

Step Change in Speed & Performance – Capability & Data Rate Demands of the Latest Industrial Inkjet Printheads

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AWA

Alexander Watson Associates

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GLOBAL INKJET SYSTEMS

CONTROL | PERFORMANCE | INNOVATION

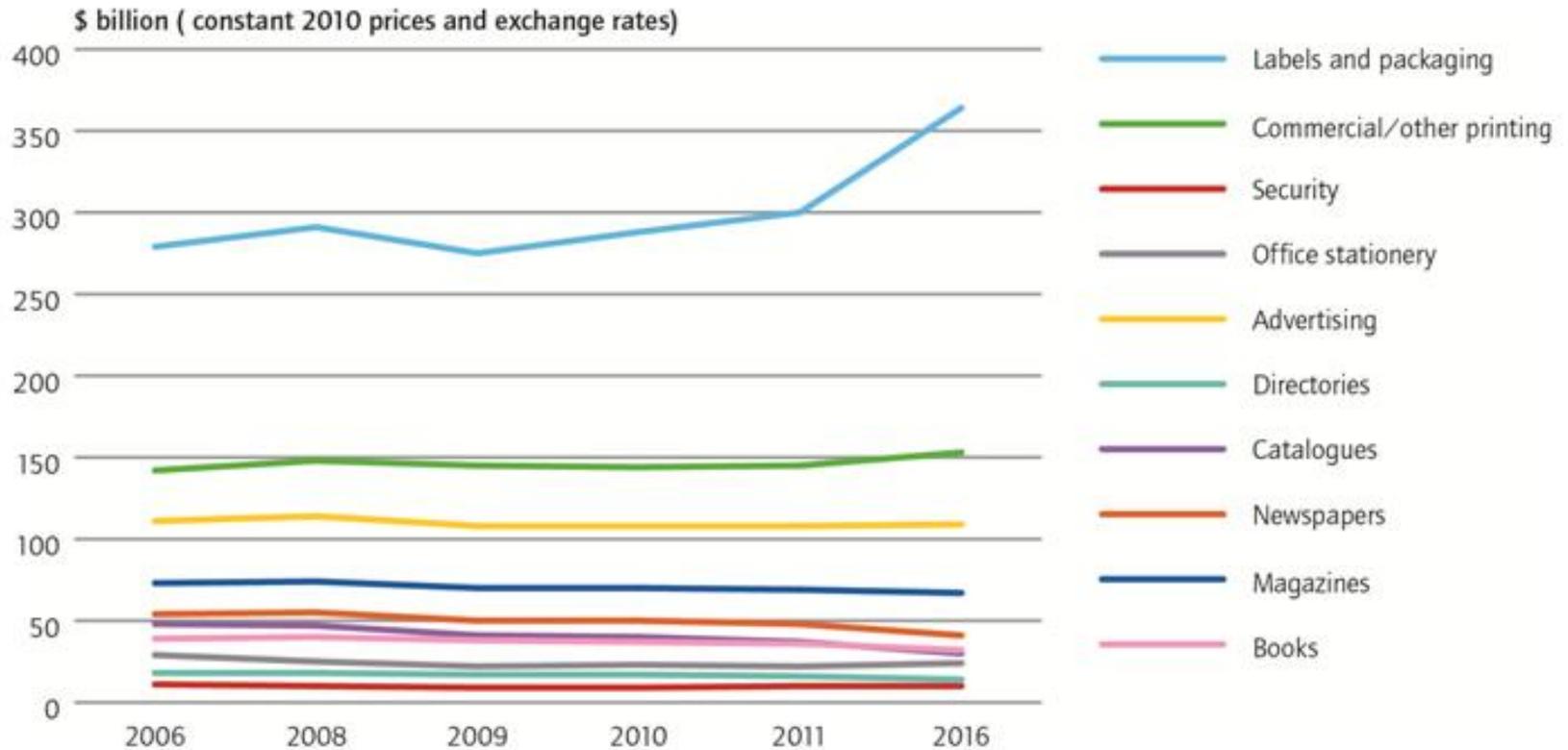
Agenda

- **Review of latest high performance industrial inkjet printheads**
 - Fujifilm Dimatix
 - Kyocera
 - Konica Minolta
 - Ricoh
 - TTEC
 - Xaar
- **Impact on labelling & packaging applications**
 - Managing & maximising opportunities
 - Data handling & system configurations



