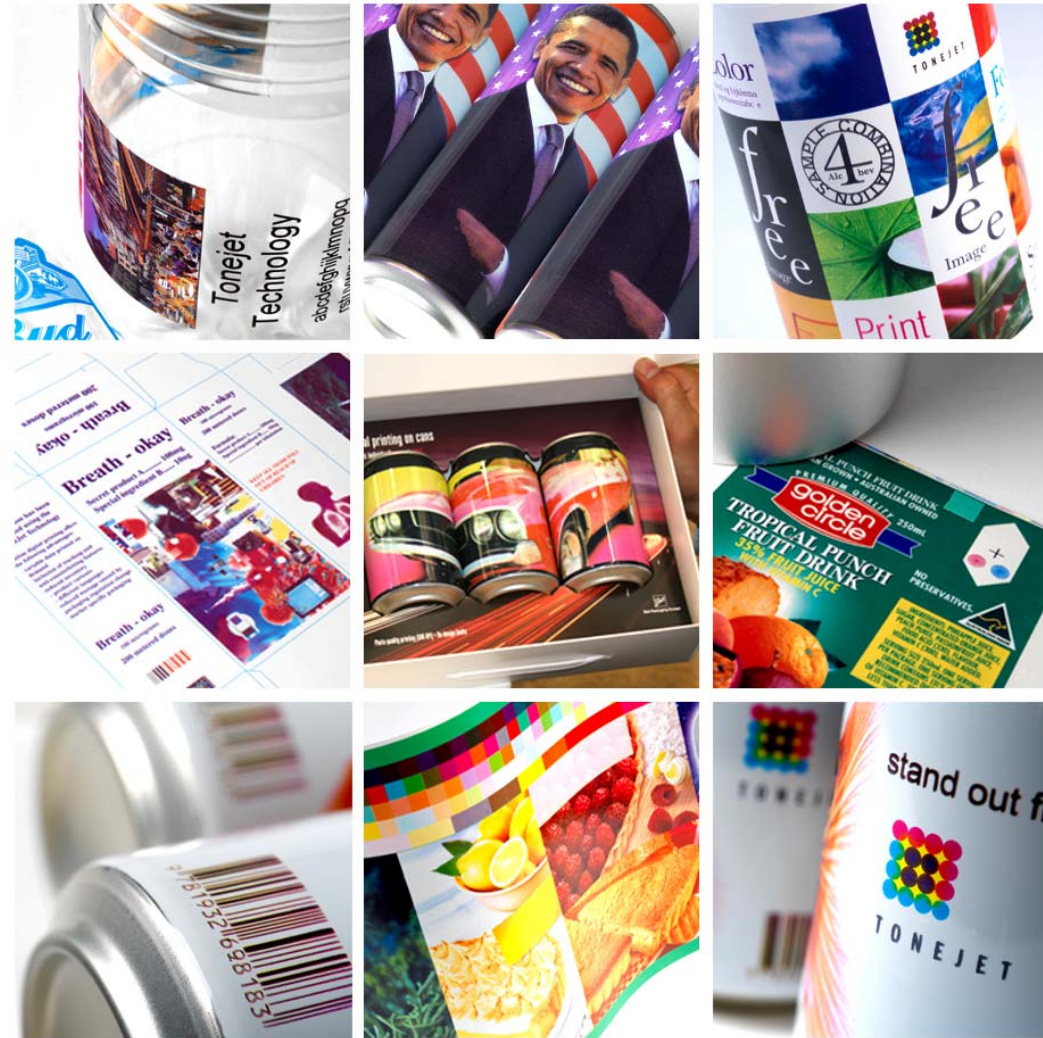


Tonejet: Meeting the needs of the Packaging Industry

Guy Newcombe

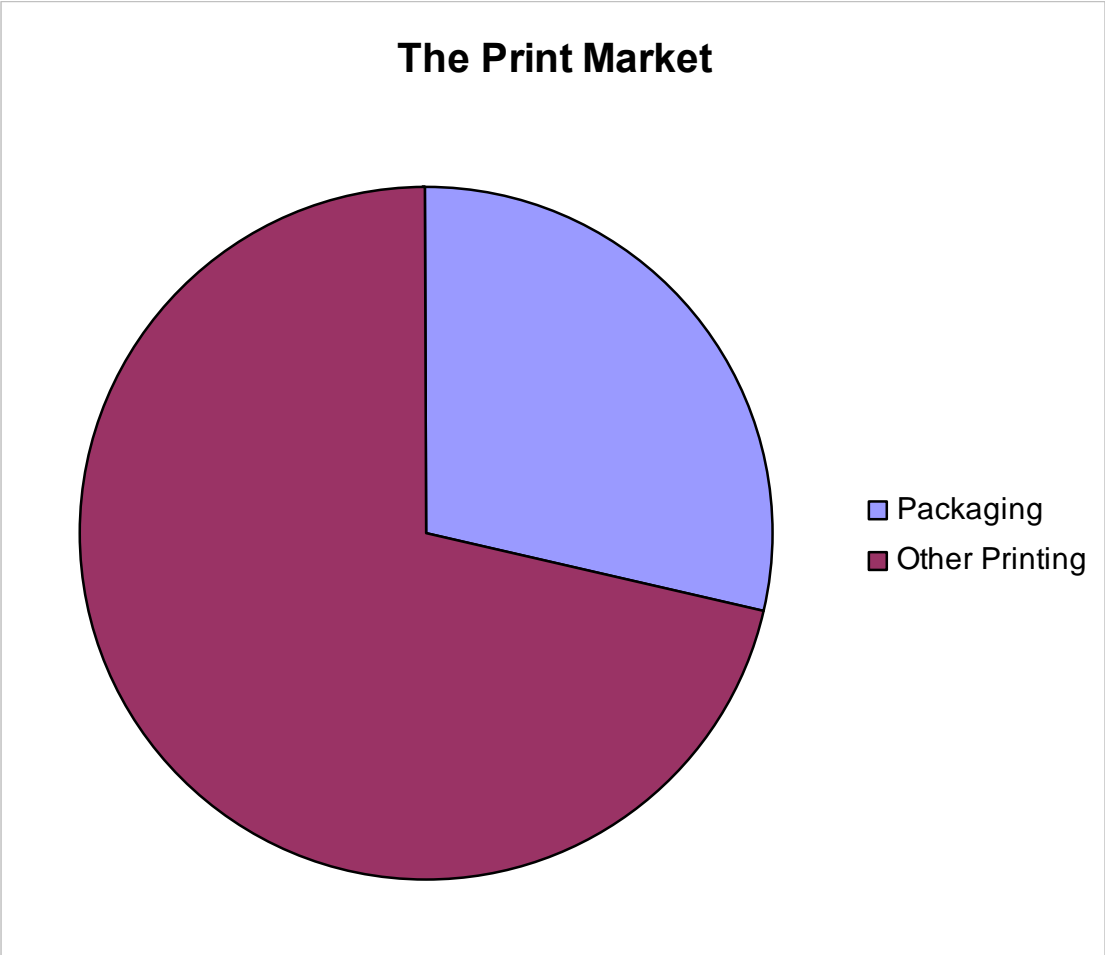


Why Packaging?

- Largest sector of printing market
- Growing
- Large demand for the right digital printing technology



The World of Print



At €140 Billion, Packaging represents the largest sector of the €500 Billion print market

PIRA: The Future of Global Printing to 2012

Packaging Sectors

Flexible Film

- Food, Medical, Shrink-wrap



Paperboard Packaging

- Food, Pharmaceuticals, Cosmetics



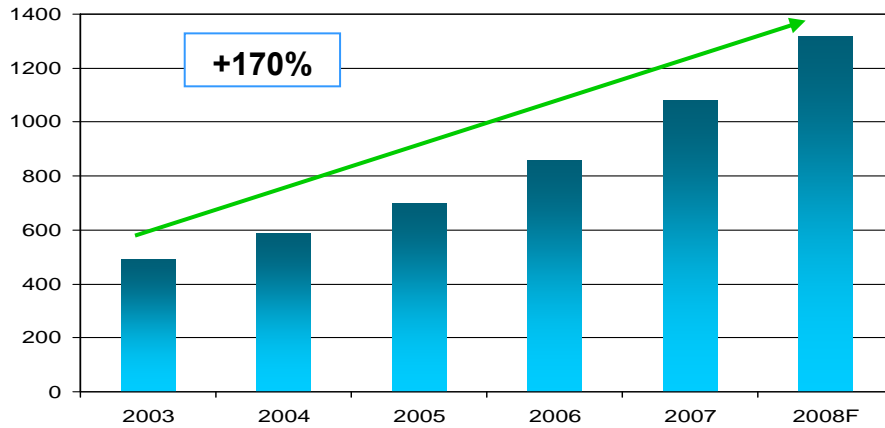
Beverage Containers

- Cans, Bottles (Glass & PET)



