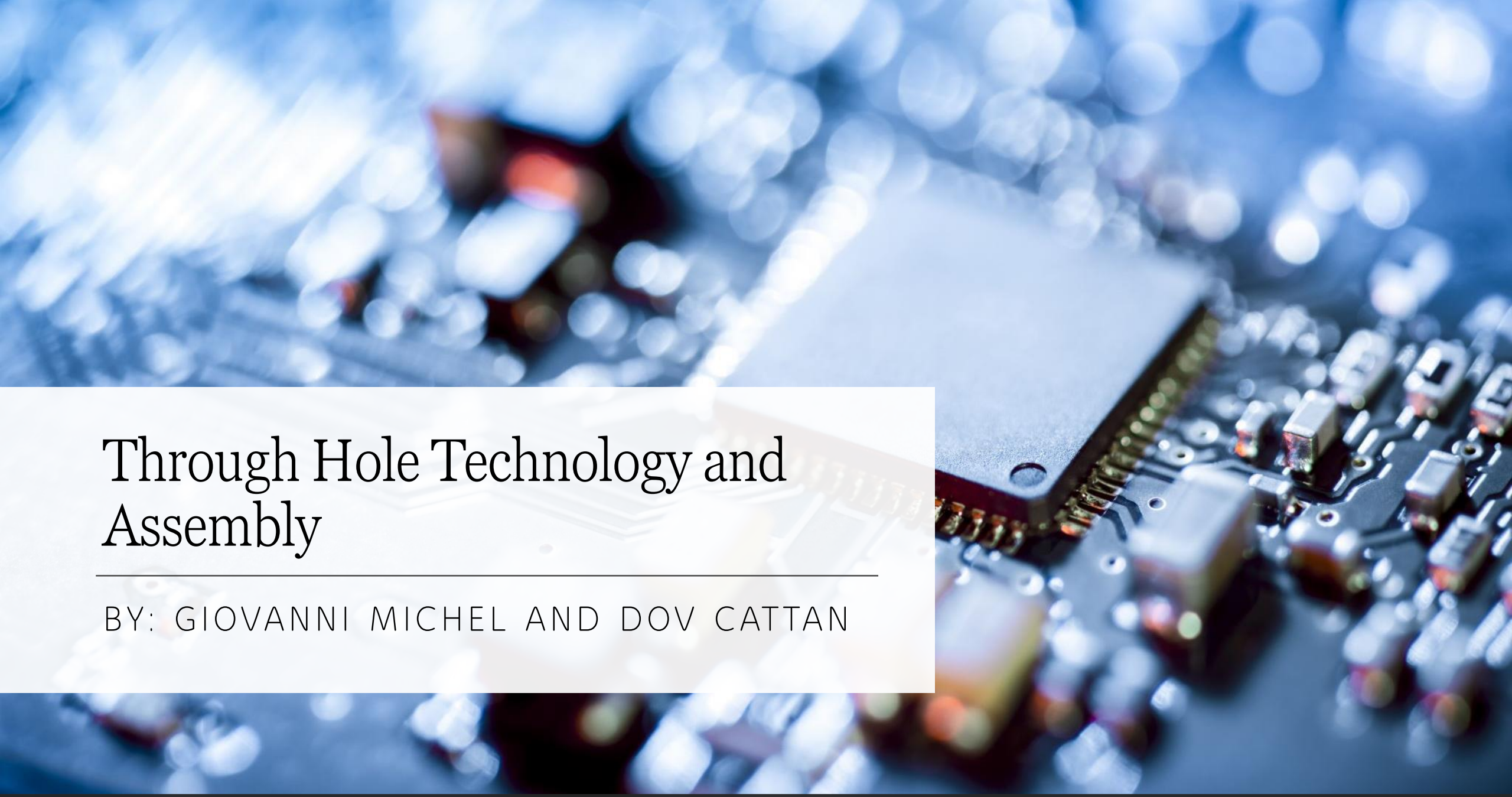


# Through Hole Technology and Assembly

BY: GIOVANNI MICHEL AND DOV CATTAN

# Introduction

·Through-hole technology or “thru-hole”, refers to the mounting scheme that is used for using the conductivity of lead to place electronic components on to a surface.

·Thru-hole technology is most useful in the design of PCB’s

·Thru-hole PCBs can be in almost every device.