Global Print

End-use Sectors

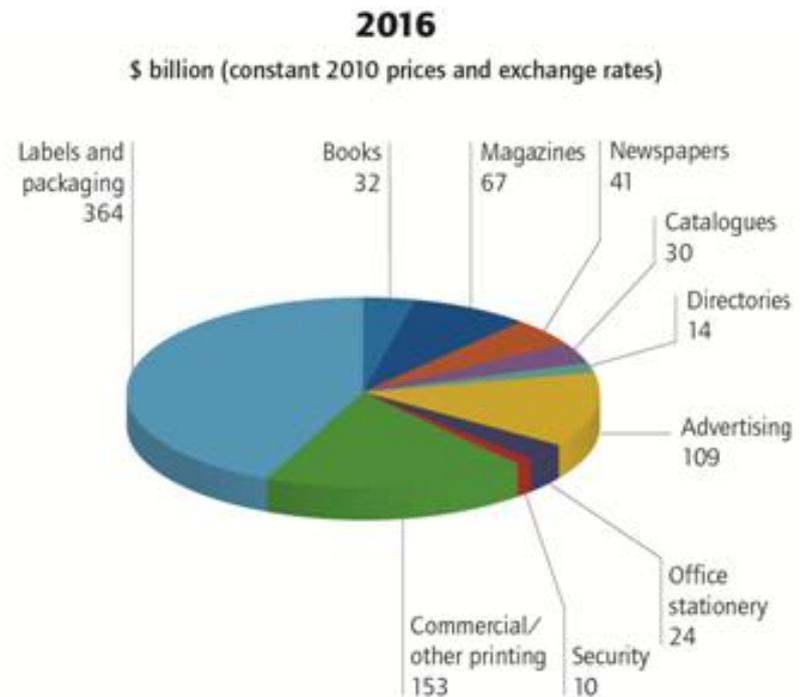
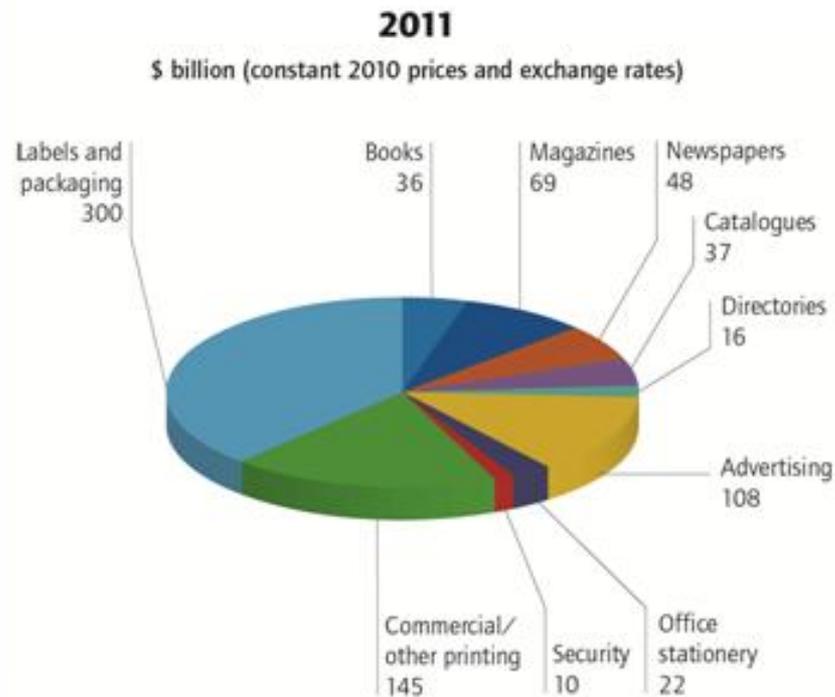


Source: Pira International



Global Market Share 2011- 2016

End-use Sectors – market share

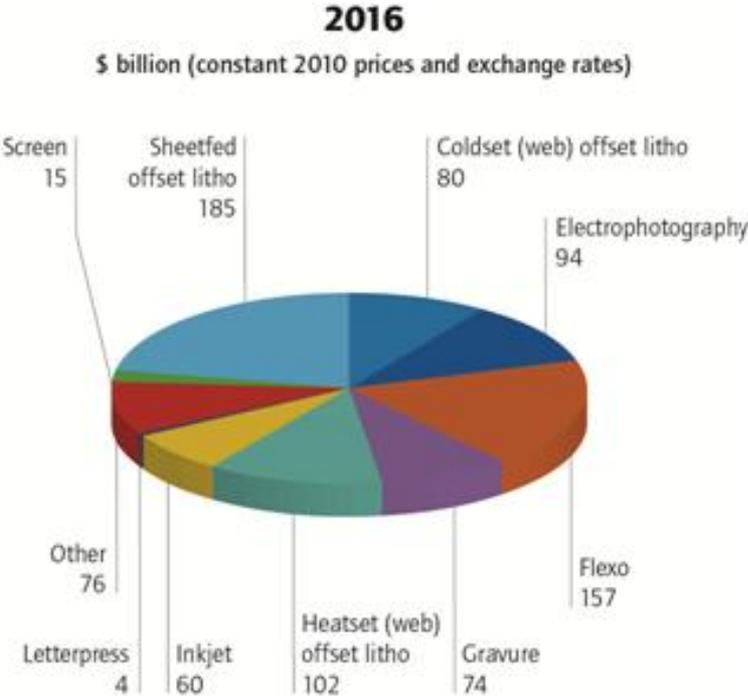
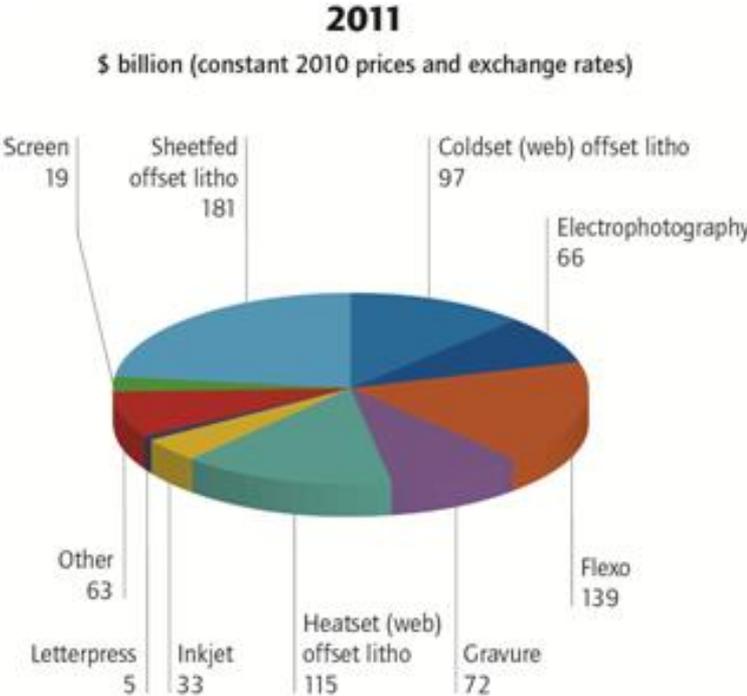


