Vacuum-Tweezer Solutions For Small Part Handling

Handling of miniature parts is becoming more challenging for manufacturers as every thing we use in our daily lives becomes either smaller itself or more complex functions are added. Companies are developing high tech cameras that can record every waking moment. Cell phones continue to include more gadgets that integrate into our daily lives. Pacemakers, hearing aids, and hearing implants are becoming smaller yet provide improved quality of life for many across the globe.

For many of the components inside of these gadgets there is automated equipment that can place parts as small as a 01005 resistor (0.010” x 0.005”) with incredible accuracy and speed. However there are parts that either because of their odd shape of sensitive surface needs to be assembled by hand. Many parts can be easily manipulated with a good old fashioned mechanical tweezer. There are tweezer manufacturers who will work with your engineering staff to manufacture a tweezer profile that matches the profile of the part you need to handle. The down side to this is the tweezer cost goes up significantly and if an assembly person drops the tool, the tip profile is easily damaged and the tweezer needs to be scrapped.

There are new tools available today that can be used for assembly of a wide variety of miniature or odd sized parts without the need for customizing the tip. The Vacuum-Tweezer tool is well suited for many of these applications. Everybody knows what a tweezer is and every one knows that a vacuum picks stuff up. Unlike a mechanical tweezer that has two gripping surfaces the vacuum tweezer has a handle with a control button and only a single conical point at the tip. The tip has an orifice opening that is connected to a vacuum source. The vacuum source creates a constant flow of low pressure that is used to grip anything that comes into contact with the tip.

There are several advantages to using a tool that has only a single gripping tip. First of all, there is no mechanical squeezing of the gripped part that could cause breakage or other mechanical damage to a fragile item. Secondly, once your part is gripped by the vacuum at the tip, it stays on the tip and is released only when you place it and press the release control button on the vacuum tweezer handle. I think everyone who has used mechanical tweezers to pick-and-place small parts is familiar with the zing effect – you pick a part, it slides off of one of the tweezer tips and it zings across the room never to be seen again. Small parts can be very expensive so lost parts can add significantly to the assembly process cost. And finally, with a vacuum tweezer you can grip a part from the side, from the top or from any other protruding feature. Two opposing flat surfaces are not required to grip the part.

I will now present several examples of customers who have used vacuum tweezers to solve their assembly dilemmas. The first engineer was picking miniature ball beading out of a container full of loose bearing. The miniature bearing were then placed into a tiny race as part of assembling a completed bearing. Gripping the loose bearing with a mechanical tweezer was a challenge. And then placing the bearing in the race was often defeated by the zing effect. The engineer purchased a vacuum tweezer with a tip that
had an opening slightly smaller than the outside diameter of the ball bearing. The process was simplified. The vacuum tweezer tip would be plunged into the container of ball bearings and the first bearing it contacted was gripped. The ball bearing was then easily placed into the race and the zing effect was totally eliminated.

A second application that I have encountered involved the handling of MEMS devices. MEMS devices (micro electromechanical sensors including accelerometers, gyroscopes, digital compasses, inertial modules, pressure sensors, humidity sensors and microphones), typically are handled at the die level. The top surface has micro machined features that would be damaged if handled from the top. Also mechanically gripping from the sides could break the die. The ADJUST-VAC vacuum tweezer solved all of the handling issues. With the correct small-part-tip and vacuum pressure the vacuum-tweezer easily gripped the MEMS device from the edge of the die and was easy placed in the assembly process.

Implementation of vacuum tweezers for assembly of electrical or mechanical parts is limited only by the imagination of the engineer. Vacuum tweezer tips range in size from the three quarter inch diameter rubber suction cup down to the VSPT0803 vacuum tweezer tip. The VSPT0803 tip has a 0.003” (75 micron) orifice for assembly of the smallest parts.

For more information visit Virtual Industries, Inc. at www.virtual-ii.com

Tom Mealey
Executive Vice President
Virtual Industries, Inc.