Packaging is Growing and Changing

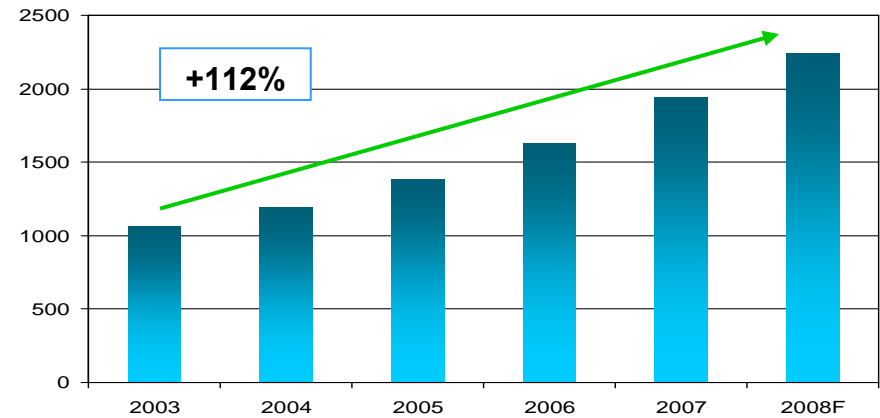
Development Energy Drinks (Million Litres)



Source: Canadean



Development Functional Drinks (Million Litres)



Source: Canadean

© Tonejet 2009

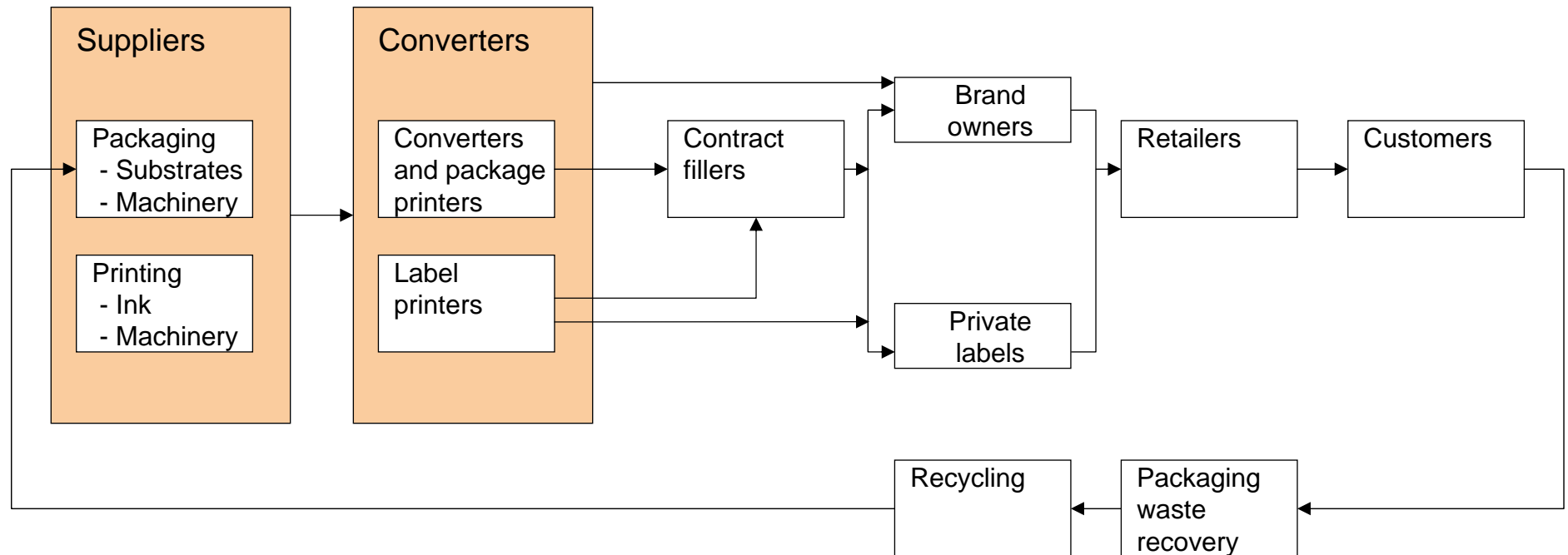


TONEJET

Digital Packaging: Who wants it and why?

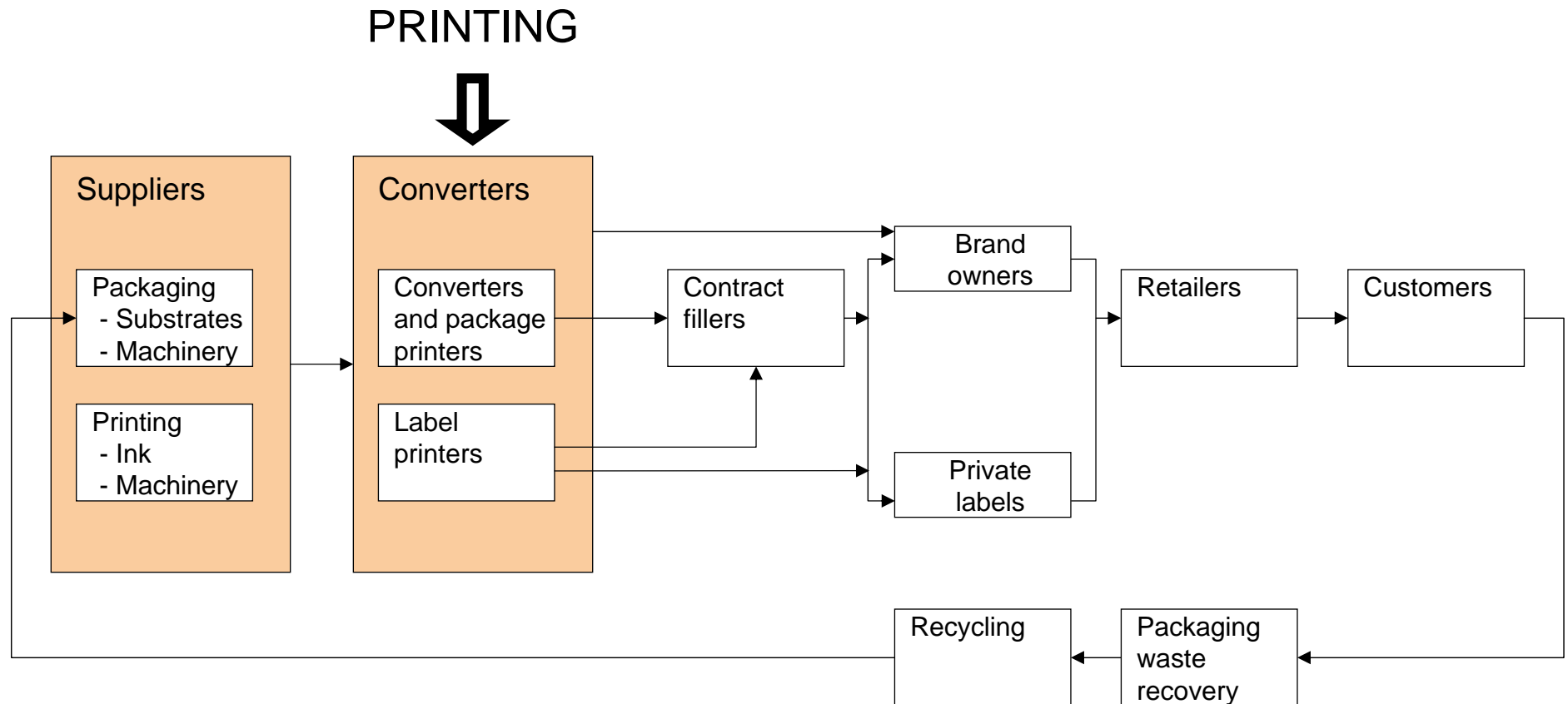


Package Printing Supply Chain: Today



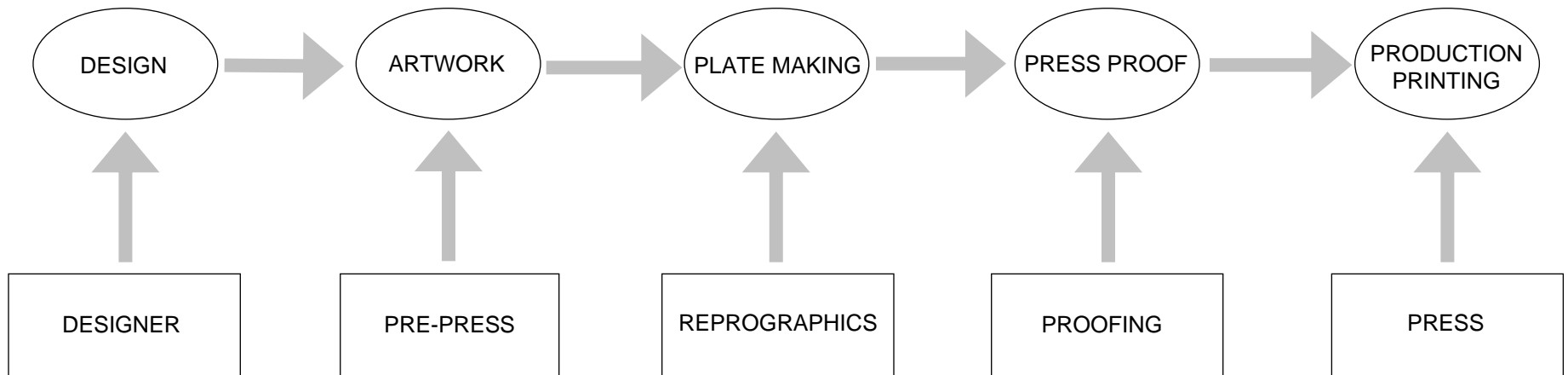
PIRA: The Future of Package Printing to 2013