Source: Pira International



Global Print 2011 - 2016

Print Processes – market share



Source: Pira International



Printhead “Funnel”



2011/2012: New printheads

- Fujifilm Dimatix - StarFire Series
- Konica Minolta – i Series
- Kyocera – KJ4 versions
- Ricoh – Gen 5
- TTEC – CF1L
- Xaar –1001GS12

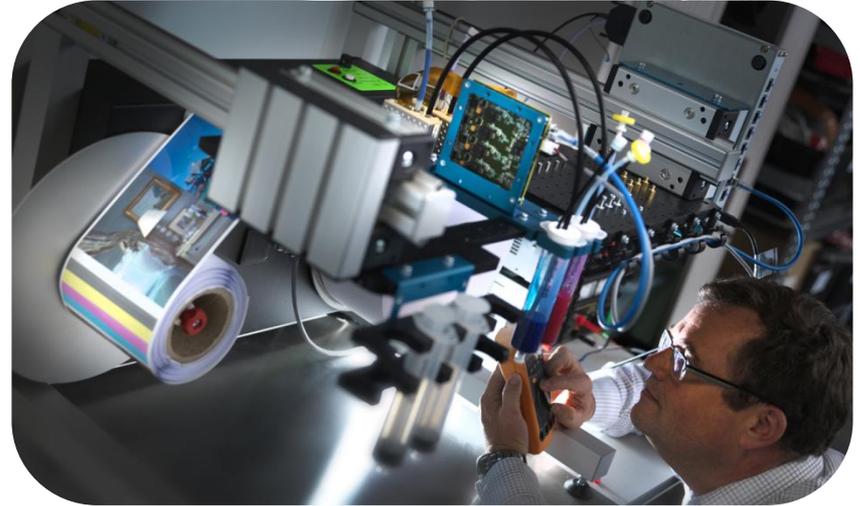
Key Themes

- Speed
- Resolution
- Ink recirculation
- Drop size



(Some) Things to Consider When Selecting a Printhead

- Resolution
- Drop size
- Linear speed (frequency)
- Print width
- Printhead cost
- Ink path
- Fluid compatibility
- Ink availability
- Easy to be swayed by one or two key marketing issues
- The smart money looks at all specifications objectively



Fujifilm Dimatix StarFire Series

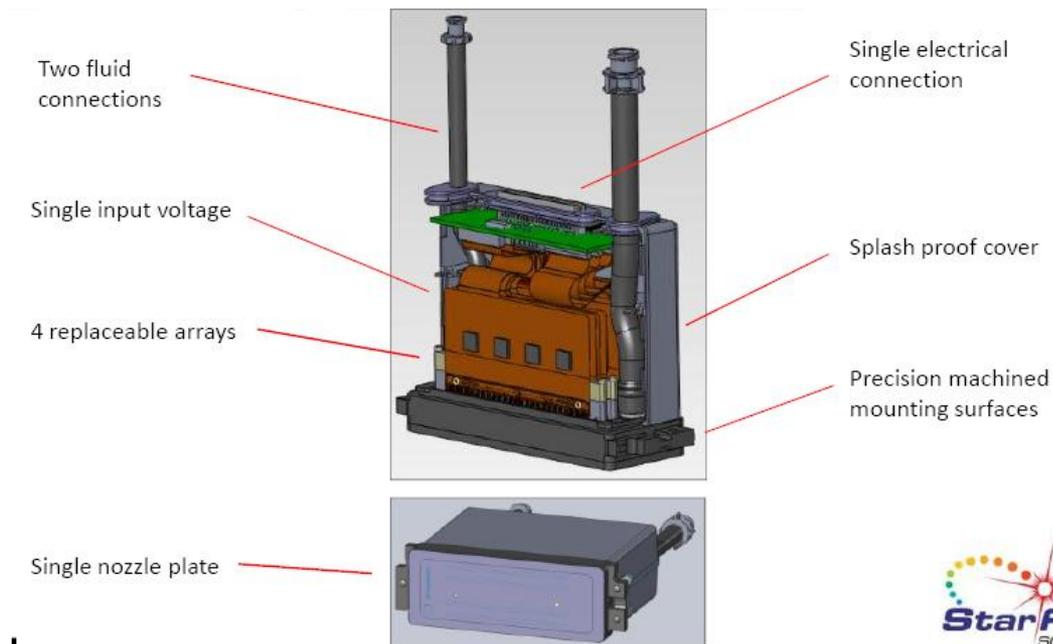
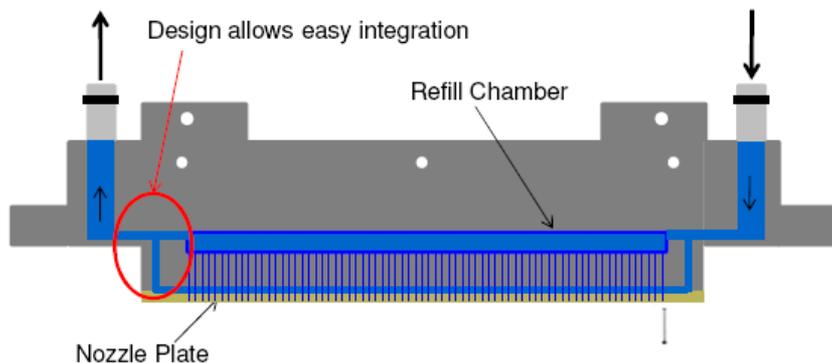
- **New family of printheads**
 - Incorporate VersaDrop binary and greyscale jetting
 - RediJet – continuous ink circulation at the nozzle
 - Improves initial priming
 - Enables fast jet recovery
 - Removable/replaceable coated metal nozzle plate
 - Precise registration points enabling drop-in alignment with system-provided mounting features
 - Allows multiple printheads to be accurately arrayed into print bars
 - Reduces set-up and alignment costs during nozzle replacement or printhead exchange
- **SG1024/M launched May 2012 at Drupa**
 - M-C version targeted at ceramic tile market
 - Large and Small drop versions scheduled



