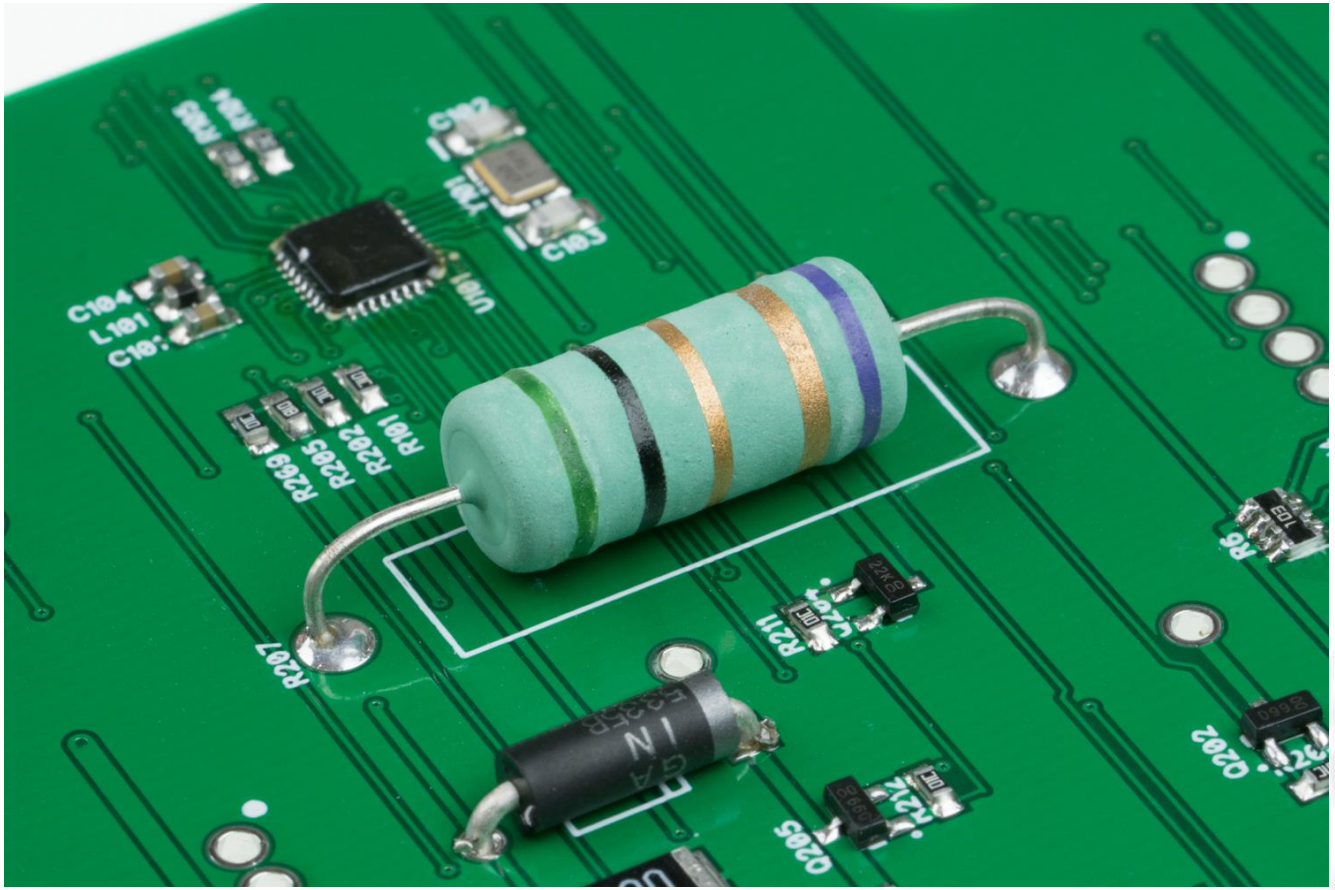
Komponentų surinkimo technologijos.

Defektai.

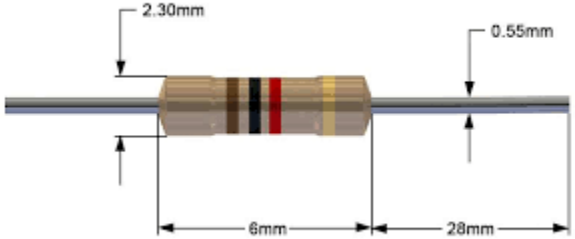
SMD placement processes. Defects

ETS

Surinkimo įrangos koncepcija
SMD Placement Machine Concepts
SMD vs Through-Hole



Surinkimo įrangos koncepcija
SMD Placement Machine Concepts
SMD vs Through-Hole



Through-Hole-Išvadiniai komponentai

Pros

Hand assembly of PTH components into a PCB is relatively simple, making them ideal for anyone prototyping a small circuit.

They can be used in a breadboard with no soldering required.

They are generally stronger than SMT components. This makes them ideal for connectors and rugged circuitry.

Cons

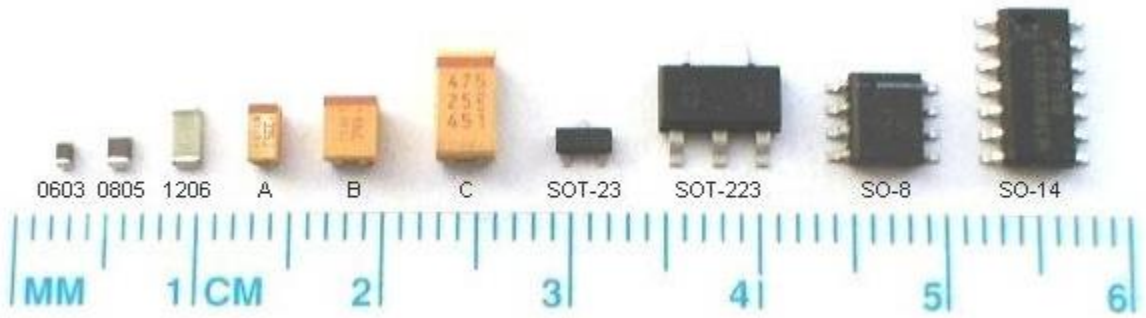
PTH components are more labor intensive to assemble. This makes them less ideal for production quantities.

They are generally larger than SMT components, making them less ideal for small circuitry.

Due to decreasing popularity, many new chips are not offered in a PTH package.

Surinkimo įrangos koncepcija
SMD Placement Machine Concepts
SMD vs Through-Hole

SMD-Paviršiniai



Pros

Generally smaller and cheaper than PTH components.

Easier to assemble in high quantities with production equipment.

More part options available due to increase in demand.