# Advantages of Through-hole Assembly

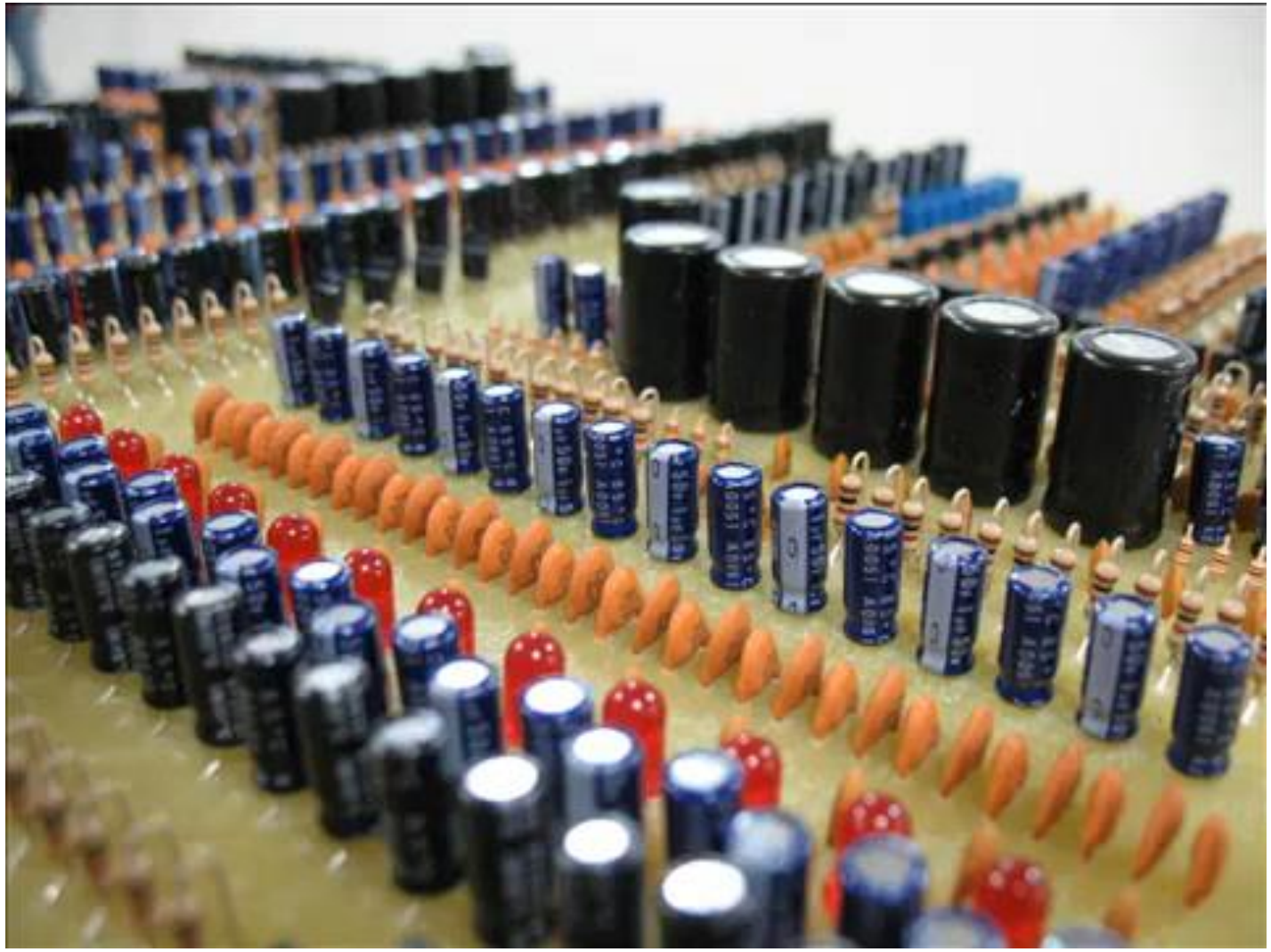
- One of the advantages of thru-hole assembly is that it creates a stronger, more solidified connection. Through-hole mounting indicates stronger mechanical bonding and applicable for products that are ready to suffer from mechanical stress. It has heat resistance so it can be used in machines that create a lot of heat like airplanes, spaceships, or even in stove ovens.
- Thru-hole assembly is easy for manual adjustment and replacement and widely accepted by testing and prototyping.