Fujifilm Dimatix StarFire

- **SG1024/M**

- 1024 nozzles (8 rows)
- 64.96mm (2.55 in)
- 400 x 400 dpi 4 grey levels
- 40m/min @ 400 x 400dpi
- 50m/min @ 400 x 300 dpi
- 20-30pl fluid dependent



Images courtesy of Fujifilm Dimatix



Konica Minolta i-series

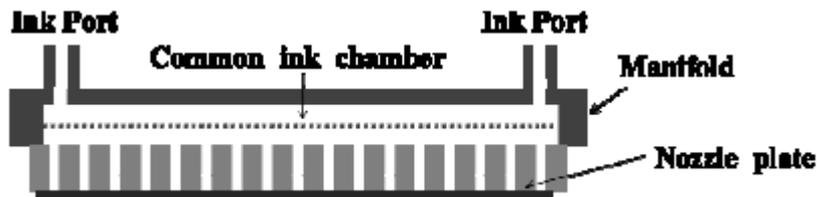


KM1024i

- **KM1024i/M**
 - Launched late 2011
 - 360 x 360 dpi
 - 3 x speed of standard KM1024
 - 75m/min @ 360 x 360dpi 3 levels
 - 72mm wide - slim & compact design
 - UV, solvent, oil, aqueous
 - Ink recirculation
 - Label printing, security printing
 - M (14pl) S & L drop versions scheduled



Image courtesy of Industrial Inkjet Ltd



Longitudinal cross section of KM1024i
Source: IS&T NIP conference 2011



Konica Minolta i-series

- **KM1800i**
 - Thin proprietary design technology
 - 75mm wide
 - 600dpi greyscale
 - 3.5pl smallest drop
 - UV inks
 - 50m/min
 - Launched at Drupa 2012
 - KM-1 B2 cut sheet press
 - 3,300 sheets/hour
 - Co-developed with Komori
 - Commercial printing, packaging, labelling



KM1800i



KM-1 press



Kyocera

- **KJ4B-QA well established in single pass aqueous systems**
 - 600dpi
 - 2656 nozzles
 - 108mm wide
 - Up to 4 levels
 - 75m/min
 - 30kHz



Océ JetStream
Est. 40 heads per engine



MS Italy LaRio
>600,000 nozzles; >225 heads



Kyocera

- **KJ4A-TA/AA well established in single pass UV systems**
 - 600dpi
 - 2656 nozzles
 - 108mm wide
 - 20kHz
 - 50m/min 4 grey levels
 - 75m/min 3 grey levels



Domino N600



Shiki Pico Jet



CSAT

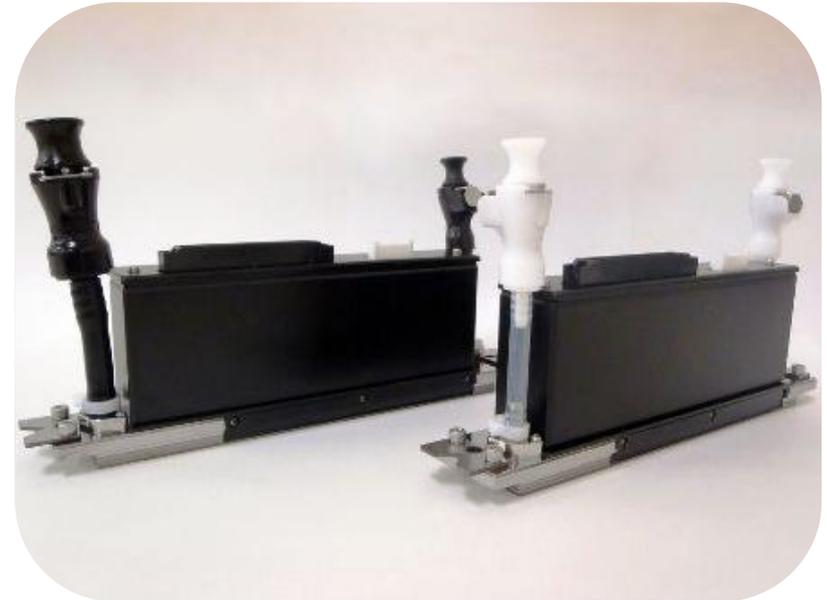


MPrint M Label



Kyocera

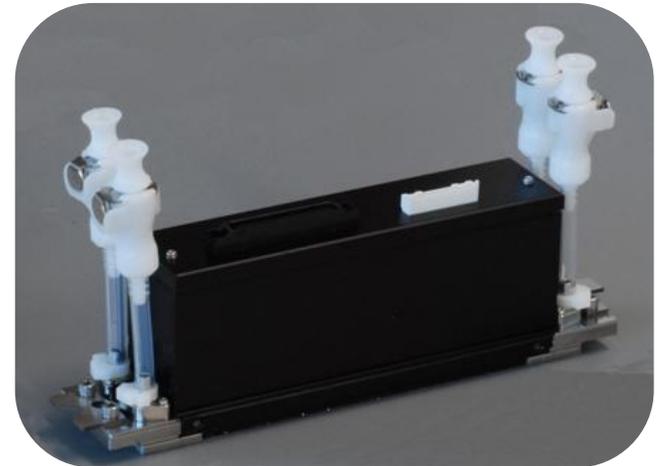
- **KJ4B-YH: 40kHz**
 - Aqueous inks
 - 2656 nozzles
 - 108mm
 - 600dpi greyscale
 - Approx. 100m/min
 - 40kHz
- **KJ4A-BH: 30kHz**
 - UV inks
 - 600dpi greyscale
 - 30kHz
 - 50% faster than 20kHz version
- **1,000 units/month production (March 2012)**



