

How to Pick Up Coiled Springs with a Vacuum System

Leading coiled spring manufacturer gets a leg up on the competition by using vacuum technology for fast pick & place without the dreaded "tangles."

Abstract

A leading coiled spring manufacturer is pick and placing coiled springs using vacuum. The new system is fast and avoids the dreaded "tangled" springs problem, thereby giving the client a leg up on its competition.

Introduction

Located in the upper Midwest, the client is a leading manufacturer of coiled springs for use in a wide range of consumer, OEM, and military applications. At the end of the production line individual springs have to be placed into separate package cells or compartments to avoid tangling. Previously, the springs

would be delivered to the packaging area via vibration tables and manually picked up and placed in package compartments.

"This is one of those situations where the bottleneck in production came down to how to manipulate these small, 'open' items that seemed to defy an automation solution," said Brian Ferri, President at Vaccon Company, Inc.

Technical Issues

"We needed a solution that would work on the Z axis," said Ferri. "The structure of the packaging was such

that we needed to be able to place these springs, some very small, in individual packaging compartments or cells which were accessible only from above." The right product for this application was a modified Vaccon DF Series Material Transfer Pump. In this applica-

tion, a 5 station DF Series pump was custom engineered to meet the unique requirements that come with picking up, holding, and placing an object as "open" as a coiled spring.



Some Basic (and Wrong!) Assumptions About Vacuum Technology

The average engineer will tend to think of vacuum systems being variations on a theme: A contact, usually a vacuum cup of some size or shape, is placed in proximity to the object being moved. The object is then drawn up to or against the suction cup and a vacuum is created allowing objects of widely varying sizes to be moved or manipulated. To place the object, the vacuum must be "broken" by compromising the vacuum or injecting air or a gas into the vacuum area creating a positive pressure. The positive pressure then causes the release of the object by the cup. "Open" objects like springs or porous objects, such as sliced bread or egg crate foam, are usually not considered candidates for vacuum technology solutions because there doesn't seem to be the ability to create



Above and inset, right. A modified Vaccon DF Series Material Transfer pump holding five coiled springs. A robotic arm positions the pump over the individual spring compartments in the packaging, allowing the springs to drop into individual packaging cells and avoid tangling.

a vacuum to cause the cup to grab and hold the object.

What these assumptions fail to account for is the dynamic of vacuum flow. With vacuum flow, instead of relying on a vacuum to “lock on to” an object, the system uses the “fluid friction gripper” of vacuum flow to grab and hold open objects. This approach has been successfully applied to objects ranging from coiled springs, to birthday cakes, to felt mats. As seen in this video [http://www.youtube.com/](http://www.youtube.com/watch?v=-dw5cHJK3Pw)

[watch?v=-dw5cHJK3Pw](http://www.youtube.com/watch?v=-dw5cHJK3Pw) coiled springs are picked up and held using the fluid friction of the vacuum flow being created by the series of vacuum pumps arrayed on the manifold.

In operation, the manifold uses a robotic arm to position the vacuum head over the springs, then carries the manifold and springs to a point just over the packaging cells where the springs are released and drop, untangled, into the individual pockets or cells.

Results

The newly deployed system is functioning better than projected, allowing the entire production line to run smoother and faster. Workforce resources are freed for other work.

Summary

Vacuum technology is highly adaptable and can be very successful working with even very “open” objects such as coiled springs.

About Vaccon Company, Inc.

Vaccon Company Inc. is the leading U.S. manufacturer of air powered venturi vacuum pumps, supplying the manufacturing, food, and process industries with reliable vacuum products characterized by efficient operation, rugged construction, and low cost.

Vaccon innovations include pump designs that place the vacuum port and exhaust path inline, making a straight-through venturi vacuum pump. These compact pumps are excellent for extremely “dirty” and dusty environments such as food processing, packaging,

foundries, and bagging operations, by not clogging, losing suction, or requiring a vacuum filter. Vaccon’s expanded vacuum pump product line also includes other unique devices such as Material Conveying Vacuum Pumps, Variable Vacuum Pumps, Air Amplifiers and Manifolds.

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