# Disadvantages of Through-hole Assembly

- Some of the disadvantages of thru-hole assembly includes that it would not be the most cost-efficient when working on a such a commercial scale. Since thru-hole component leads go through holes on board that are time-consuming and lead to higher cost.
- Since thru-hole is such more precise practice, wave soldering, or hand soldering is relied on so that both reliability and repeatability. Compared to surface mounts where you just to stack IC's and electrical components together. For example, you can also add a microcontroller on top of a thru-hole, and it won't go through the entire board.
- They also limit the available routing area for signal traces on layers immediately below the top layer on multilayer boards since the holes must pass through all layers to the opposite side.

# Why Use Through-Hole-Technology Circuit Boards

- Thru-holes are better to use when taking into considerations, Through-hole components (THCs) are preferred for high-reliability products requiring more stronger bonding between layers since they can withstand higher environmental stress such as intense heat when their leads are going through board holes, which is the main reason that THT has been widely applied in military and aerospace products that may suffer from extreme acceleration, collision or high temperature change.



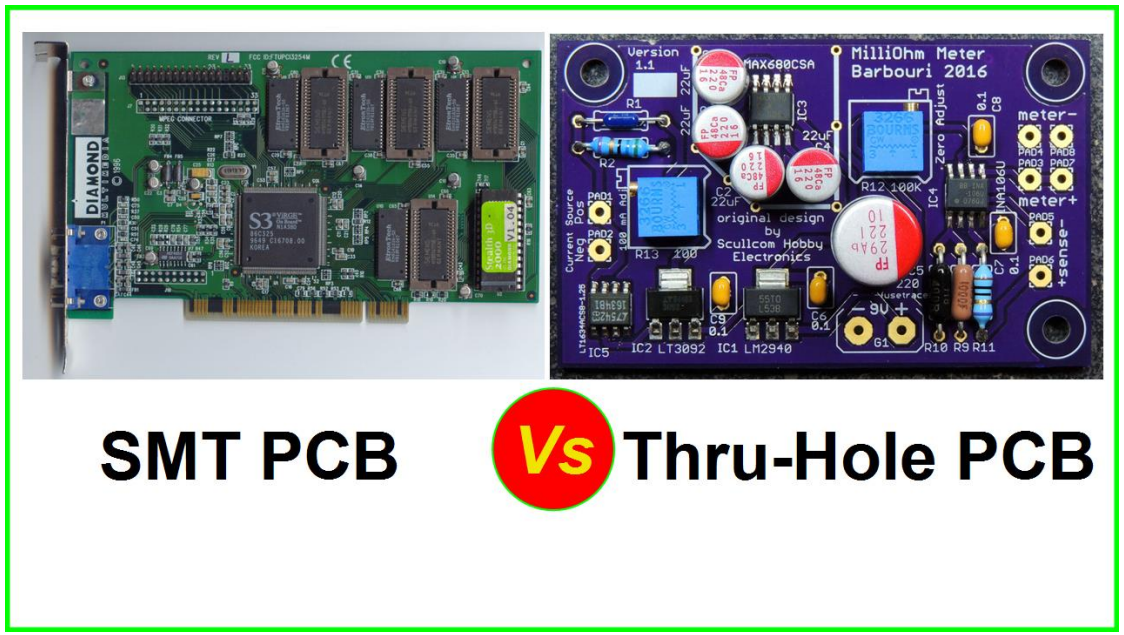
# How Through-Hole Circuit Boards Are Made Part 1