Kyocera

- **KJ4B-Z**
 - Aqueous inks
 - 1200 x 1200dpi
 - 5312 nozzles
 - 108mm
 - <2pl smallest drop
 - 80m/min
- **KJ4A/B - (2C)***
 - Aqueous and UV versions
 - 2656 nozzles
 - 112mm wide
 - 300dpi
 - Two colour (1328 nozzles each)
 - 152m/min
 - 30kHz

* Kyocera official name not yet known



Ricoh

Gen 5

New Products ↗

Gen 4L

- Ricoh Gen 4

- 384 nozzles (2 rows)
- 32mm wide
- 300dpi
- UV, solvent, aqueous

+ Textile Printing



Gen 4



GEN3 E3

+ UV graphics + Color proofing



Gen3 E1 and E2



+ 3D modeling



GEN3

+ Grand & Wide format graphics



GEN2

Industrial Marking

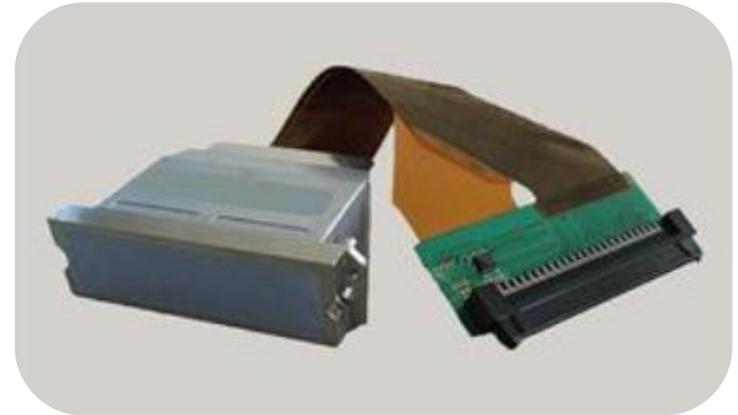


GEN1



Ricoh Gen5

- **1280 nozzles**
 - 4 rows
- **54mm wide**
- **600dpi greyscale**
- **UV, solvent, aqueous**
- **Four separate independent ink manifolds**
 - 1, 2 or 4 colour support
 - One colour: 600dpi
 - Two colour: 300dpi
 - Four colour: 150dpi
 - 8 greyscale levels
- **75m/min binary 30kHz**
- **50m/min double & triple drop 20kHz**
- **Stainless steel nozzle plate**
- **Built in 20 μ filter**
- **OEM engineering samples Q4 2012**
- **Mass production Q2 2013**

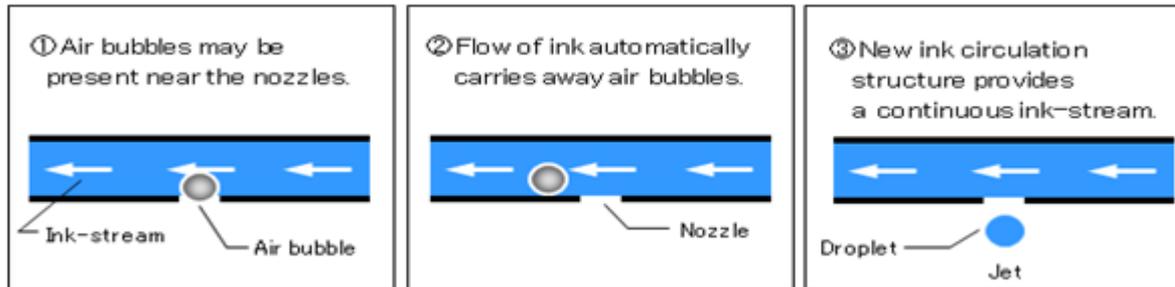
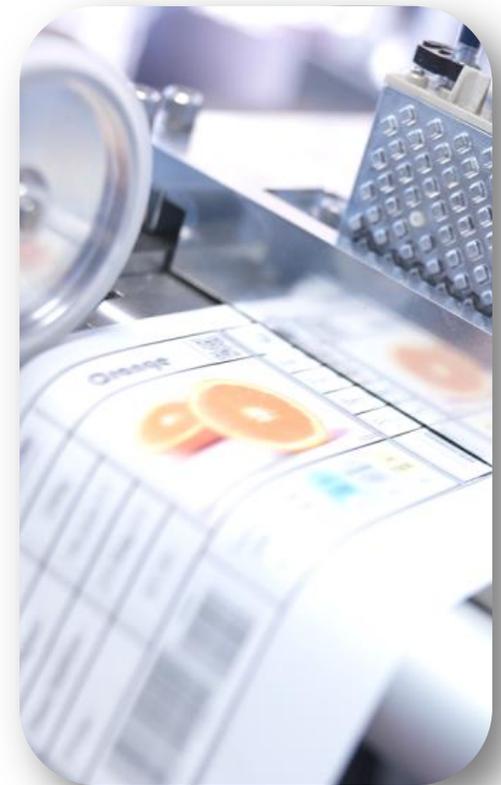


TTEC- CF1L

- Large drop version of the CF1ou
 - CF1ou 6pl to 42pl
- 636 nozzles
- 53.7mm wide
- 300dpi - 8 levels greyscale
- UV, oil
- Approx. 90pl
- Ink recirculation
- CF1L targeted at ceramic tile market