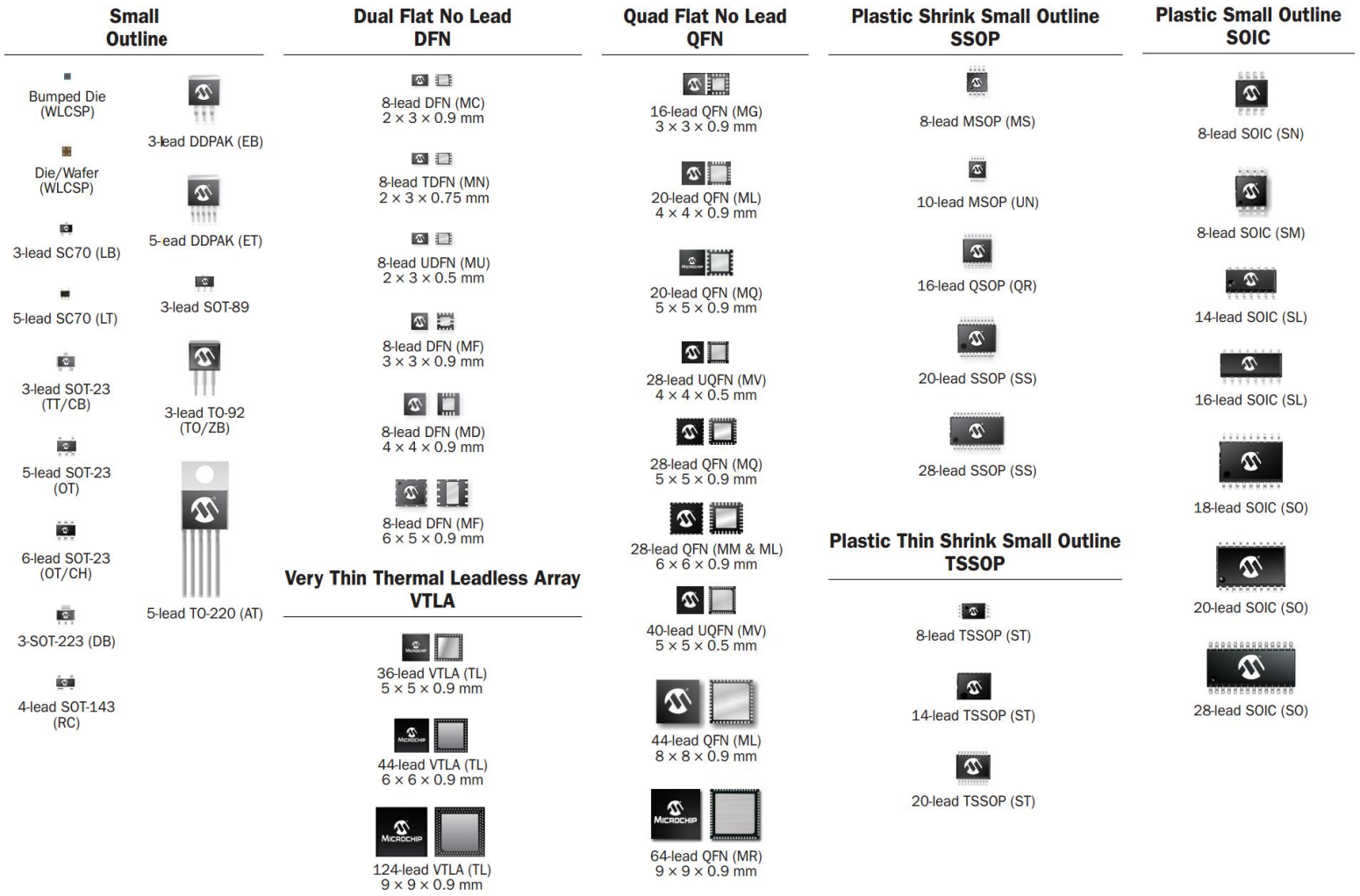
Cons

Generally harder to hand assemble.

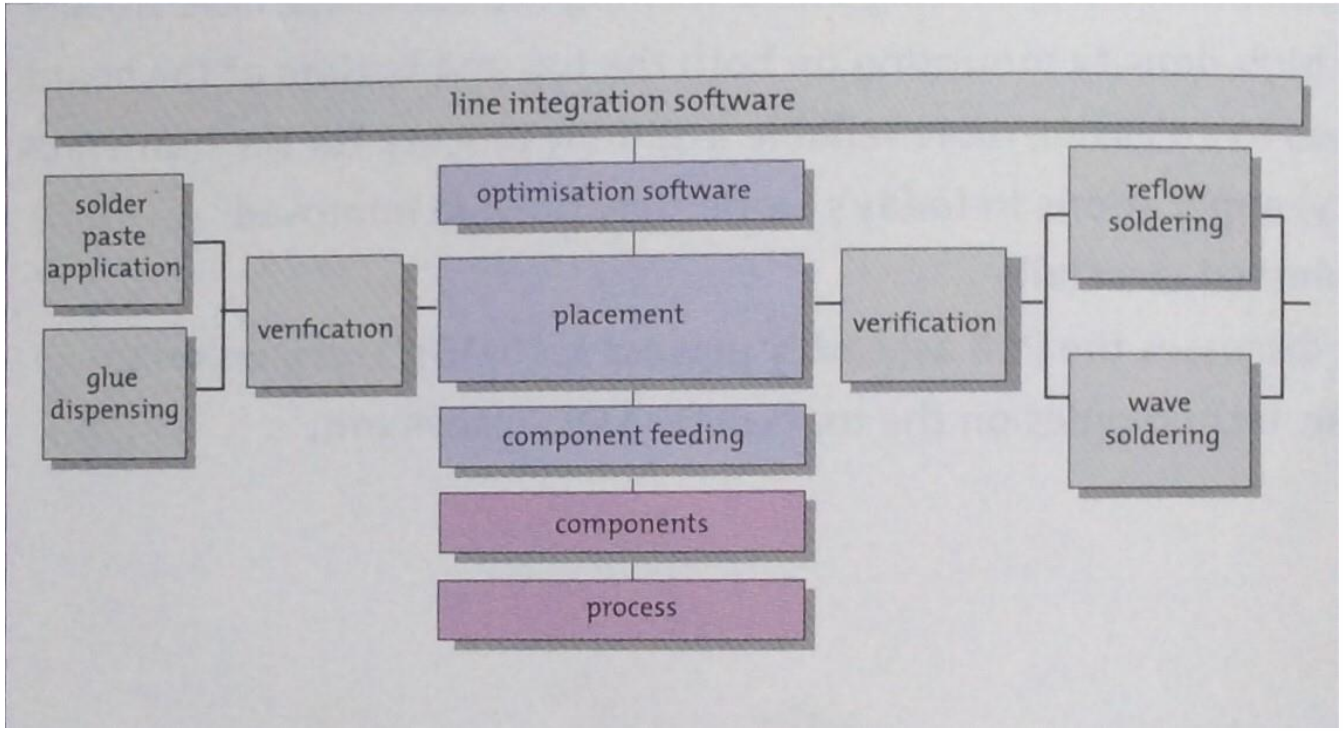
Can be weaker for connections that need strength, such as connectors.

Solder joints can crack and degrade due easier to their diminutive size.

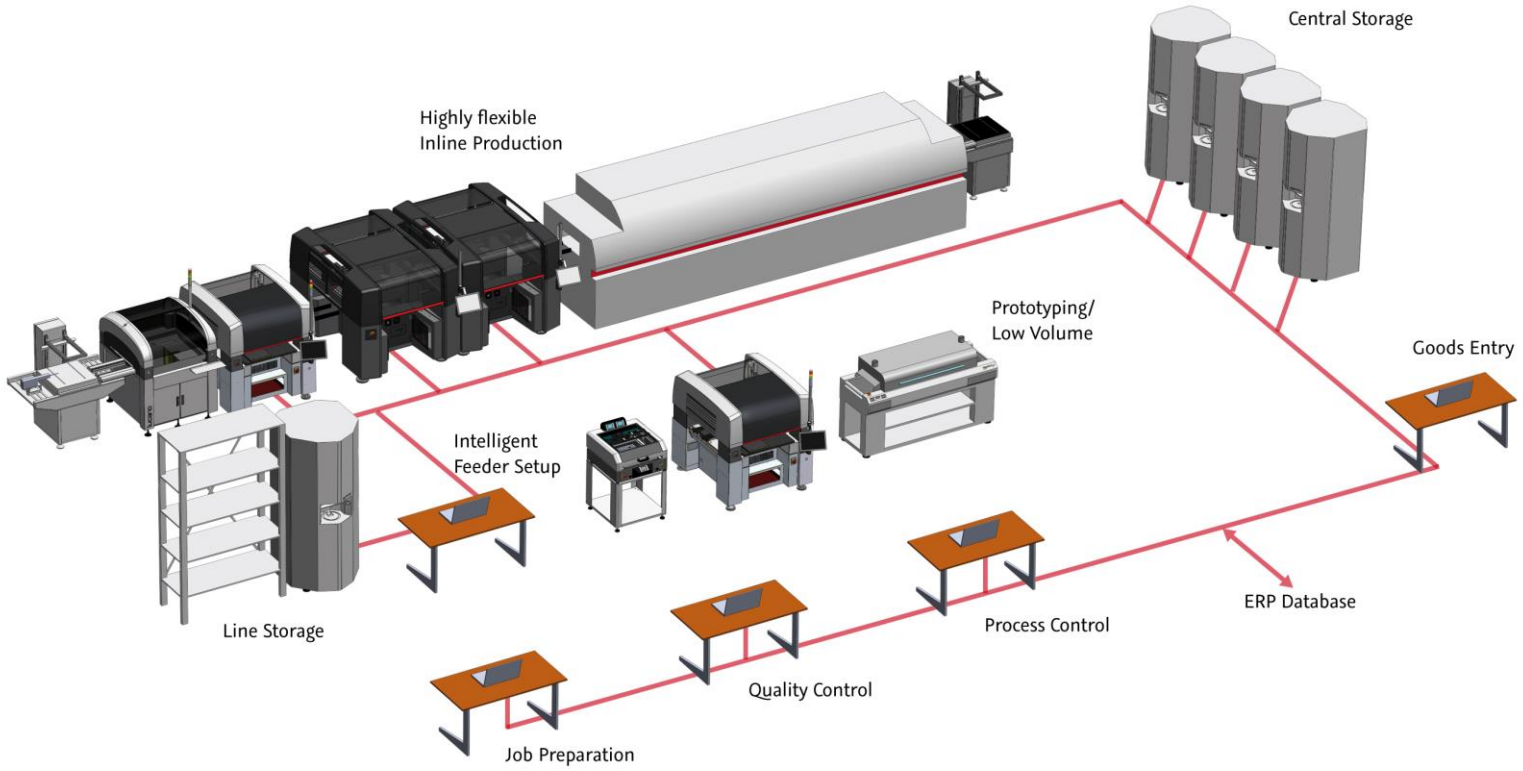
Surinkimo įrangos koncepcija
SMD Placement Machine Concepts