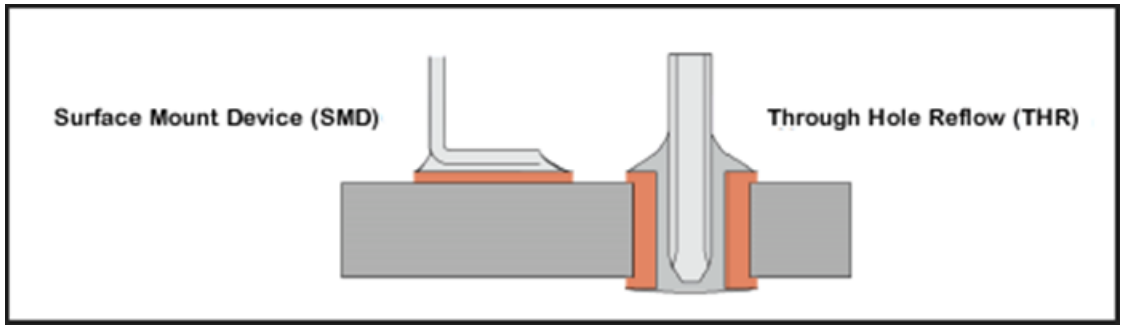

# How Through-Hole Circuit Boards Are Made Part 2

# Through-Hole-Technology vs Surface-Mount-Technology

For Passive Thru-Hole Technology, there are two types of possible types of thru-holes components, either radial or axial. Axial thru-hole components that has electrical leads running along the component‘s axis of symmetry, like a resistor the way the leads run along the axis. For radial components, you have electrical leads that protrude from one end of the component. Active Thru-Hole components include the DIP ( dual-inline package) these are similar op-amp packages or low-power voltage regulators.

Surface Mount Technology on the other hand, does not use pins for electrical leads. The leads rather appear as small pads of metal, which has a primary purpose of making it easier to take the least amount of space when building PCBs




# Through-Hole Vs Surface Mount PCBs

# Through-Hole-Technology in Robotic Applications

- Thru-hole technology in robotic applications are being used in mass production when taking into consideration the assembly lines of automated thru-hole design implantations on chips.
- Design engineers use thru-holes in making complex system on chips, for example Field programmable gate arrays use thru-holes technology in the implementation of these complex SOCs.

# Surface-Mount-Technology in Robotic Applications

- This Surface Mount Device is widely used in an automated Printed Circuit Boards assembly and has changed the way PCBs are made.
- The SMD is a pick and place machine that allows PCB design to be automated, a bulk production setting which has Feeder assembly present allowing the PCB to be assembled on a tray that also has a built in Reflow Oven to heat the electrical components on the board with the lead.

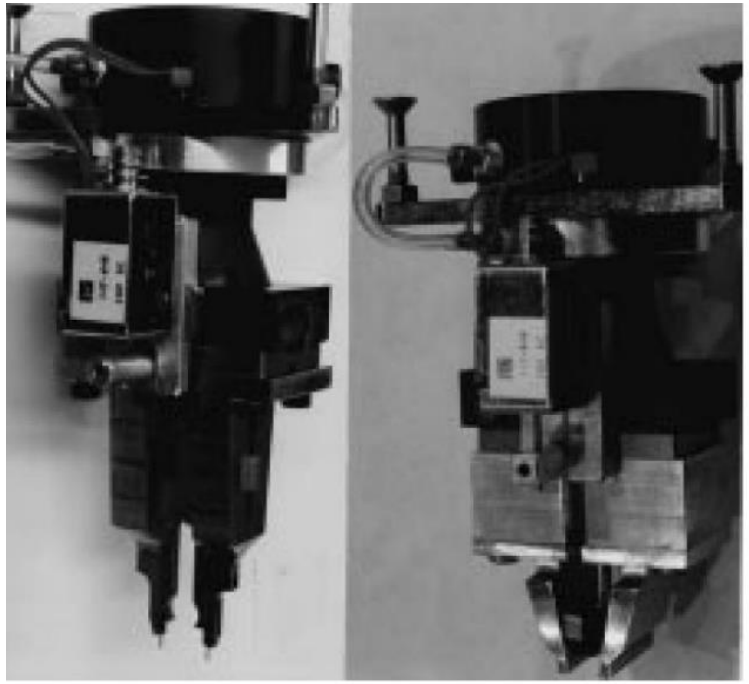
Fig. 1. Basic SMD P&P Machine.

# Through-Hole Robotic Solution

Our Robotic Solution that is Presented is automated removal and replacement of through hole technology components such as resistors, Field-Programmable-Gate-Array (FPGA) chips, or even memory.

It uses a specific robotic arm called a Multifunctional Gripper in our case. There are two types of Multifunctional Grippers, "grip&push - support-grip&pull" "grip&push - grip&pull."

Both of two Multifunctional Grippers place through hole technology components in the same way, but to remove, while the "grip&push - support-grip&pull" gripper grips the component body axially and pulls the component with the puller alone, the "grip&push - grip&pull" gripper pulls by gently departing the whole gripper instead.



p&Push-Support-Grip&Pull **(b)** Grip&Push-Grip&Pul

# Summary

- This research PowerPoint covers through-hole advantages and disadvantages.
- We also cover some of the THT and surface mount technology solutions such as the placer machine, for example through-holes assembly can either be done by hand or be automated using a robot.
- After this PowerPoint the reader will be able to know the difference between through-hole technology and surface mount technology.

# The End