CF1

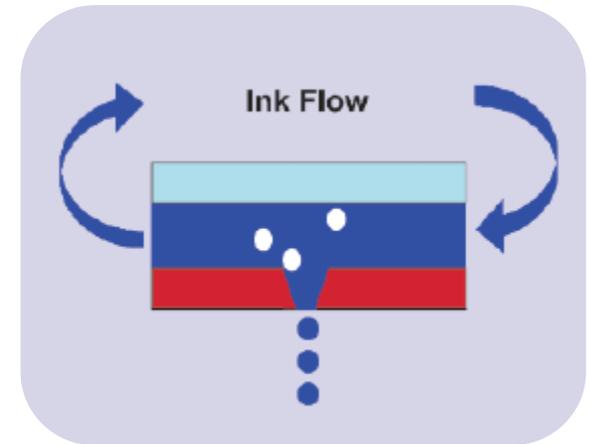


Ink circulation image courtesy of TTEC



Xaar 1001 GS12

- **Large drop version of 1001 GS6 (6pl)**
 - 1001 nozzles
 - 70.5mm wide
 - 360 x 360 dpi 8 levels
 - **GS12 = 12pl drop greyscale**
 - **Targeted at ceramic tile market**
 - **TF Technology (ink recirculation)**
 - **Two operating modes**
 - Large drop capable 12pl to 84pl
- OR
- 2 x speed of GS6