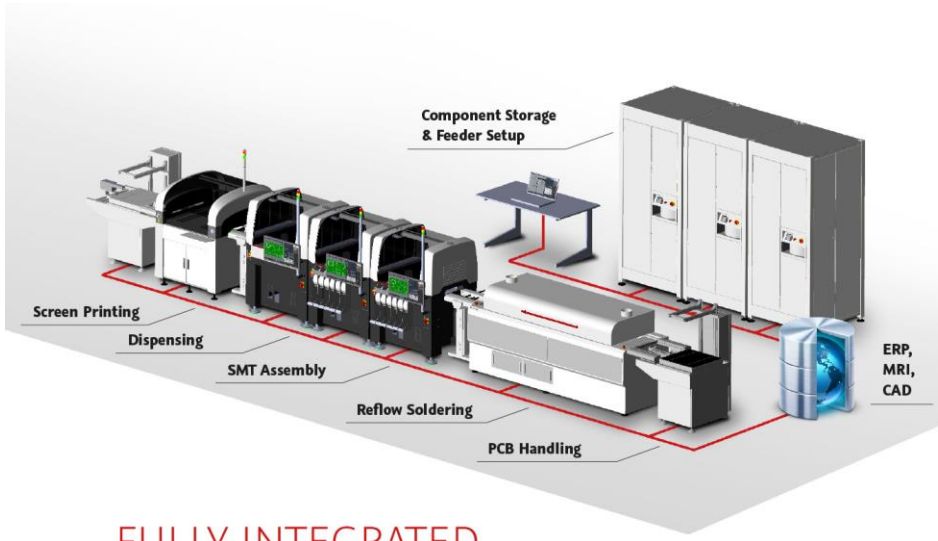
Surinkimo linijos koncepcijos
Production Line Concepts



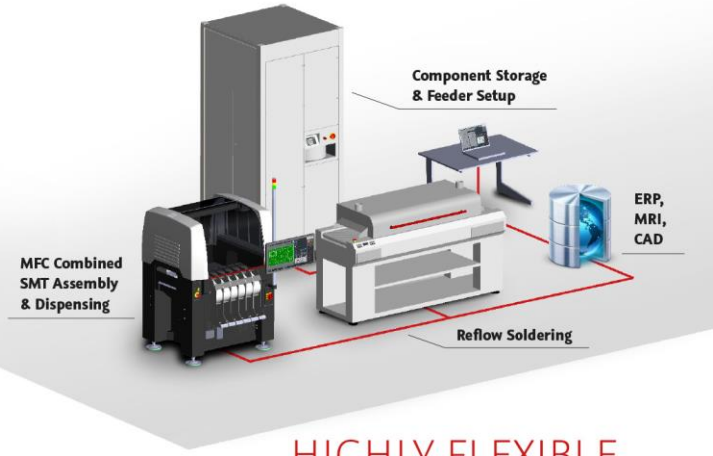
Surinkimo linijos koncepcijos
Production Line Concepts



Surinkimo linijos koncepcijos
Production Line Concepts

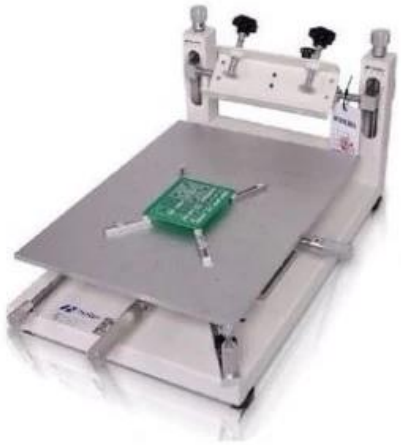


FULLY INTEGRATED
LINE SOLUTIONS

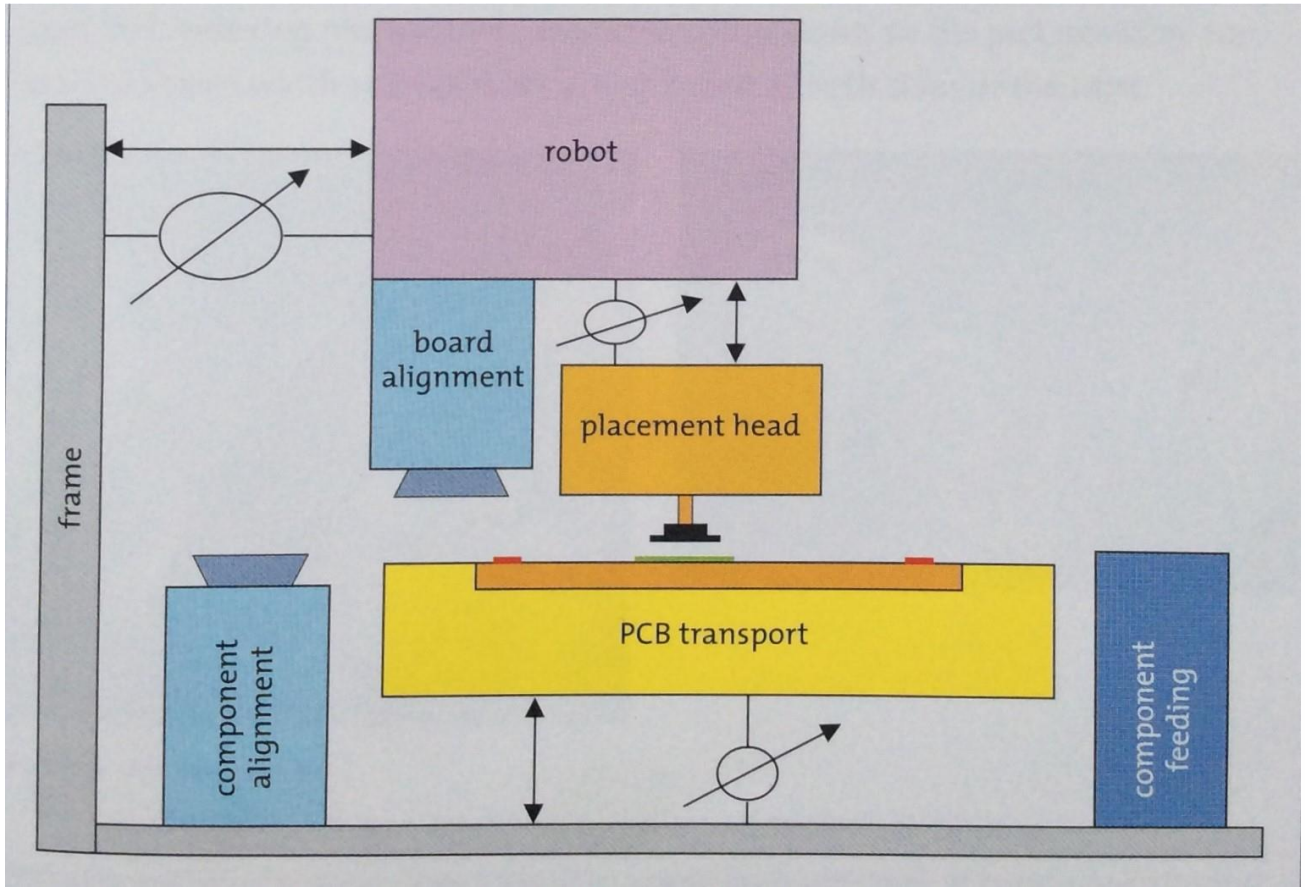


HIGHLY FLEXIBLE
CELL SOLUTIONS

Surinkimo linijos koncepcijos
Production Line Concepts



Komponento pastatymo procesas
The SMD placement process



Komponento pastatymo procesas
The SMD placement process

Figure shows a generic pick-and-place machine in which the majority of modules are assigned a specific function in the placement cycle. The following modules can be distinguished:

- Frame, the skeleton of the machine, which positions the sub-modules in relation to each other and transfers forces;
- Component feeding unit;
- Component alignment sensor unit, part of the placement head or mounted on the base.

