CASE STUDY

SHUTTLEWORTH

How GKN Sinter Metals Improved Quality with an Automated System

EXECUTIVE SUMMARY

Powdered metal sintering offers significant advantages over other part manufacturing processes. Specifically, sintering provides greater dimensional accuracy, higher strength, and lower weight at a lesser cost. Not to mention, the sintering process of powdered metals is an extremely environmentally-friendly process that uses 99% of the material, generating harmless bi-products of nitrogen and hydrogen. It is no wonder that the automobile industry uses this process in the creation of parts. A car or truck that is produced in North America use an estimated 40 pounds of powdered metal parts.

GKN Sintered Metals is the world's leading supplier of metal powder precision components. At the Salem, Indiana plant, GKN manufactures a series of transmission clutch plate parts for pick-up trucks produced by 3 large motor companies.

Customer Challenge

Producing powdered metal parts can have its own set of unique challenges, as GKN Sintered Metals can attest to. After the powder is molded into shape (which begins with a consistency of confectioner's sugar) it is sent to a sintering furnace to harden. Before entering the furnace, the molded part is extremely fragile and susceptible to damage. Prior to using Shuttleworth's solution, pallets of parts were moved manually through a manufacturing cell that consisted of a compacting press, part scale, positioning station, robotic drill, furnace, as well as an in-process bin.

"Moving these parts through by hand was very costly, both in terms of labor and product quality", stated the Manufacturing Engineering Manager at the GKN Salem, Indiana plant. "Each part weighs about three to four pounds. This doesn't sound like much, but by the end of the shift, operators were fatigued and would often bump and chip parts and pallets. We knew there had to be a better way."

The Solution

Shuttleworth previously installed a smaller low pressure accumulating system for GKN which took parts from a heat treated machine and automatically loaded and unloaded the draw furnace. The goal now was to totally automate the whole process.

Shuttleworth's innovative Slip-Torque®, roller-based conveyor system was the perfect solution to automate the handling of the powder metal parts. The Slip-Torque system works by using individually powered roller shafts covered with segmented, loose-fit rollers. Unlike belt conveyors, the rollers beneath the product "slip" when products accumulate. This greatly reduces product damage in handling brittle powder metal parts and ceramic plates.

The first phase of the system was to move product from the compacting press to a scale, where the powder metal parts could be weighed for accuracy. Shuttleworth engineers designed a unique device to raise the part from beneath the conveyor, weigh it, and place it back down. Parts that pass the weight check are transported down the line to the positioning station for robotic pick-up. The parts that did not pass the weight check are pushed off line by another Shuttleworth device. Once positioned, parts are selected and drilled by a robot and then gently placed on a pallet. Both the engineering team from GKN and Shuttleworth collaborated on a fully-integrated solution to work with the existing robot to accomplish this task without any operator intervention.

Next, the part-filled, ceramic pallets move down the line and are accumulated to be 3 side-by-side as several hundred of these positioned pallets enter the sintering furnace. This accumulation solution was a sizeable cost savings for GKN rather than installing three separate conveyors to load the same way. "Loading and unloading the furnace was a unique challenge that we faced on this project", stated Kim Hildebrand, Regional Sales Manager of Shuttleworth. "The conveyors at both ends of the furnace approach at 90-degree angles. A traditional push mechanism would wear the rollers due to the abrasive characteristics of the ceramic pallets." The engineers at Shuttleworth designed a friction-free, lift and transfer mechanism that runs parallel to the furnace conveyor. The device projects on-demand from beneath the rollers, allowing for a smooth transfer in an out of the furnace. The new system allowed to reduce wear and damage to the pallets in comparison to manually loading and unloading the cell. This also provided a reliable "safety net" for products leaving the furnace in the event of a back log.

After the parts have been heated, the pallets progress onto the Shuttleworth Slip-Torque conveyor system to a second robotic positioning station. This robot picks up the parts from the pallets and places them in a bin. The empty pallets are then recirculated through the closed circuit system.

COMPANY BACKGROUND

GKN Sinter Metals is the leading supplier of metal powder components with 6500+ people solving problems at production sites worldwide. GKN designs, manufactures and supplies market-leading sintered metal components in additive manufacturing, conventional powder metallurgy, metal injection moulding and porous metal filters.

SLIP-TORQUE® CONVEYOR

SINGLE-ROWING OF PARTS

ROBOTIC POSITIONING STATION

"The Shuttleworth conveyor is the critical component of our completely automated system for building our complex part. The fact that we can safely move these parts from the press through all the various stages without an operator is a big deal"

PART ACCUMULATION

RESULTS

Since the system was put into operation in 2001, GKN has benefited from significant quality improvements and reduced inventory and labor costs. The gentle nature of the Slip-Torque conveyor, as well as the inclusion of the robotic positioning system, allows parts and pallets to remain free of damage throughout the entire process. Not only did GKN see fewer damaged parts, but they now require six fewer operators running the cell. "The Shuttleworth conveyor is the critical component of our completely automated system for building our complex part", says GKN, "The fact that we can safely move these parts from the press through all the various stages without an operator is a big deal." Overall, the Shuttleworth system has allowed GKN Sinter to produce higher quality product for less cost. And, due to consistent preventative maintenance and lubrication services, the Shuttleworth system continues to run at optimal performance nearly 17 years later.

From automotive and electronics, to paper conversion and pharmaceuticals, to food and consumer good markets and beyond, manufacturers across the globe rely on Shuttleworth's proven product handling solutions to increase line efficiency, maximize profitability, and minimize risk. As part of the ProMach Product Handling business line, Shuttleworth helps packaging customers protect and grow the reputation and trust of their consumers. ProMach is performance, and the proof is in every package.

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