Package Printing Supply Chain: Today



PIRA: The Future of Package Printing to 2013

Package Printing Authorisation Chain: Today



Digital Packaging: Who wants it and why

Brand Owners recognise that they stand to gain from bringing digital decoration closer to their operations

Gains come from both the savings and the added value that digital creates

Money will be saved

- Lower stock
- Lower waste

Extra value will be created

- Higher value product with customised up-to-the-minute designs



Digital Packaging: Impact on the Supply Chain

- Authorisation process will be shorter
- Product will be printed to order
- Print process will be simpler

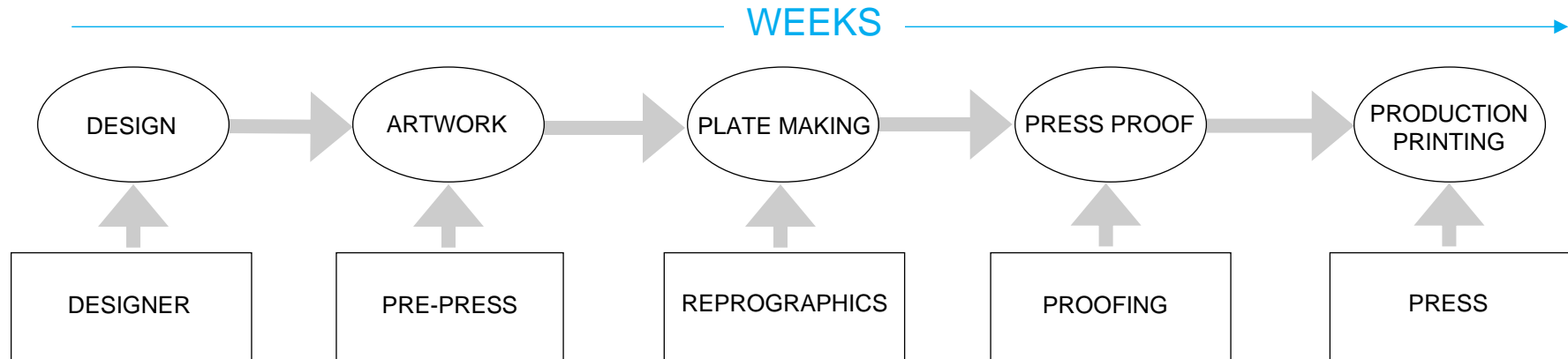
Supply Chain will be restructured:

- Printing further down the chain and closer to the customer

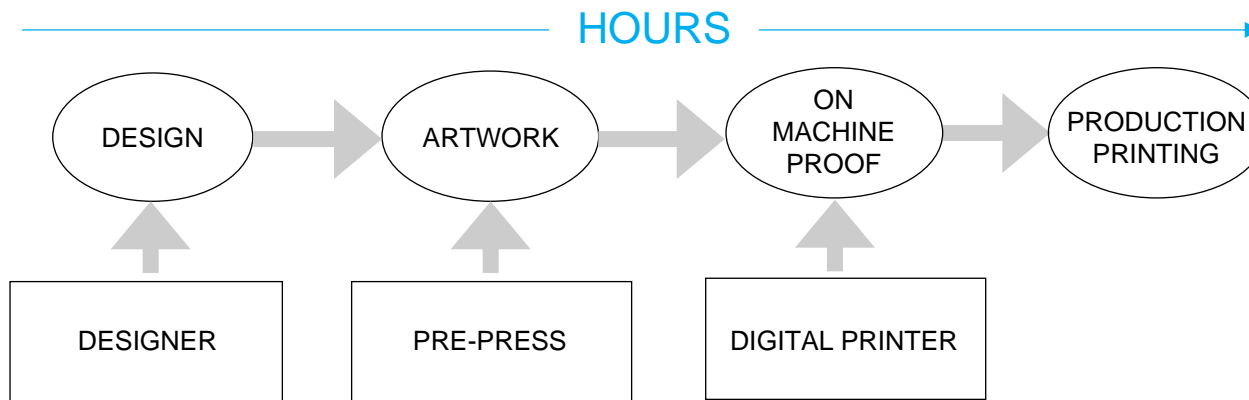


Digital Transforms the Authorisation and Supply Chain

Conventional



Digital



What does the packaging industry need?

Packaging needs are specialised
...and demanding

- Many substrates
- Tough environments
- Food compatible
- Increasing need for recyclable products
- Need to deliver high volumes at competitive costs



The right solution needs to

- Print onto the complete range of customer's material
- Be food safe
- Be compatible with a range of curing systems
- Deliver high volumes, high quality, competitive cost

Tonejet delivers this through

- Tonejet ejection process
- Simple ink formulations
- Using the customer's current curing process



The Tonejet Process: Science

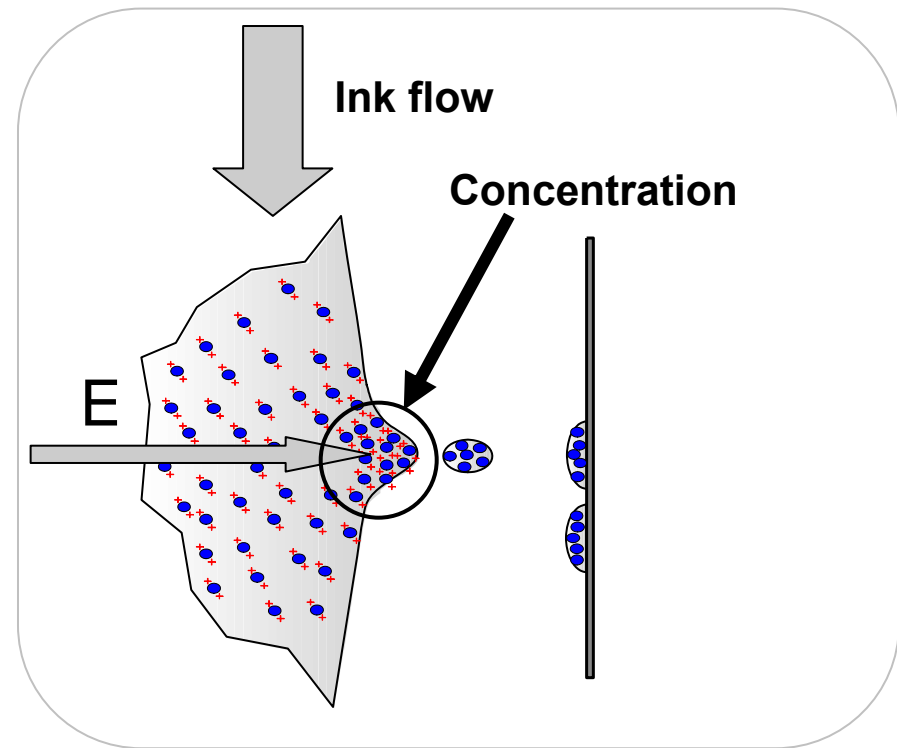
Electrostatic concentration and ejection of particles from a fluid.

The Tonejet printhead creates the meniscus shape and enables an electric field to be applied to the ink surface.

The Tonejet ink is a key part of the ejection process. The force is applied direct to the charged particles.

