

Comparing TIJ and CIJ Printers in Packaging



CIJ AND TIJ TECHNOLOGIES IN PACKAGING



Historically, companies looking for a coder to print barcodes, expiry and lot date in a packaging environment really only had one major print technology to consider – Continuous InkJet (CIJ). It could print on almost everything, from metal to plastics and more. However it came at a price – complex operation, costly downtime issues and the interminable smell from the solvent used. Today, however, there is an alternative that overcomes all the problems previously encountered – Thermal InkJet (TIJ).

AN OVERVIEW OF THE TECHNOLOGIES

CONTINUOUS INKJET (CIJ)

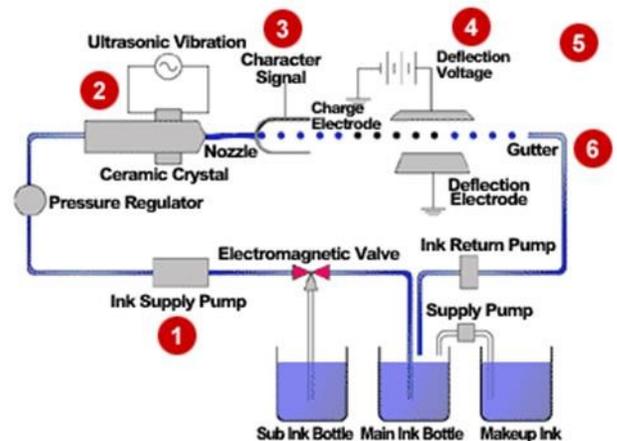
CIJ works on the principle of jetting a continuous stream of electrostatically charged ink droplets into a gutter that returns it back into the ink supply. When a print pixel is required, it is deflected for a brief moment away from the gutter and this drop impacts onto the substrate. Only a small fraction of the droplets are used to print, the majority being recycled. The ink is held in suspension in a solvent and some of this will vent to the atmosphere. The returned ink is constantly monitored for viscosity and a solvent is added to counteract fluid loss.

Advantages

- High Speed Printing
- Small Characters
- Good Throw Distance on Irregular surfaces
- Prints on many substrates

Disadvantages

- High Maintenance
- Complex Fluid System
- Limited Character Height
- Ink Mess



THERMAL INKJET (TIJ)

In TIJ the print cartridges contain a series of tiny chambers, each containing a heater. To eject a droplet from each chamber, a pulse of current is passed through the heating element causing a rapid vaporization of the ink in the chamber to form a bubble, which causes a large pressure increase, propelling a droplet of ink onto the substrate

Advantages

- High resolution Print Quality
- No Ink Mess
- Maximum Reliability
- Low Maintenance
- Easy to Maintain and use
- Prints on many substrates

Disadvantages

- Throw distance
- Irregular substrates can be a concern



HOW THEY COMPARE

CAPITAL EQUIPMENT COSTS

Lowered Image Costs with TIJ

A CIJ Printer is a complex piece of equipment with over 3 separate pumps in place, various pressure regulators, valves and electronics. All of this comes at a cost. Although capital costs vary greatly between manufacturers, a CIJ printer capable of printing lot codes, expiry dates and text can cost upwards of \$9,500.

A comparable TIJ printer, based on disposable print cartridges and with no moving parts retails for almost half the price at \$5,000.

✓ **TIJ: Lower Cost**
CIJ: Higher Cost



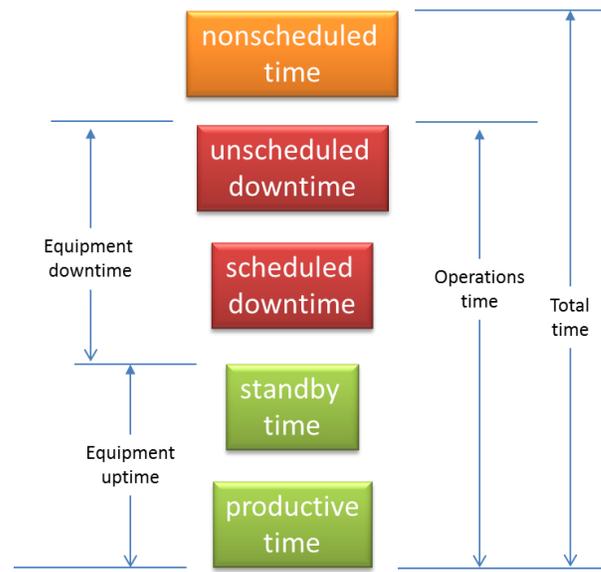
UPTIME AND DOWNTIME

The first part is a measure of reliability and if we assume that both CIJ and TIJ are equally reliable, this really becomes the extent of time that it takes to get equipment back on line. CIJ takes much, much longer due in part to its complexity and startup times. Many end users have a factor of 5 or even 10 to 1 in favor of TIJ when comparing the two. Depending on the production line, this can be a very significant cost factor.

Scheduled downtime is planned maintenance time in the form of preventative activities. With CIJ this can be a common and regular event compared to TIJ, where there really is no maintenance time.