Komponentų talpyklos
Component feeding

Tape, cut-tape feeders, trolley tape feeders

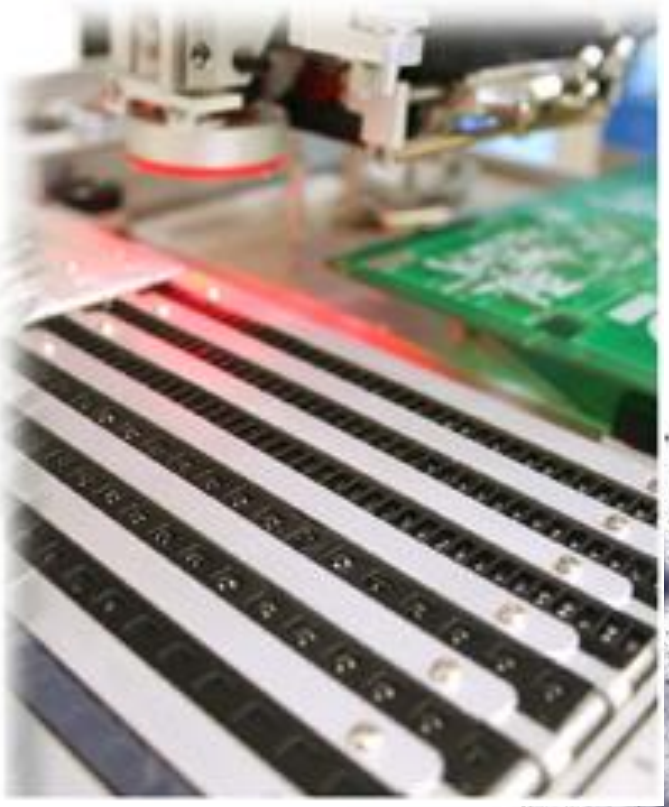
Bulk feeders

Tray feeders

Waffle feaders

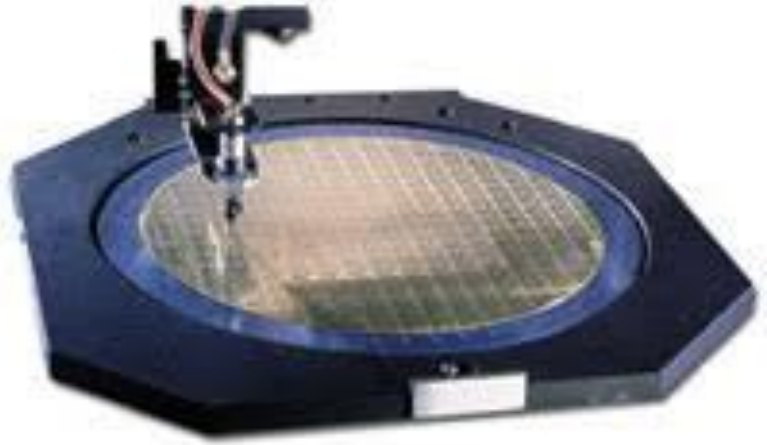
Stick\tube feeders

Juostinės talpyklos
Tape, cut-tape feeders

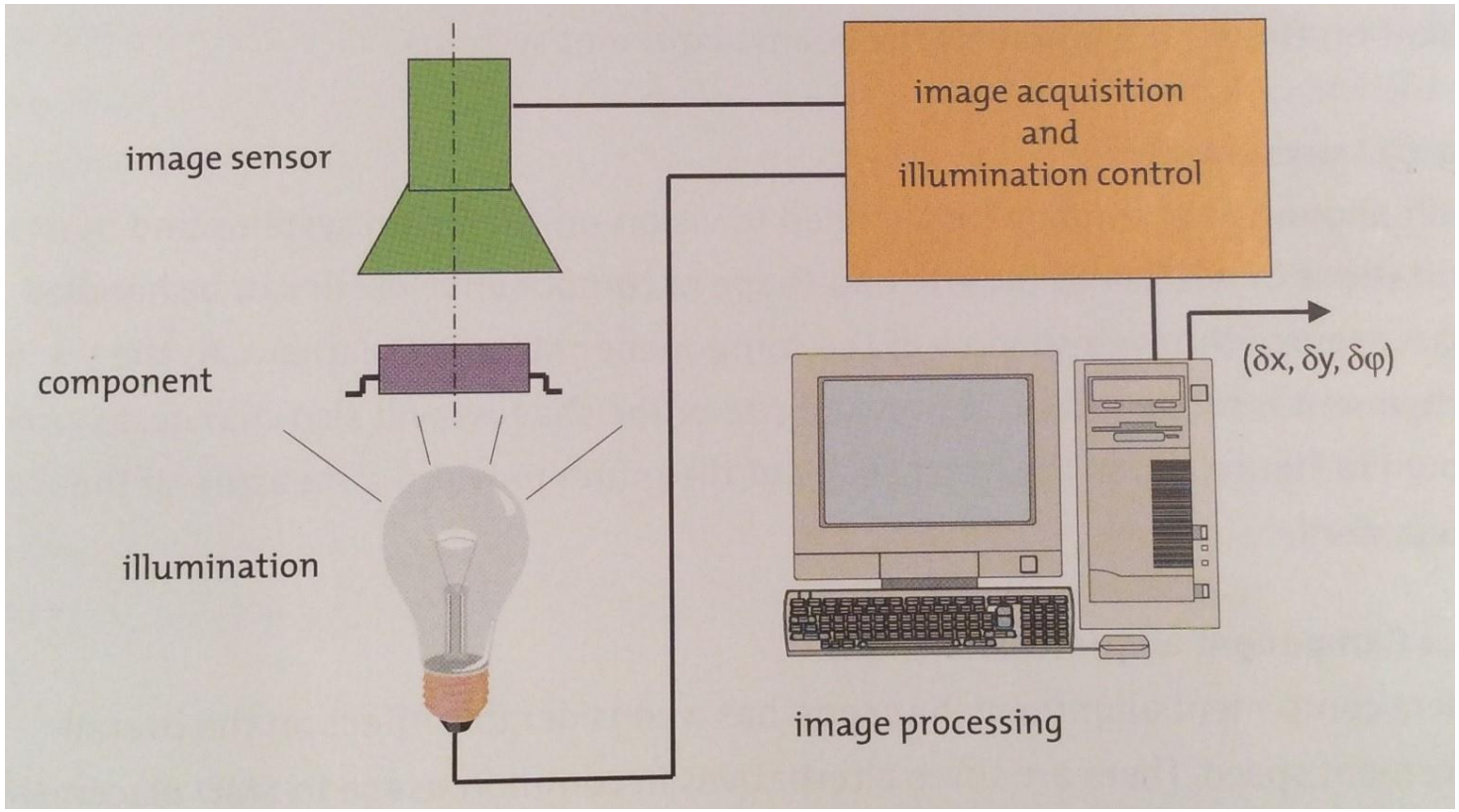


Supiltų komponentų talpyklos
Bulk, tray feeders

Lustų talpyklos
Waffle feeders, Wafer feeders

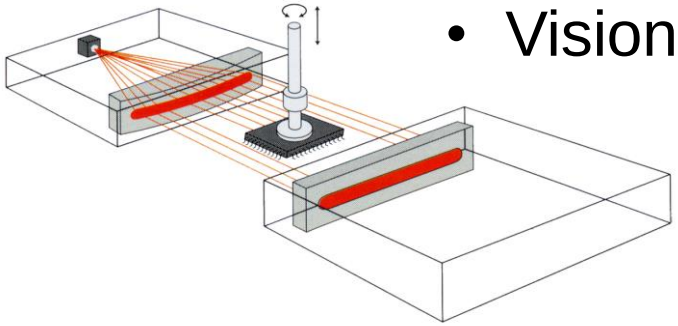


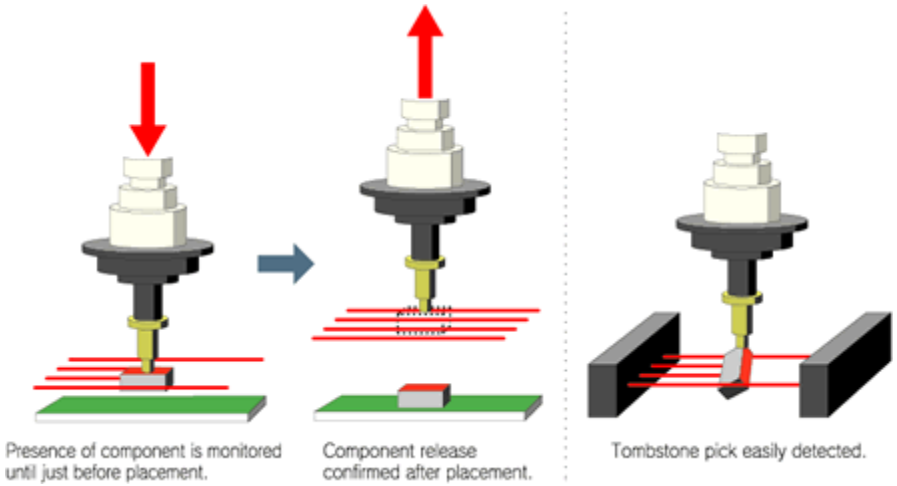
Komponento pozicionavimas
Component Positioning