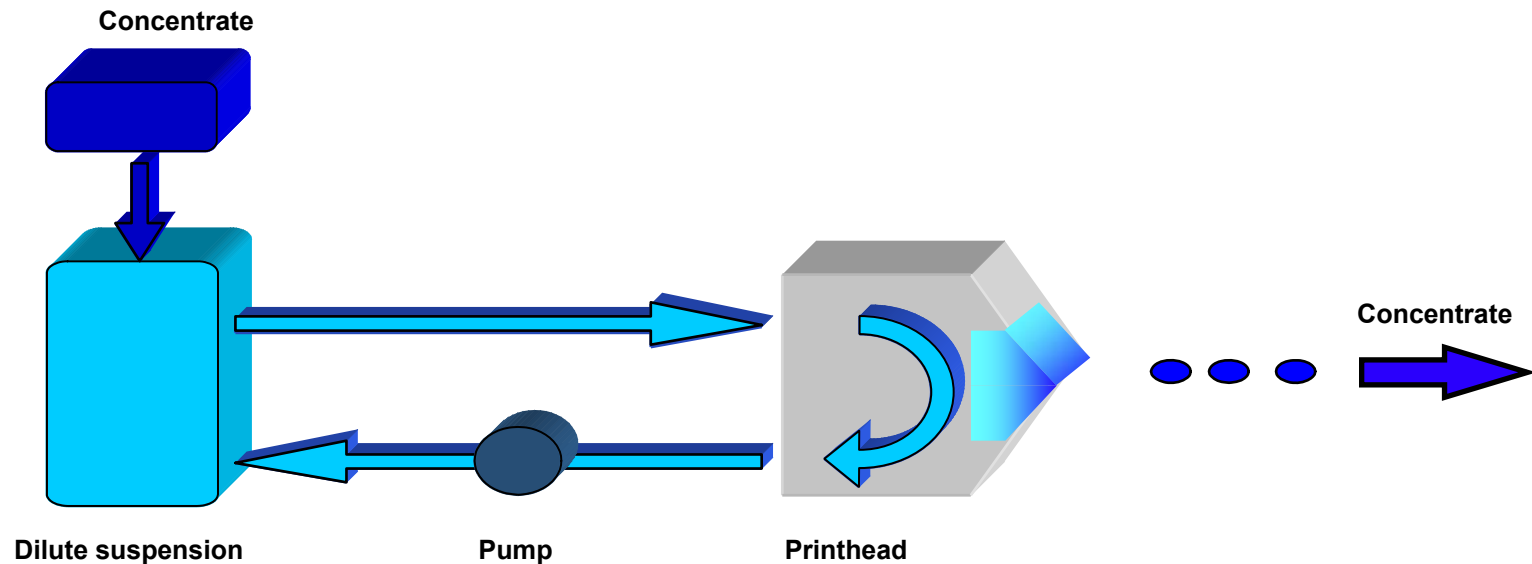
The electric field draws the particles into a fine concentrated jet. The longer the pulse the more ink is ejected.

Tonejet ink flows continuously through the ejection region.



The Tonejet Process: System

- Non-contact
- Prints concentrated ink
- No special substrate treatment
- Continuous greyscale control
- Ejects large range of materials



Tonejet Ink

A suspension of charged particles in Isopar

Printing Requirements

Print quality
Up-time
Coverage rate

Tonejet Ink Properties

Particle size
Pigment loading
Viscosity
Conductivity
Particle Mobility

Ingredients

Isopar
Pigment
Dispersant
Charge Additive

Processes

Milling
Dispersion
Mixing
Filtration

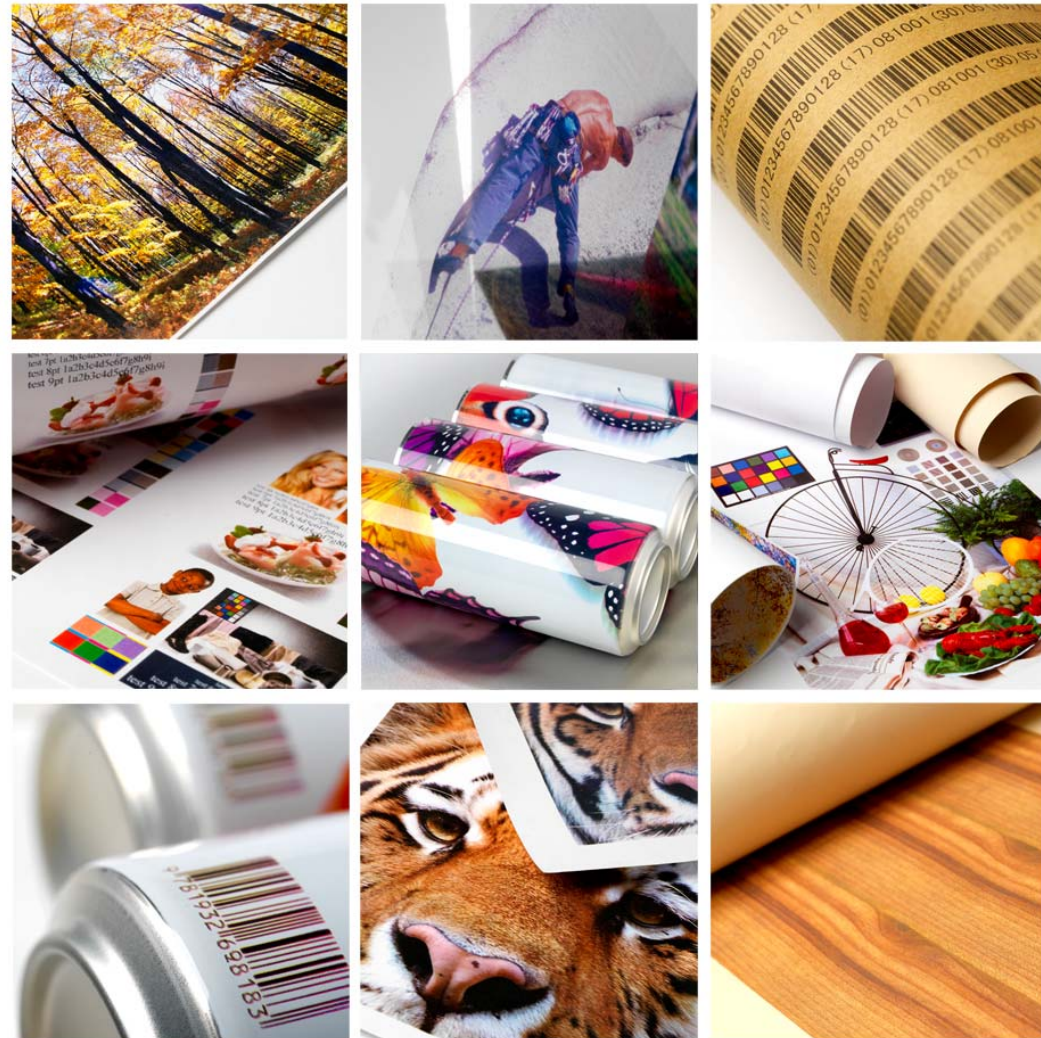
Tonejet Inks

Benefits of Tonejet Inks

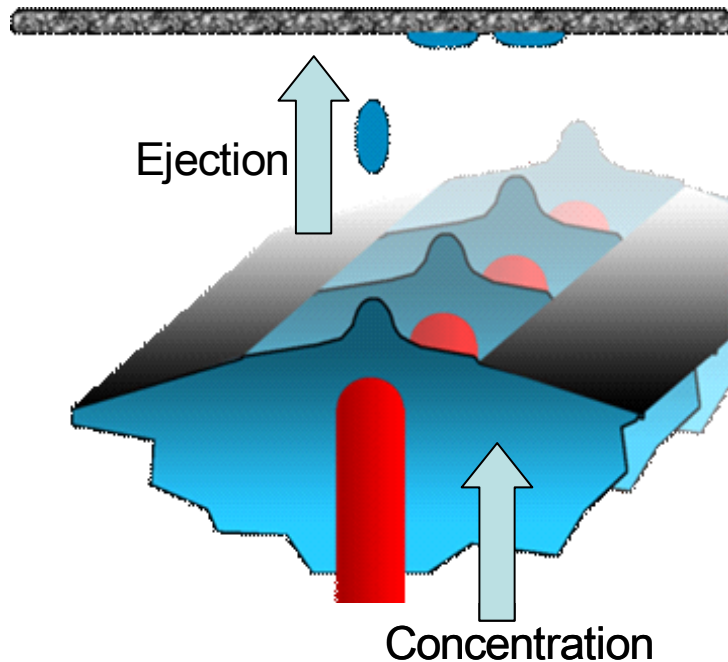
- Low-cost formulation
- Robust, flexible ink chemistry
- Excellent image quality and durability

Ink Materials

- Same pigment components as in conventional ink
- 4 process colours + white + spots



The Tonejet Printhead: Design Requirements



The purpose of the Tonejet printhead is:

- To create the meniscus shape
- To enable a controlled electric field to be applied to the ink surface
- Allow fresh ink to be supplied to the ejection region.

The Tonejet Printhead: Creating the Meniscus Shape

The Tonejet head is a three dimensional structure consisting of sidewalls, flow channels and ejectors (see model).