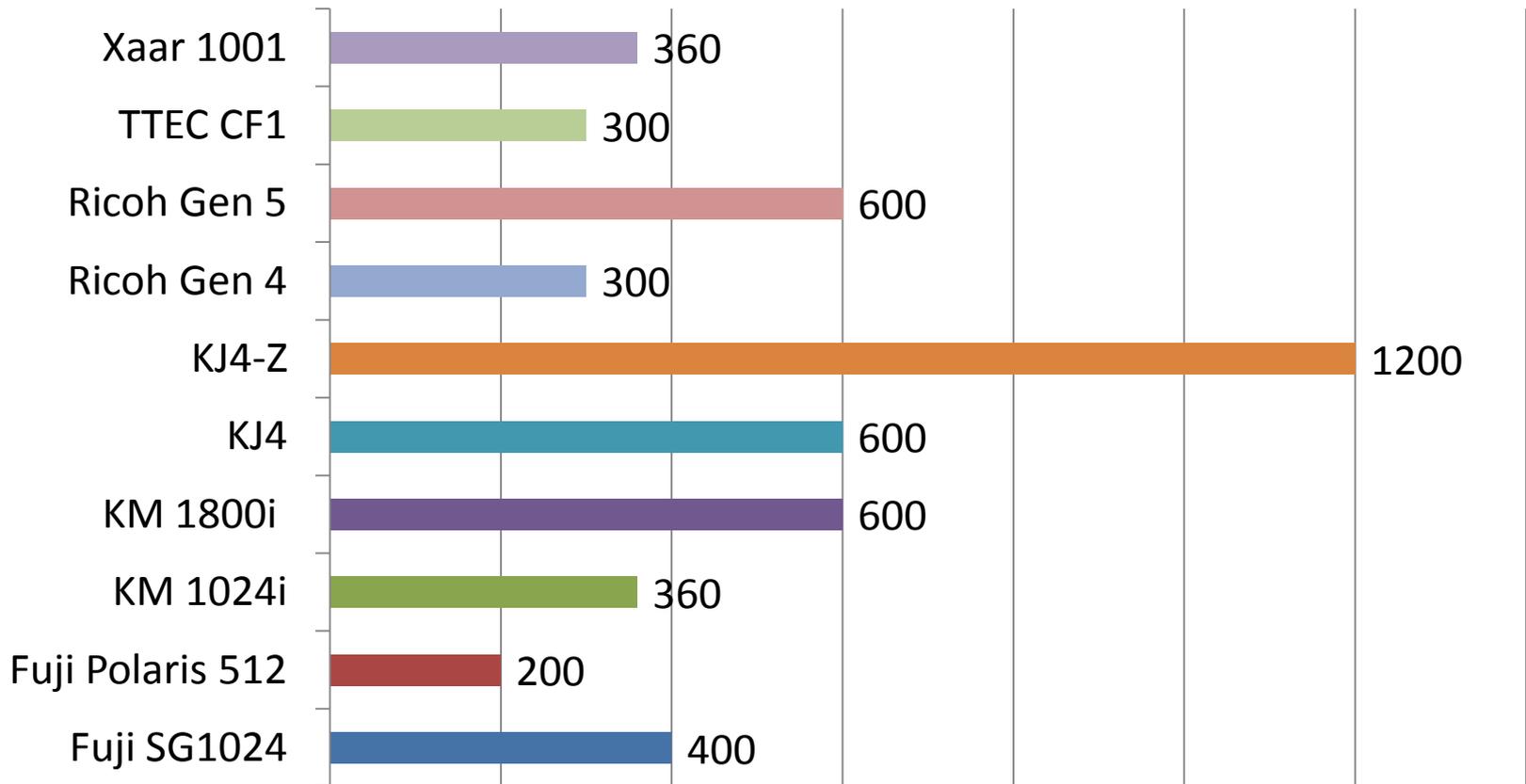


Images courtesy of Xaar

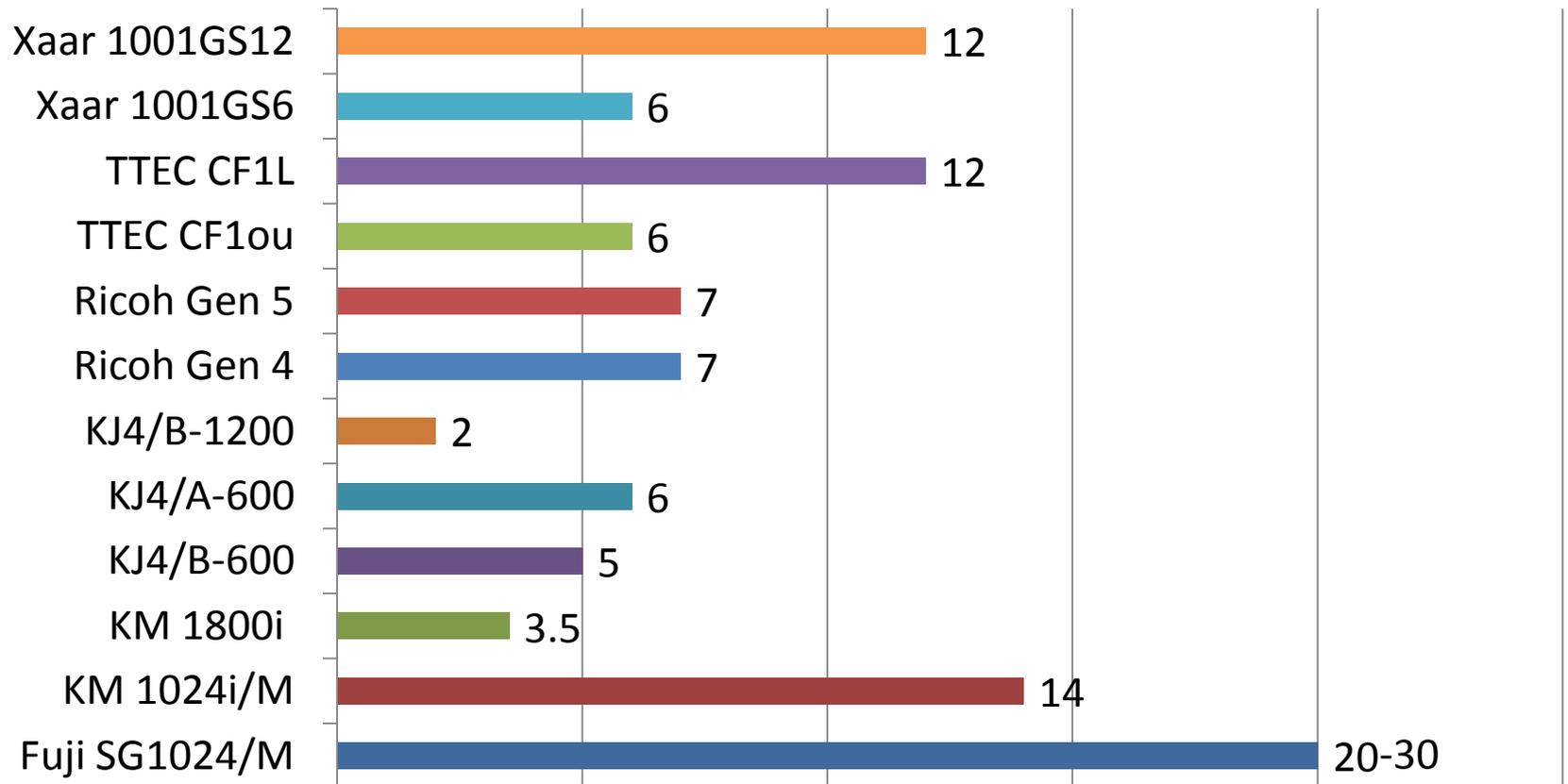
An advertisement for the Xaar 1001 GS12 printhead. The background is a blue and red abstract pattern. On the left, the text reads: 'More colour.', 'More throughput.', and 'More choice.' in yellow and white. Below this, it says 'The unique Xaar 1001 GS12' and 'The NEW choice of ceramic printhead'. On the right, there is a photograph of the printhead. To its right, a red box contains three bullet points: 'Double the colour intensity', 'Double the speed', and 'Unrivalled reliability'. The Xaar logo is in the top right corner, and the TF Technology logo is in the bottom right corner.



Native DPI



Primary Drop Volume (pl)

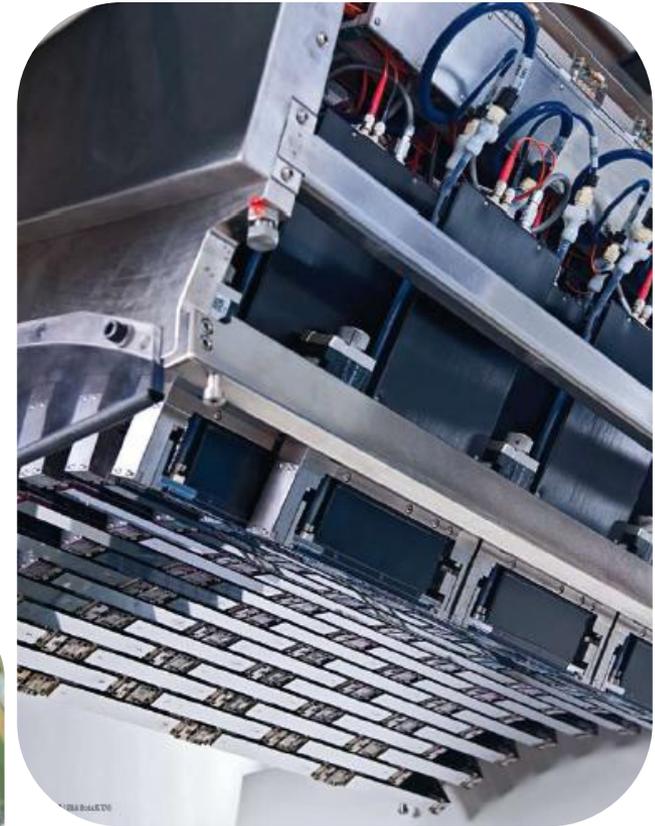


Acceptance of Inkjet for Single Pass Applications

- Industry acceptance of inkjet in single pass systems
- Large arrays of inkjet becoming more common
 - Web presses
 - Sheet presses