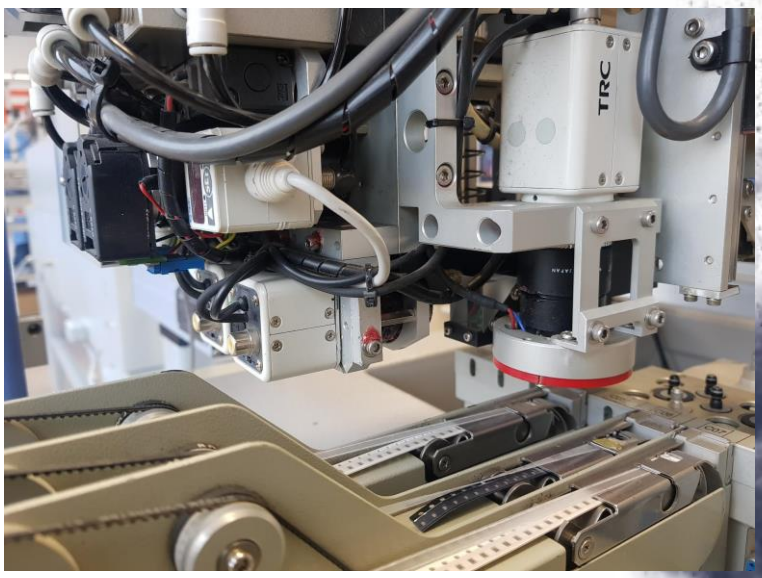


Komponento pozicionavimas
Component Positioning

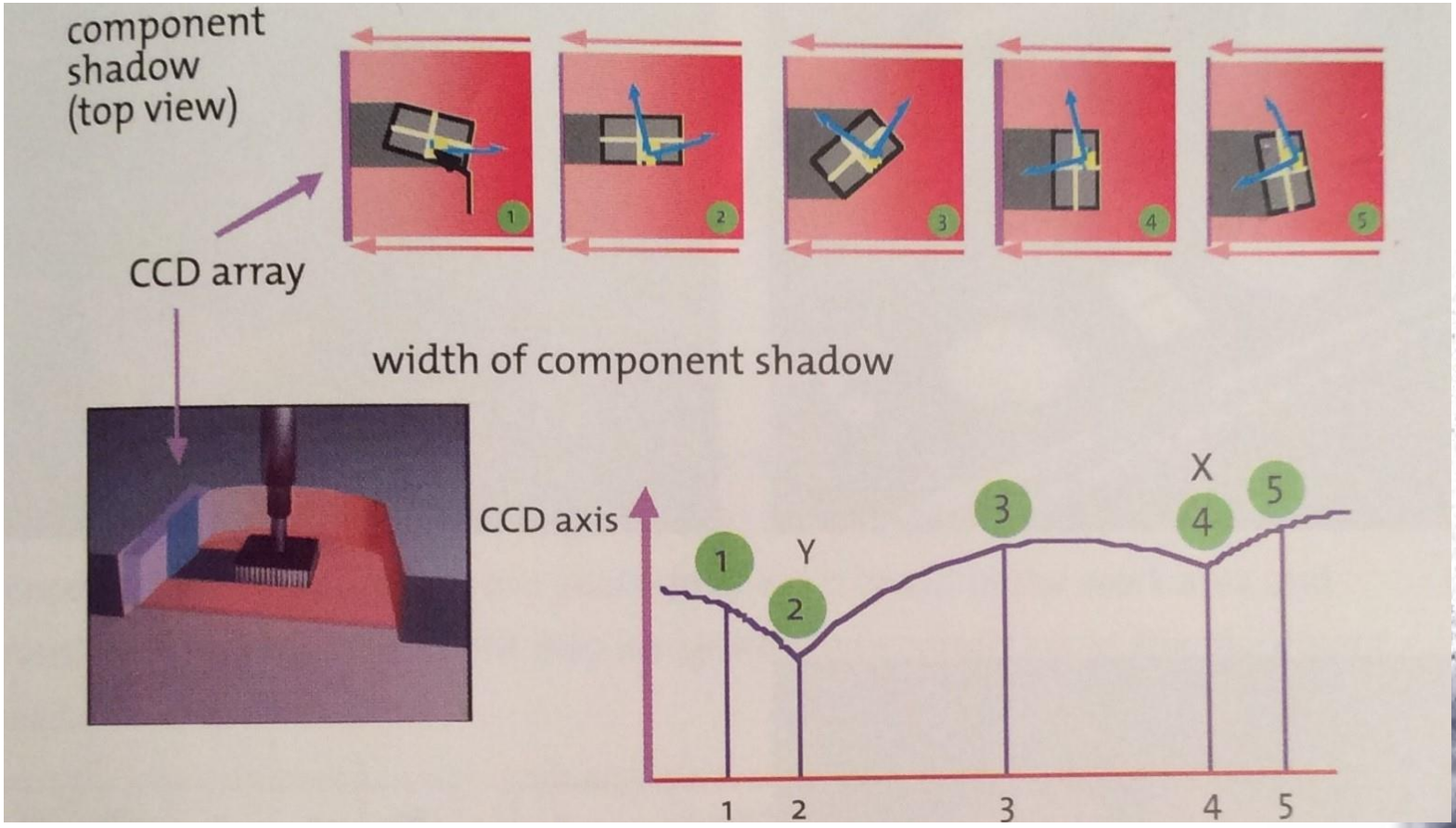
- Stop and Go
- Vision on the Fly
- Vision on the Beam





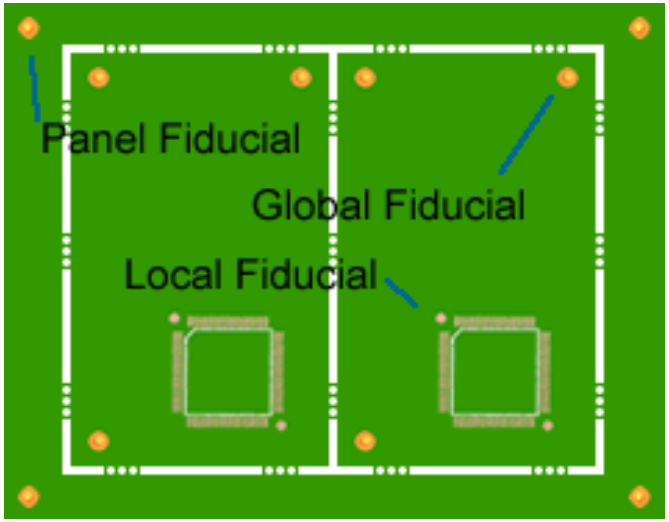


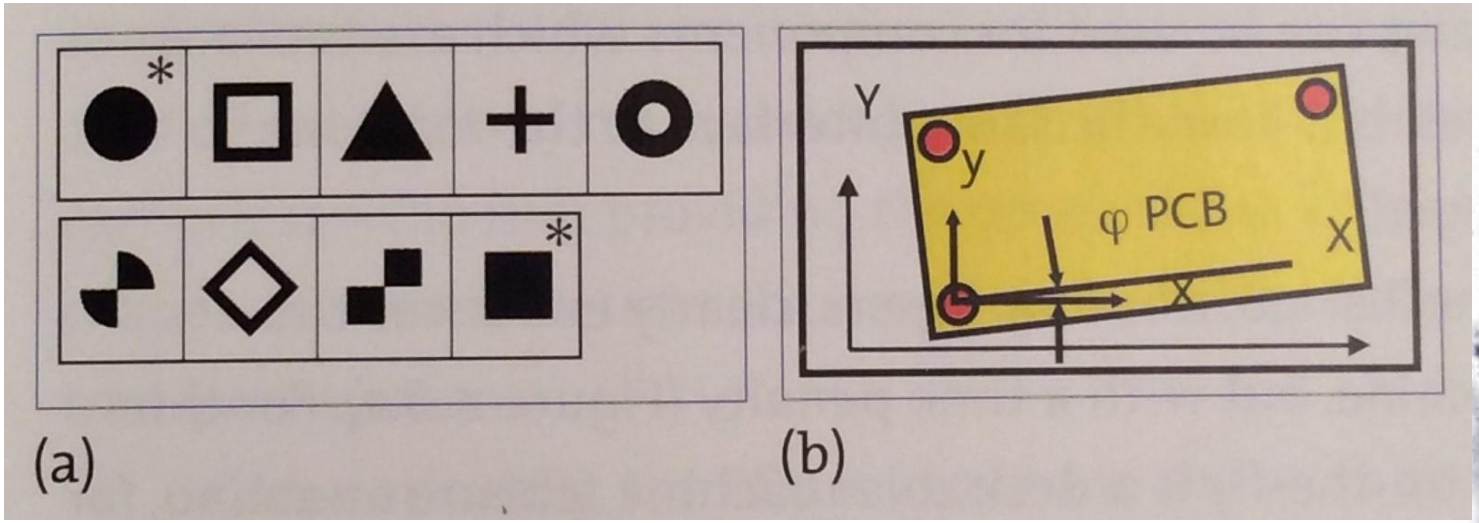
Komponento pozicionavimas
Component Positioning. Laser alignment