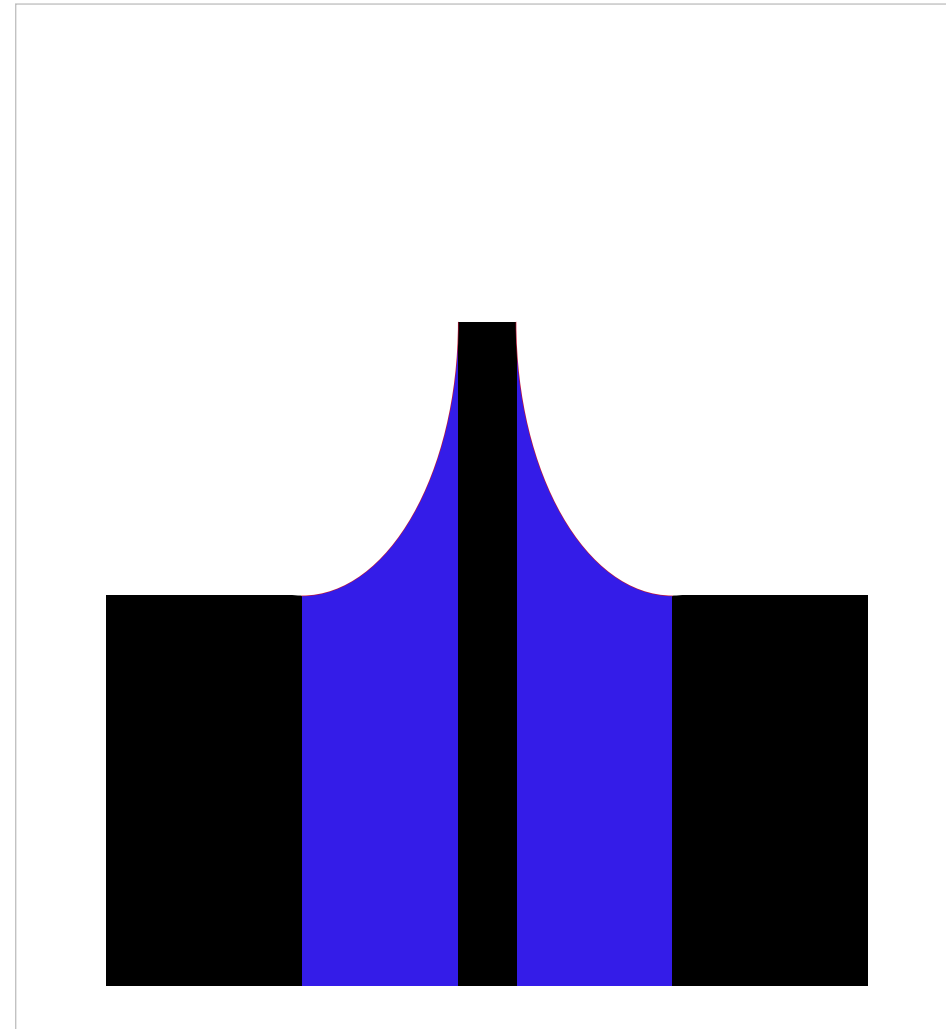
The meniscus is pinned between the side walls and the ejector.



The Tonejet Printhead: Creating the Meniscus Shape

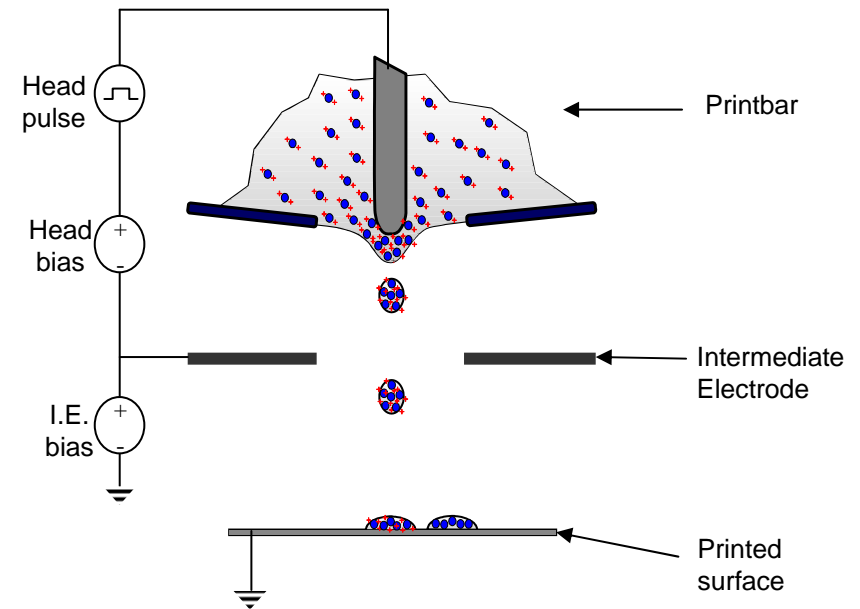
The Tonejet head is a three dimensional structure consisting of sidewalls, flow channels and ejectors (see model).

The meniscus is pinned between the side walls and the ejector.



The Tonejet Printhead: Creating the Ejection Field

- The electric field is created between the printbar and an intermediate electrode, which is integral to the printhead structure.
- A constant bias voltage is set between the printbar and the intermediate electrode and ejection is effected by applying an additional pulse to the ejection electrode.
- A constant acceleration field is applied between the intermediate electrode and the printed surface, so drops are continuously pulled towards the imaged surface.

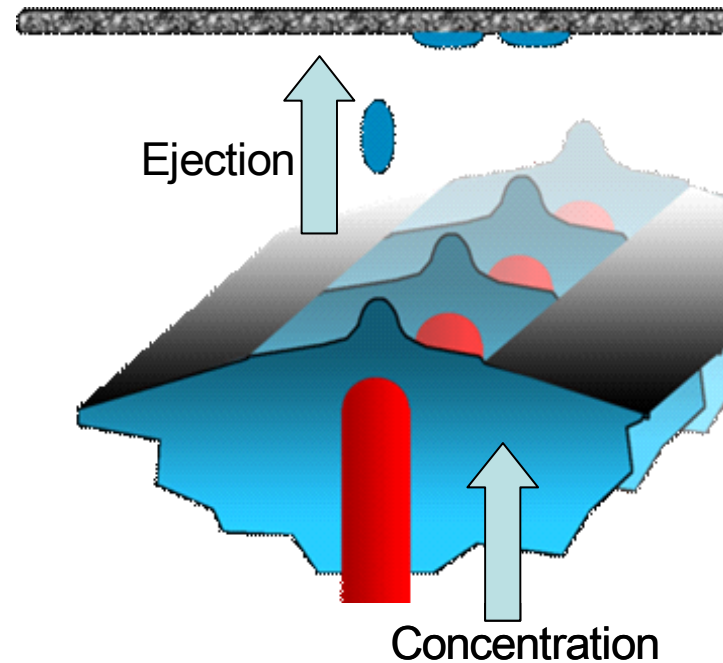


The Tonejet Printhead: Attributes

- Open Structure
- Simple
- Scalable

- No nozzles
- No dead ends
- No internal stresses

Flow channel: 120 μm wide



Printing onto Different Substrates

Tonejet prints onto metal, plastic, paper and glass and uses standard treatments that are used for conventional printing.

The rheological properties of the printed ink can be tuned to get the required dot and image formation on any particular material