The third part is non-scheduled time this is the time that production is not ongoing, such as unworked time periods, off line training, installation of upgrades. On the surface this would appear not to have an impact on the cost of particular equipment; however with some printers, especially CIJ, due to long or complex startup times, it may be advantageous to leave the machines on during nonscheduled time. This can have an impact on evaporation of makeup fluids in the case of CIJ printers or even a reduced lifespan. With TIJ this is never a concern.

✓ **TIJ: Best Uptime**
CIJ Lower Uptime



Operational Productive time impacted by printers is measured in three parts – (1) unscheduled downtime, (2) scheduled downtime and (3) non-scheduled time

OPERATIONAL COSTS

Operational Costs can often be far greater than the initial purchase price so any differences between equipment offered should always take into consideration cost savings on consumables, reliability, maintenance and other concerns.

Printers consume – inks, makeup, electricity. This has to be calculated prior to any purchase as it is a major operational cost. This will be different between print technologies, although there is more control within TIJ solutions as densities, print resolutions can be adjusted to meet darkness and legibility requirements that affect the cost of consumables used.

Although the ink used in CIJ printers is cheaper than comparable TIJ systems; when costs per print are calculated, based on makeup and print efficiencies, parity between the two technologies is the norm.

✓ **TIJ: Same**
 ✓ **CIJ Same**

The screenshot shows a dashboard for 'Assembly Area 3' with the following data:

Counters	Average Rate (RPH)	Current Rate (RPH)
Total Count: 5,960	Average Rate Total: 812.7 RPH	Current Rate Total: 1,102.9 RPH
Good Count: 5,834	Average Rate Good: 795.5 RPH	Current Rate Good: 1,102.9 RPH
Reject Count: 126	Average Rate Reject: 17.2 RPH	Current Rate Reject: 0.0 RPH

OEE	Target Counter	Goal Counter
OEE: 70.71%	Target Count: 6,184	Shift Goal Count: 6,184
Availability: 76.19%	Takt Time: 4.10	Pieces to Goal: 350
Performance: 94.82%	Efficiency: 94.34%	Percent of Goal: 94.34%
Quality: 97.89%	Time Variance: -0:23:55	

Cycle Times	Production Times	Prod. Time Percentages
Current Cycle Time: 1.22	Run Time: 5:35:13	Percent Run: 69.84%
Last Cycle Time: 3.26	Down Time: 1:27:25	Percent Down: 18.21%
Average Cycle Time: 3.34	Setup Time: 0:17:22	Percent Setup: 3.62%
	Standby Time: 0:40:00	Percent Standby: 8.33%

Standard Cycles	Production State
Standard Cycles: 4,649	Production State: Run
Slow Cycles: 1,192	
Small Stops: 60	

Standard Cycles Time
Standard Cycles Time: 4:12:54
Slow Cycles Time: 1:11:12
Small Stops Time: 0:04:46

MAINTENANCE

Part of any equipment operation has to be maintenance. How often this has to happen is a critical part of the total cost of ownership. CIJ printers, for example, require upkeep on an ongoing basis from cleaning to filter replacement and addition of makeup fluid. As this is often a skilled exercise that requires external services, this can be a sizeable sum of money. With CIJ printers, a rough rule of thumb would be to assume \$3,000 per annum per printer.

TIJ on the other hand requires almost no maintenance. Every time a cartridge is changed, which is where the ink is stored, effectively the user gets a new printer. As the ink and printer is a closed system, there is no regular addition of makeup solution. Consequently the fees for maintenance can be classed as effectively zero.

✓ **TIJ: No Maintenance**
✓ **CIJ: High Maintenance**



SUBSTRATES

Previously CIJ, with its wealth of MEK solvent based inks was the only print technology capable of consistently printing on non-porous substrates – plastics, metals, varnished stock. Today, however, that has changed with the advent of solvent based inks that can be used in TIJ cartridges. Now printing on cans, plastic bags, foils etc. is a reality.

✓ **TIJ: Same**
✓ **CIJ: Same**

TIJ IS A VIABLE REPLACEMENT FOR CIJ PRINTERS

TIJ solutions have come of age in the packaging industry. What was once a stretch for the technology in printing on non-porous substrates has now become the norm.

The many downsides of CIJ – maintenance, cleanliness, and complexity - has largely been overcome and TIJ provides a highly effective method for marking and coding solutions that are high quality, low maintenance and with maximum reliability.



.UNO—A REAL ALTERNATIVE TO CIJ



The 1/2" .UNO packaging printer's all-in-one print head and screen give you a simple, yet incredibly powerful way to print up to 1/2" of print with the minimum of effort. This packaging printer system comprises of a 7" screen and attached print head allowing you to be up and running within minutes.

Using norwix proven and highly reliable print solutions based on Hewlett-Packard technology, the .UNO packaging printer is the ideal product for serialization, barcodes and human-readable printing in all packaging applications.



8 REASONS TO REPLACE YOUR CIJ PRINTER

1. No Mess
2. No Smell
3. Zero maintenance
4. Higher reliability
5. Lower Costs
6. Simple operation
7. Lowered VOC's
8. Small Footprint

norwix
MARKING SYSTEMS