PCB pozicionavimas
PCB Alignment

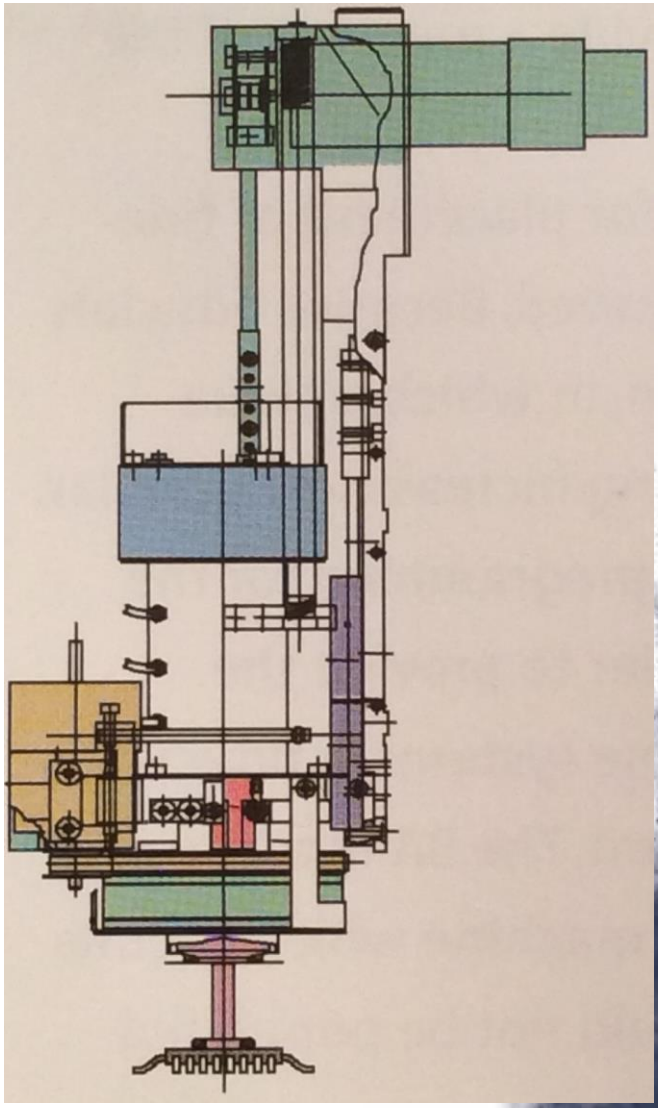
- Global Fiducials
- Local Fiducials



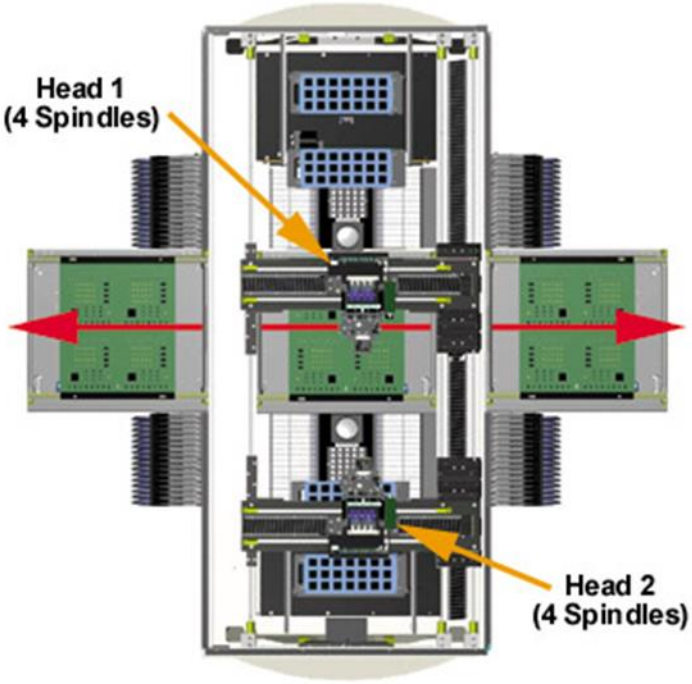


Pastatymo manipuliatorius
The placement head

- Vacuum nozzles
- Exchanging toolbits
- Telescopic nozzles
- Vacuum generators

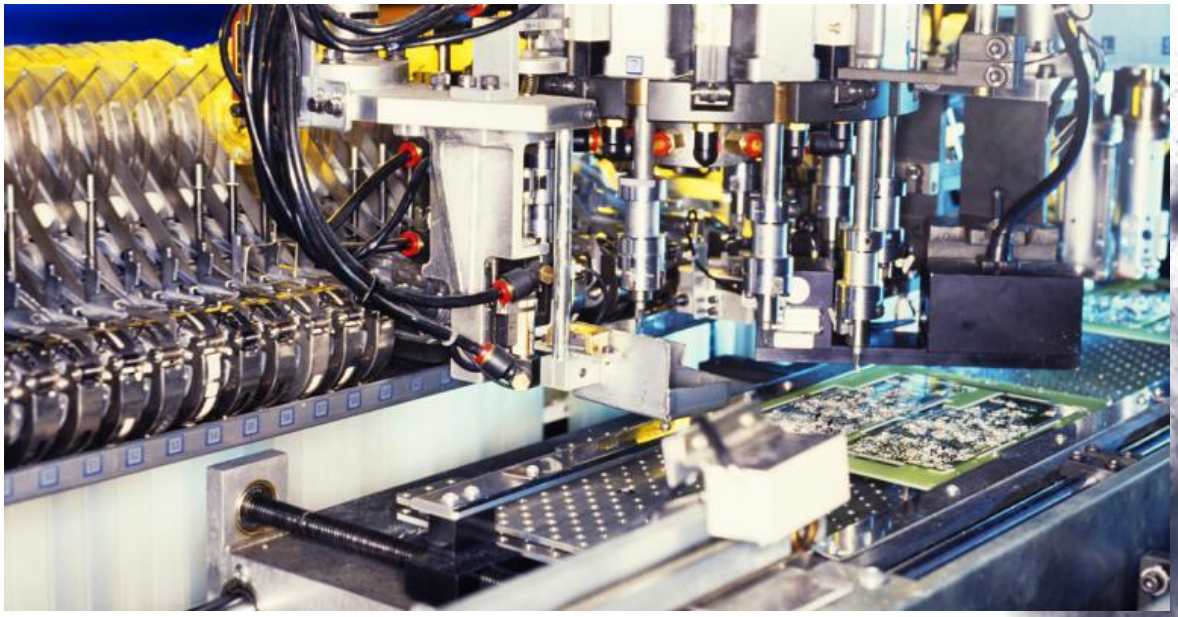


Pastatymo manipuliatorius
The placement head

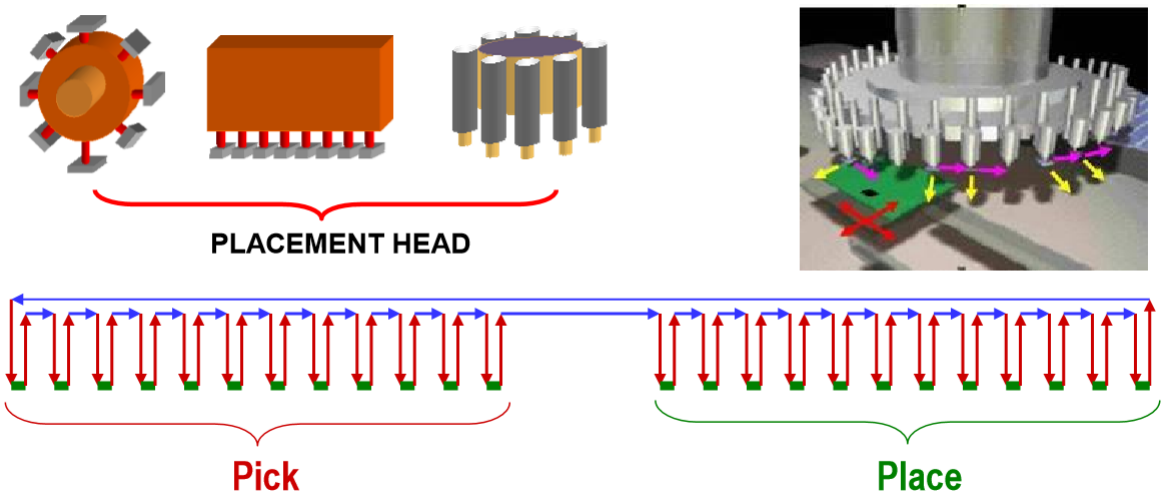


SMT įrangos koncepcija
SMT Placer Concepts

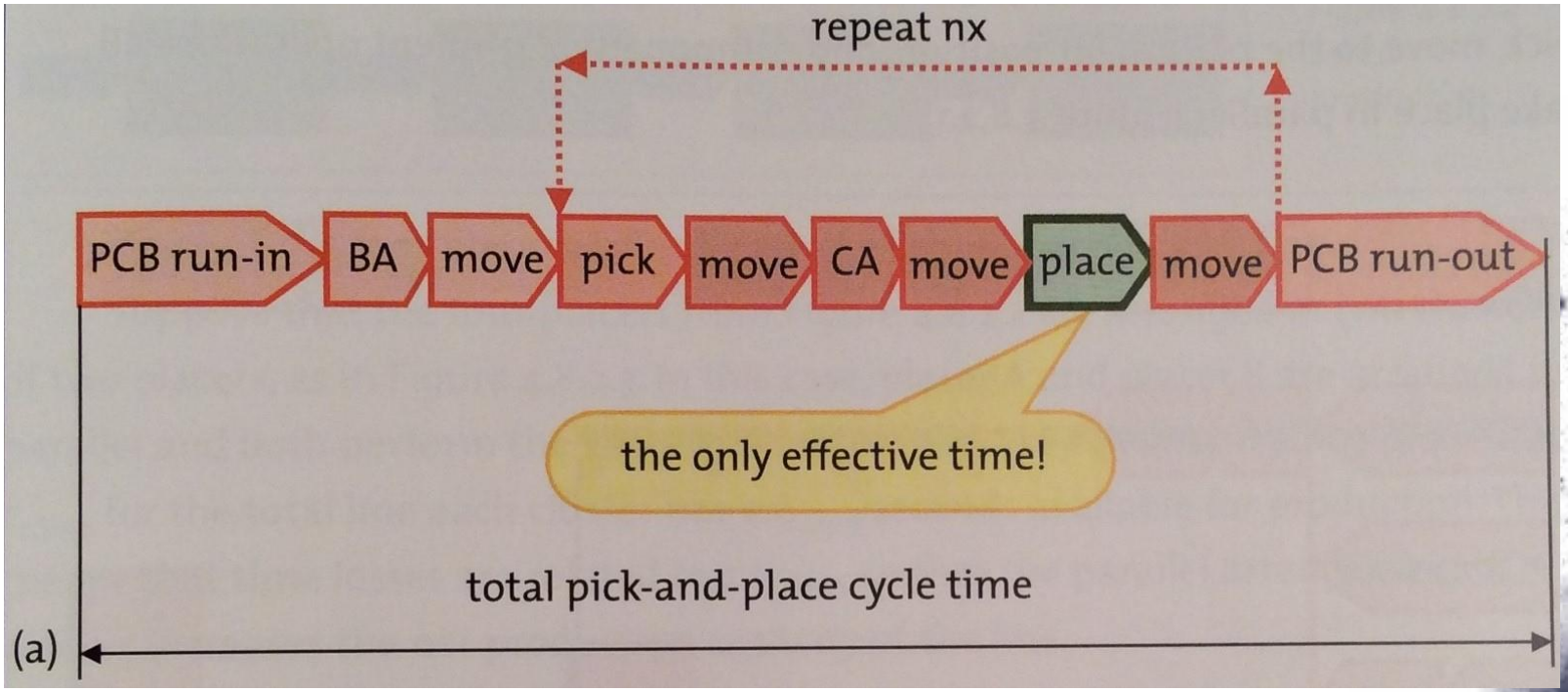
- Accuracy and Flexibility
- Placement Cycle Time
- Cost per Placement CPP



SMT nuoseklus surinkimo procesas
SMT Sequential placement process



SMT nuoseklus surinkimo procesas
SMT Sequential placement process

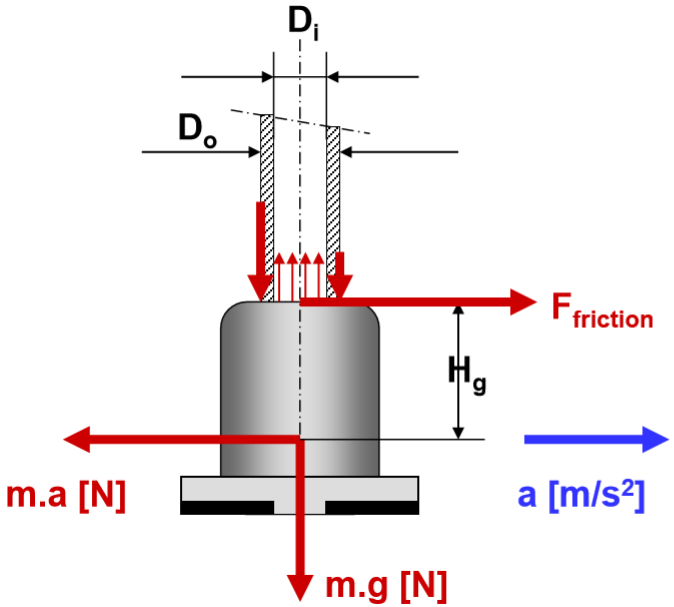


SMT nuoseklus surinkimo procesas
SMT Sequential placement process

- High accelerations / decelerations
- High forces acting on components risk of component shift or loss
