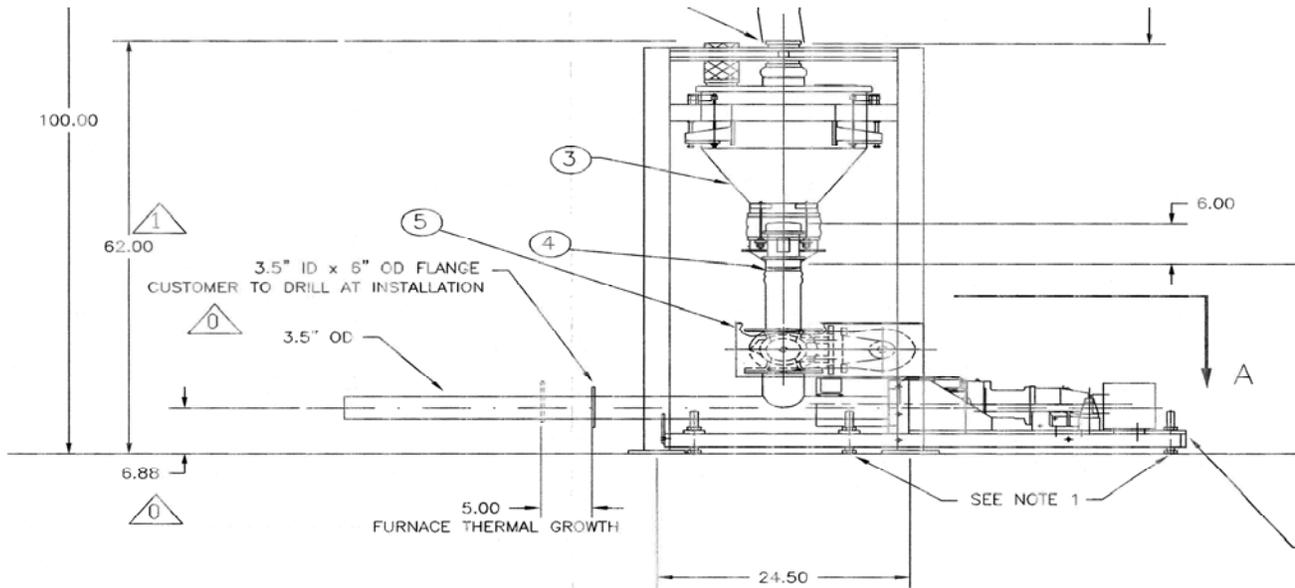
CMT worked with the company's plant engineer to arrive at a solution to meet the following goals:

- A reliable system that would eliminate unplanned shutdowns.
- An accurate loss-in-weight feeder that would properly meter the metal powder, thereby providing a more consistent "bake" and a better end product.
- An air lock system that would prevent the escape of hydrogen into the atmosphere.
- A robust conveyor system to deliver product to the calciner.

CMT designed the following system:

- A SS06 GeoMate™ LIW feeder was installed to accurately meter the metal powder. As this unit operates with no moving parts there are no screws, seals, bearings, bushings, etc to affect and maintain.
- Product is fed through a 4" rotary Airlock that keeps hydrogen from escaping into the plant.

- The airlock feeds a high temp, *industrial duty screw conveyor*, which is bolted to the calciner. The inlet of the conveyor is placed 12" forward, in relation to the back bearing and seal, ensuring material never reaches the bearing, thereby eliminating the wear and lock-up problems.
- The entire system was placed on a rolling expansion frame that allows for movement of the entire system when the furnace expands due to heat.



**System Drawing**

**Results**

- The system was installed in 1998. To date there has **not been one unplanned shutdown** caused by the new feed system.
- Although the customer purchased a spare industrial screw, this has never been used.
- Although we have had to replace a few items (rotary airlock, flexible connections and load cells) the LIW feeder has operated with no mechanical failures of any sort.
- **“The system paid for itself in six months”** per the plant engineer.

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