Any printed Isopar evaporates and can be collected for reuse

The ink fixing mechanism is fitted to the application requirements



Printing onto Different Substrates

- non-absorbing



- absorbing



Printing onto Different Substrates

- conductive

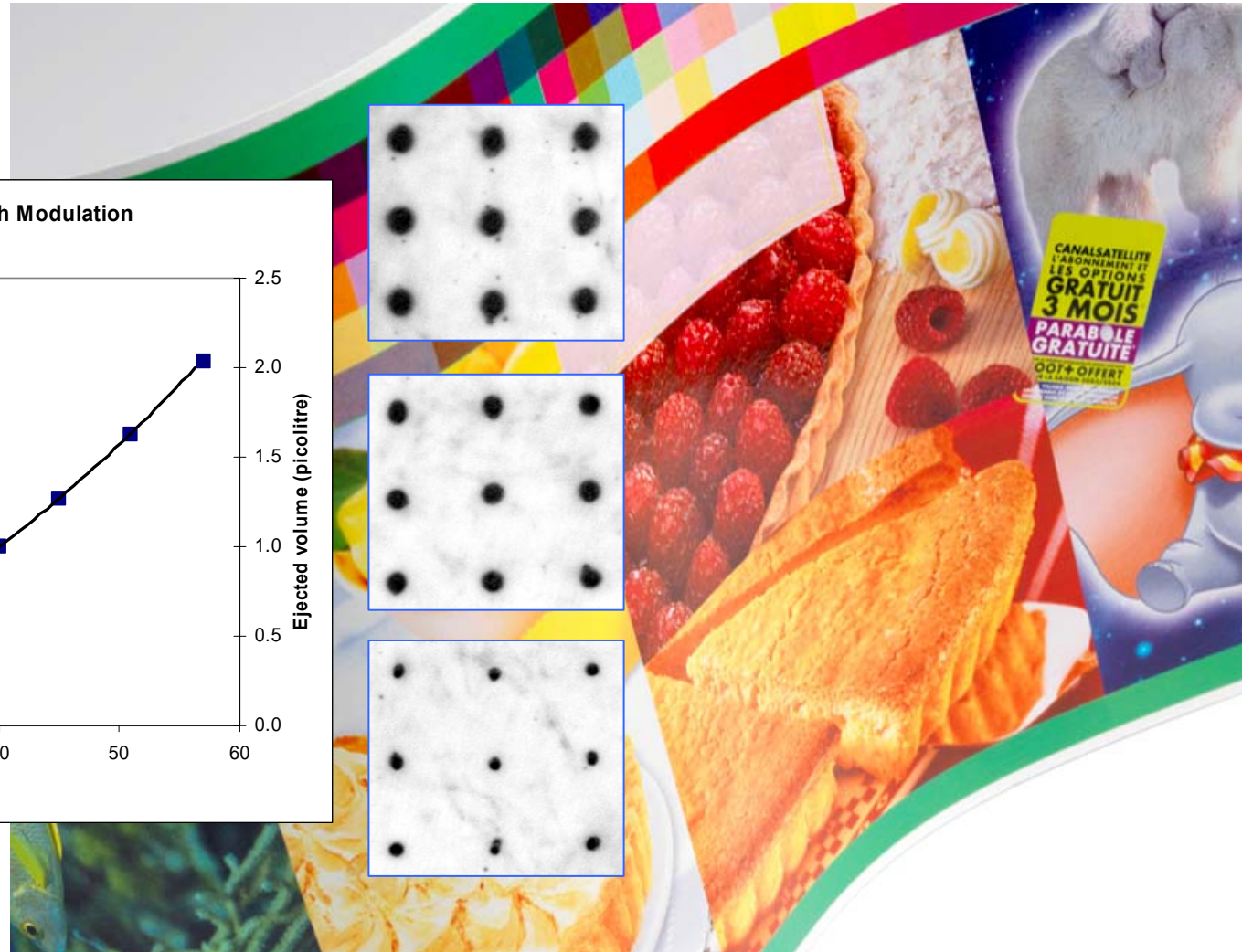
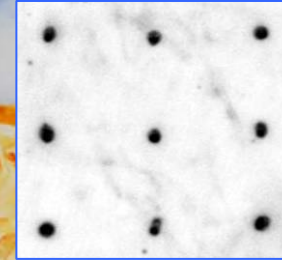
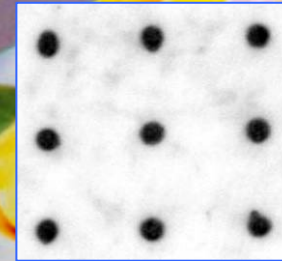
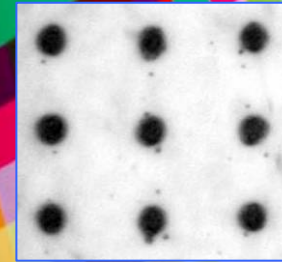
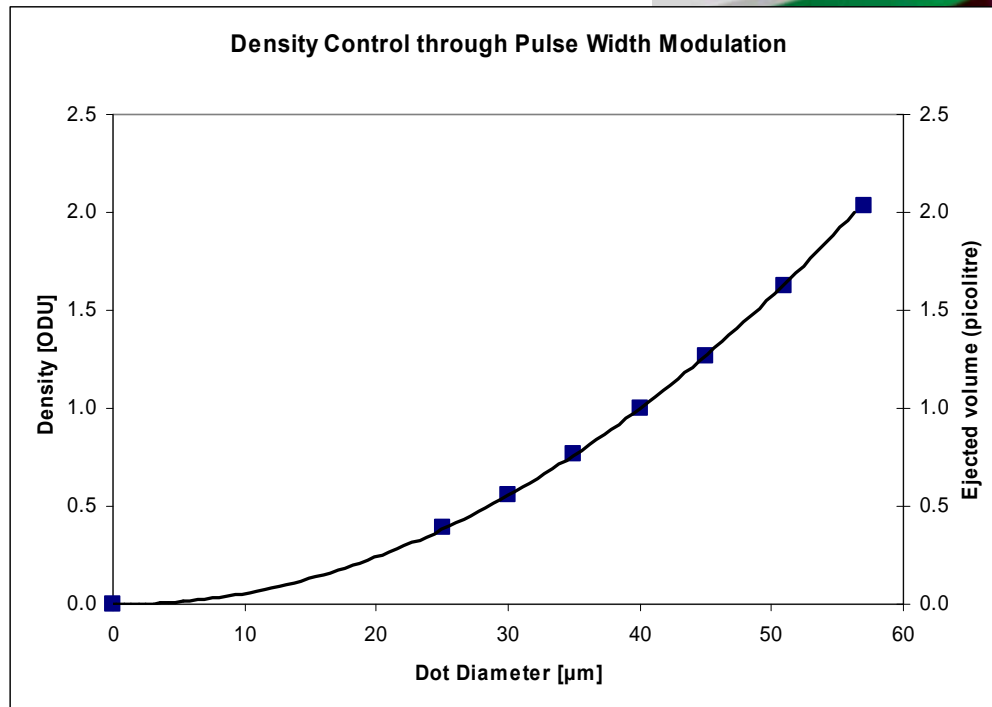