- No component position monitoring between component alignment and placement position
- In most cases: no placement force control / no presence check

SMT nuoseklus surinkimo procesas
SMT Sequential placement process

Acceleration forces acting on pipettes



Risk of components shift:

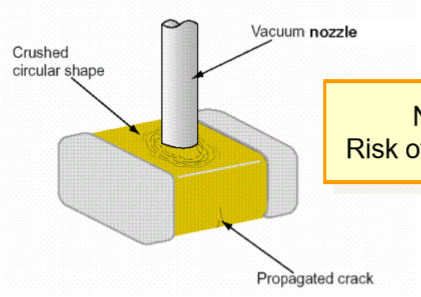
- Acceleration force (= m.a) > friction force

Risk of components break loose:

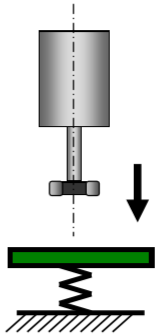
- $m.a.H_g > F_{vacuum}.(D_o/2)$

SMT nuoseklus surinkimo procesas
SMT Sequential placement process

Force control



No force control:
Risk of component cracking



Placement head

PCB

Contact stiffness

Impact force is determined by :

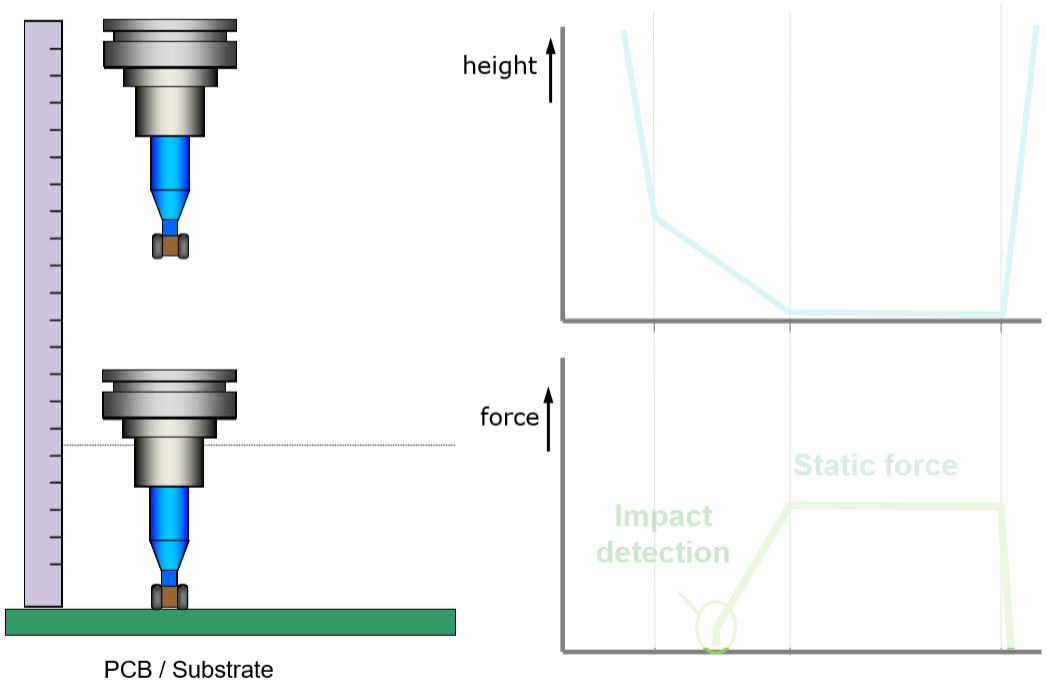
- Velocity
  - High velocity → high impact force
- Contact stiffness
  - High stiffness → high impact force
- Impact mass
  - High mass → high impact force

$$F_{placement} = F_{impact} + F_{static}$$

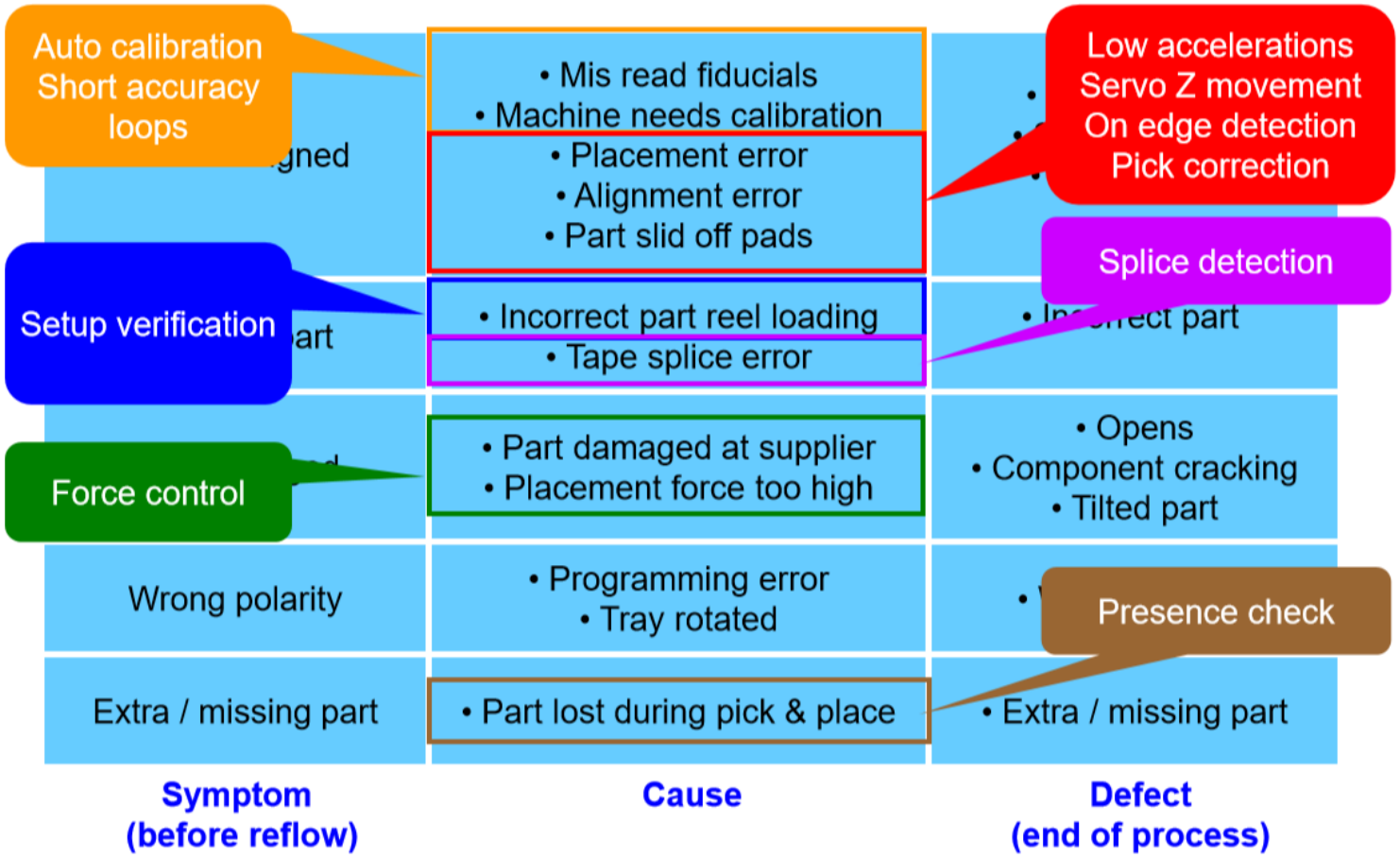
$$F_{impact} = v * \sqrt{m * k_{contact}}$$

SMT nuoseklus surinkimo procesas
SMT Sequential placement process

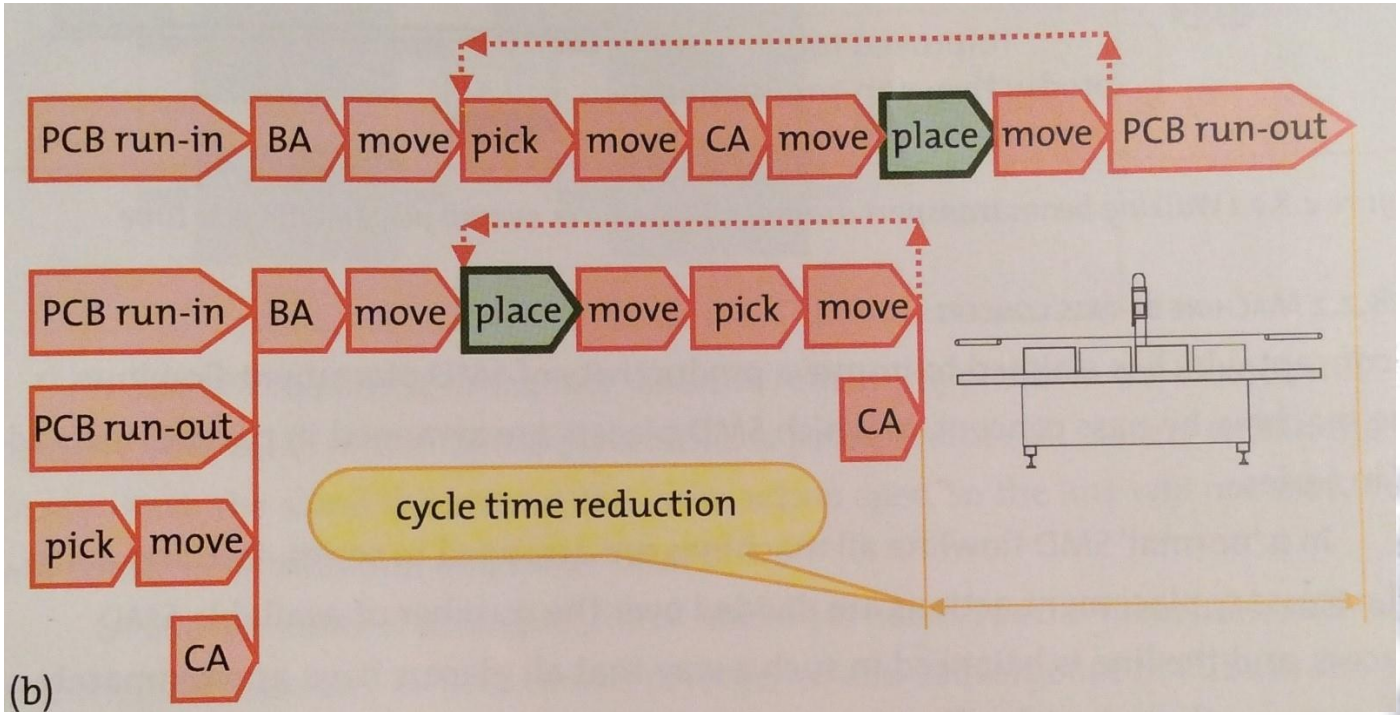
Impact force control



SMT nuoseklus surinkimo procesas
SMT Sequential placement process



SMT lygiagretus surinkimo procesas
SMT parallel placement process



SMT lygiagretus surinkimo procesas
SMT parallel placement process