- non-conductive



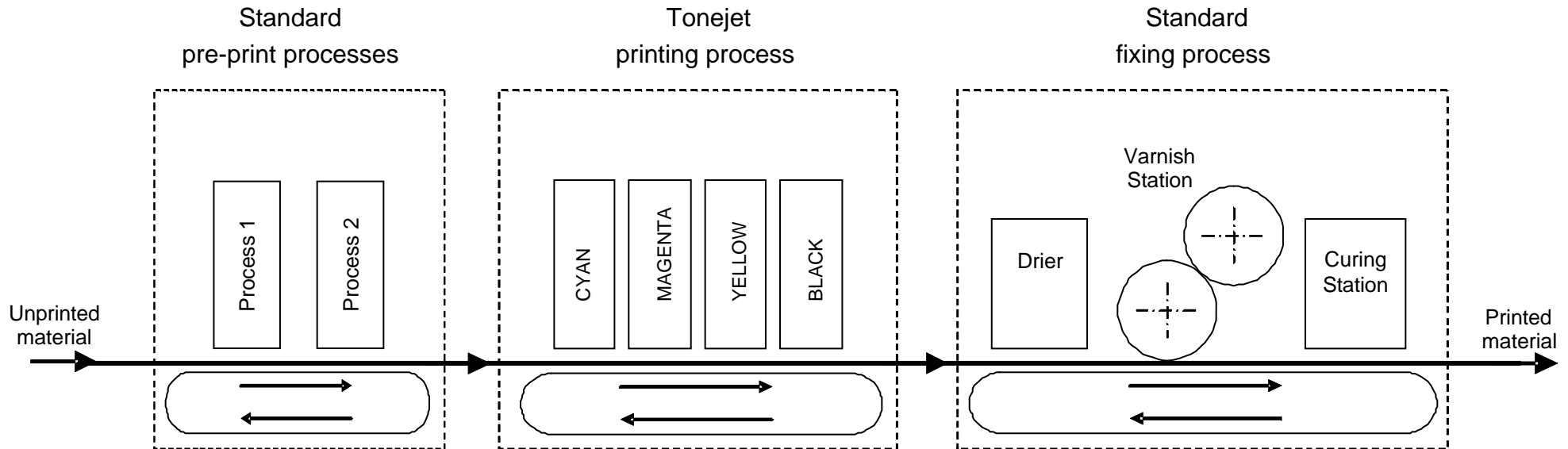
Grey Scale Control

Binary to 8 levels

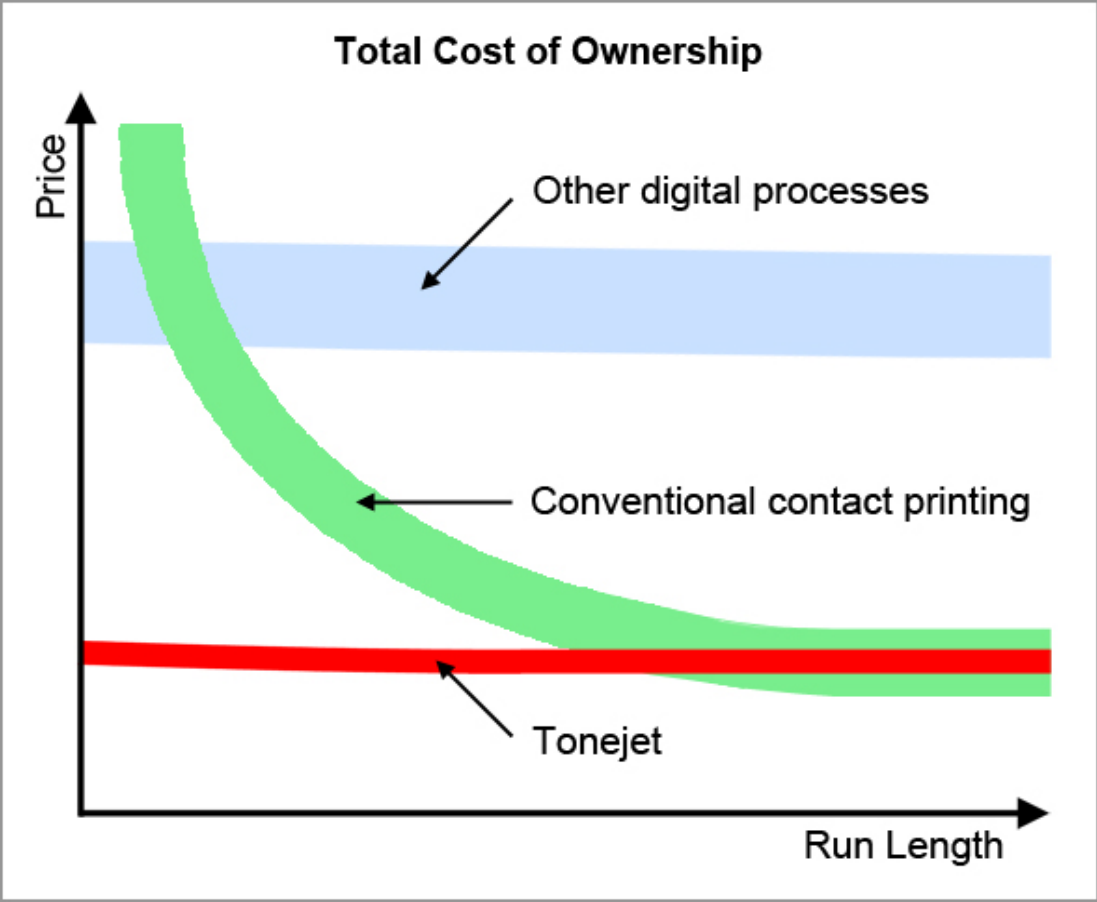


Separating the Decoration and Fixing Processes

- Simple formulation inks
- Can choose from full range of fixing chemistries and mechanisms to match current conventional approach
- Decoration cost comparable to conventional



Total Cost of Ownership



Case Study: Ball Packaging Europe

- Digital can printer
- Fully flexible decoration
- Image curing as for existing process



© Tonejet 2009



T O N E J E T

What Digital Printing offers Ball



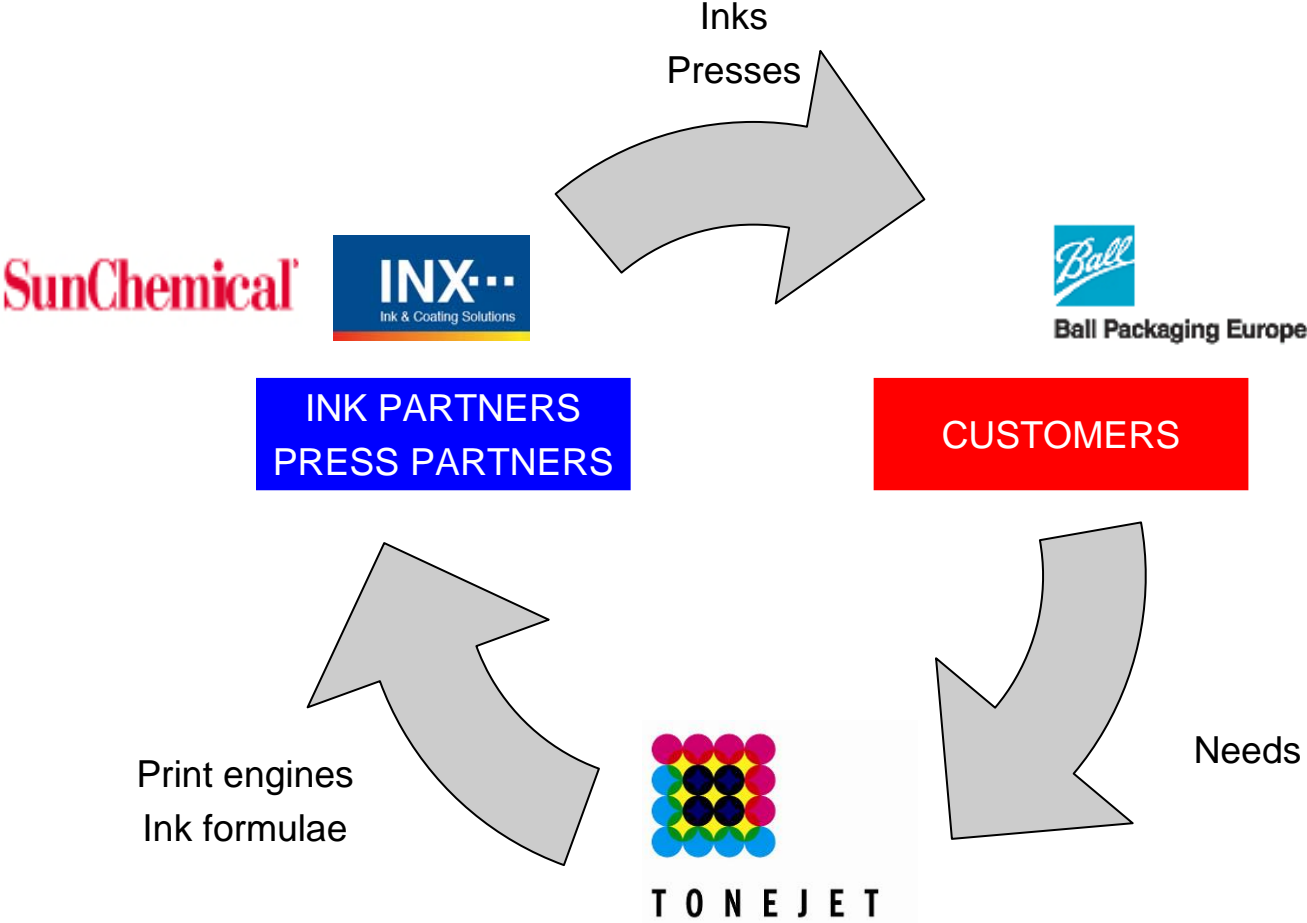
"I've been personally involved from the beginning. I know that the potential offered to brand owners presents some truly new opportunities."

Gerrit Heske

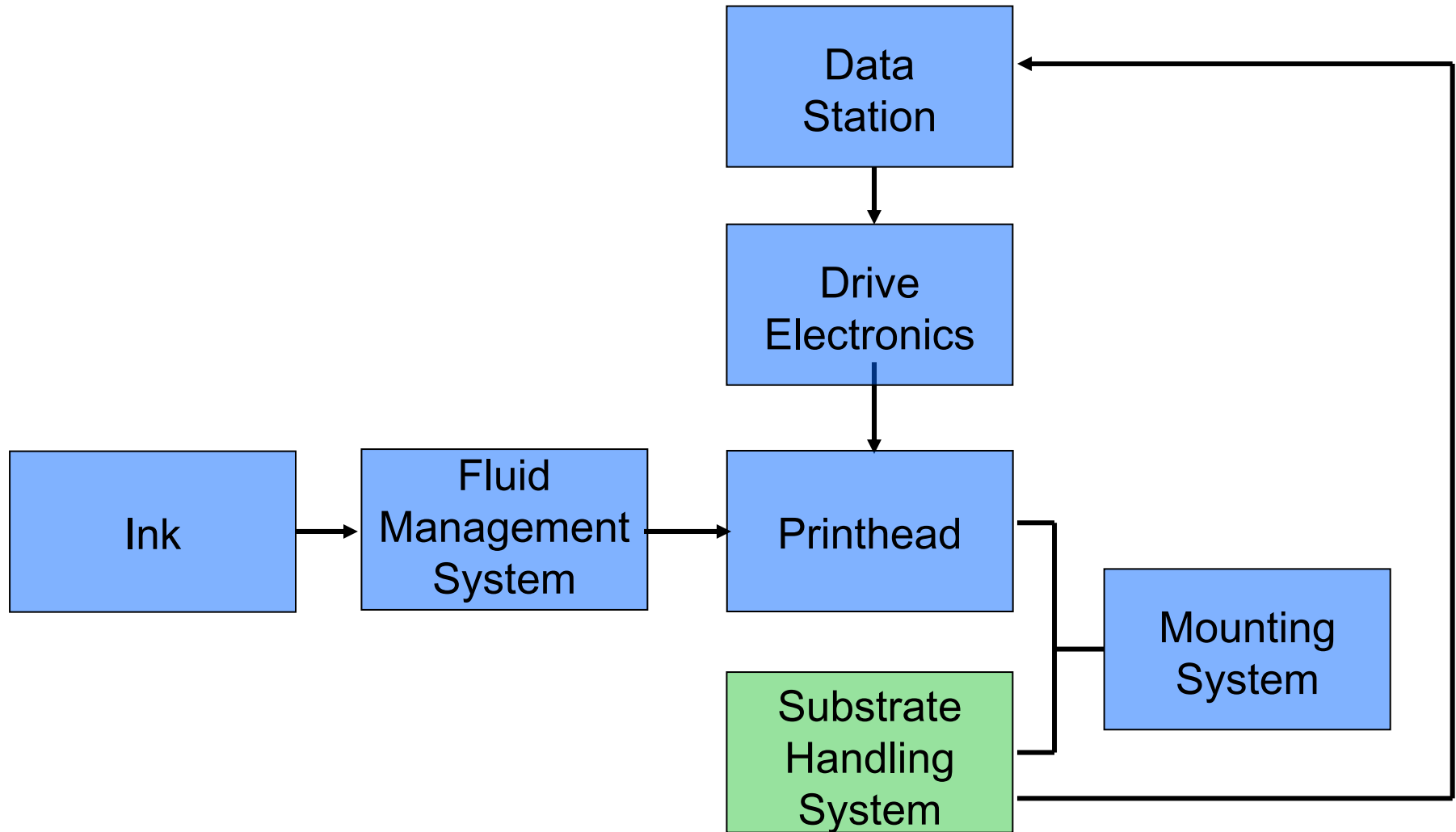
President of Ball Packaging Europe



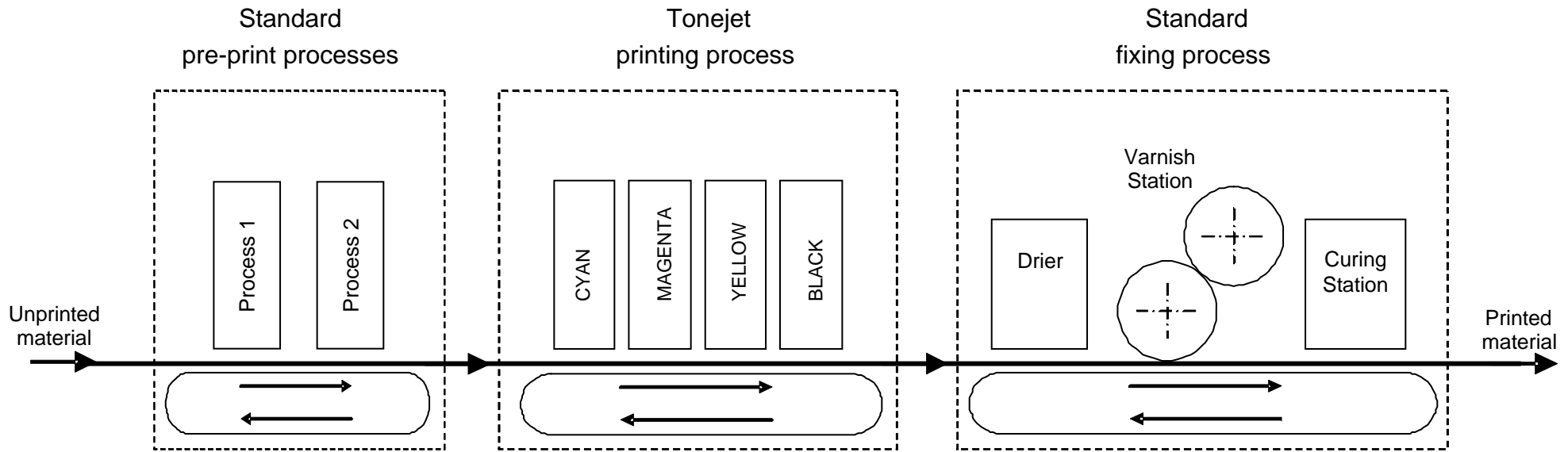
The Tonejet Ecosystem



The Tonejet Print System



The Decoration and Fixing Process

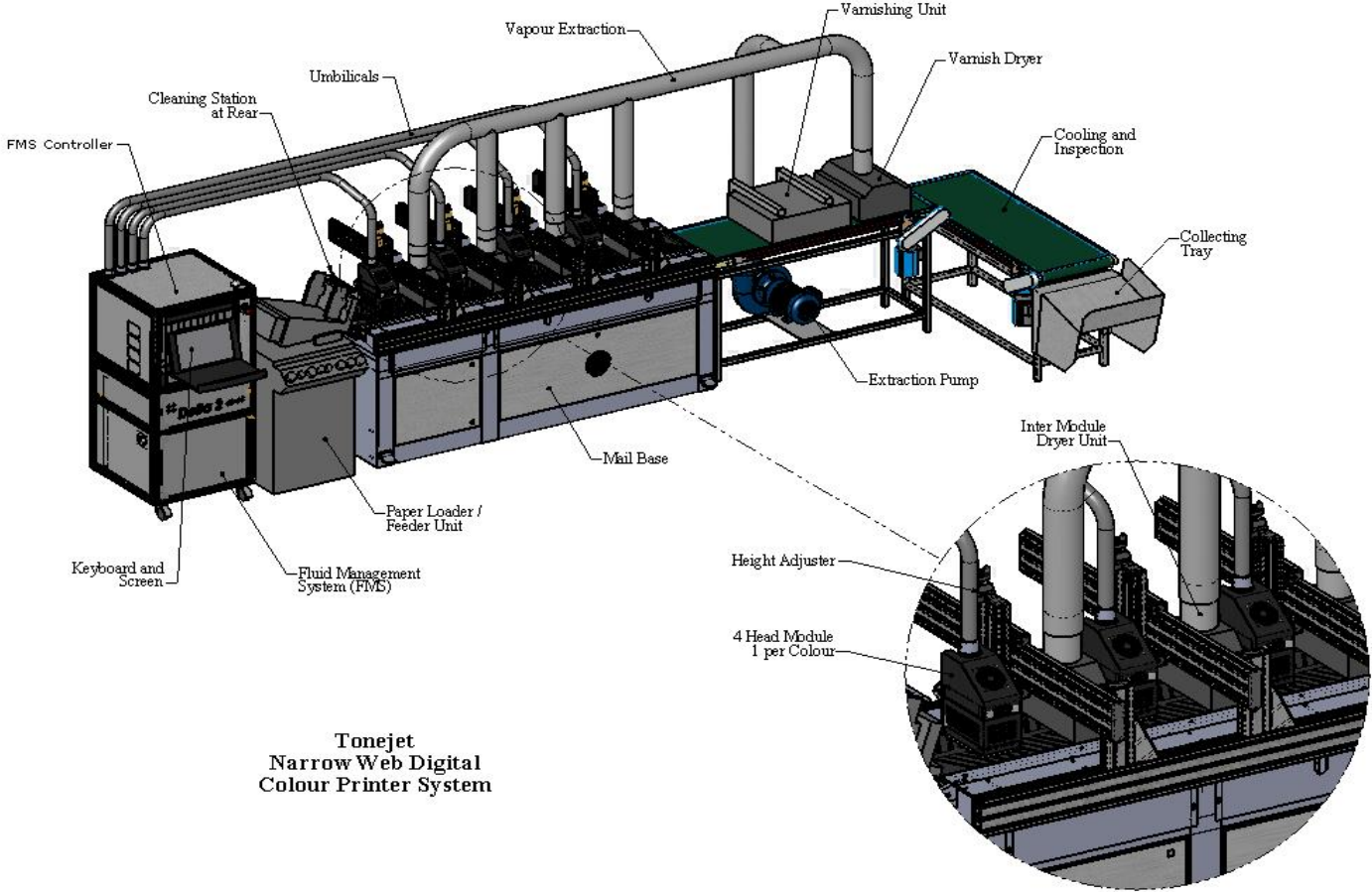


The Delta 2 Printhead Family



- Delta 2-100 Web and Sheet
- Delta 2-170 Containers

Tonejet Narrow Web printer



**Tonejet
Narrow Web Digital
Colour Printer System**

Tonejet: What Next

Important partnerships

- Sun and INX
- Machine Builders

Close to key players in packaging

- Ball
- Printer/Convertors
- Brand Owners

Building systems for delivery in 2010

- Container
- Web
- Sheet