System Group Creadigit : Fujifilm SG1024; 6 colours;
710mm print width



KBA RotaJet 76: 112 x KJ4/B printheads



Thoughts on Opportunities

- Labels
 - “Standalone” becomes more fully featured
 - In-line with existing handling/flexo systems growth



Focus Label: d-flex; KM1024 heads



IIJ: KM1024 unit - in-line flexo



PPSI: Xaar 1001 unit - in-line flexo



Thoughts on Opportunities

- **Corrugated packaging**

- Large flatbed systems

- Merging of POS displays & packaging

- HP Scitex FB7600; 312 HP X2 piezo heads; UV inks
- EFI HS100Pro, Inca Digital Onset, Durst, Agfa etc



- Single pass pioneers

- Inca/Sun Chemical FastJet (2004/2008)

- Calypso Systems (2008)

- KJ4/B; up to 1m/sec 600dpi; aqueous inks; 22-66cm; CMYK



- Sun Automation CorrStream (2011)

- Kodak CIJ; 500fpm; aqueous inks; sheets



- A market ready for expansion?



Thoughts on Opportunities

- **Folding cartons**

- Established mono coding

- In-line & off-line w/stackers

- Drupa 2012 – sheet presses

- Potential for folding carton
- 300gsm capability
- Konica Minolta KM-1

- B2; KM 1800i heads; 3,300 sheets/hour; UV inks; 1200dpi

- Fujifilm Jetpress 720

- B2; Samba heads; 2,700 sheets/hr; aqueous inks; 1200dpi

- A market ready for expansion?

Atlantic Zeiser Omega series



KM-1

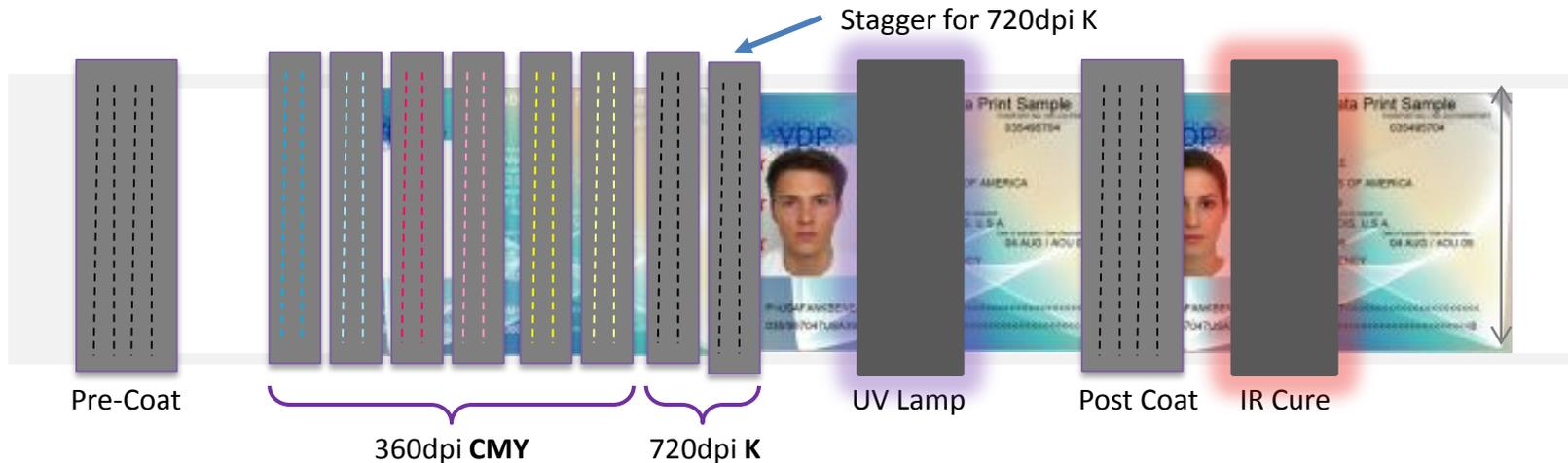


Jetpress 720



Thoughts on Opportunities

- **Mixed printhead resolutions**
 - Single printhead technology – running bars or colours/fluids of printheads at different resolutions
 - e.g. CMY at 360dpi and K at 720dpi



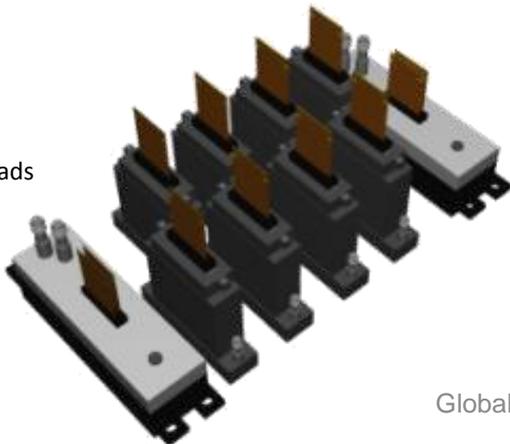
Thoughts on Opportunities

- Families of printheads – different drop sizes
- Mixing different printhead technologies
 - Decoration & pre/coating/varnishing in one pass
 - Small & large drops heads
 - e.g. EFI Cretaprint C3 ceramic tile printer
 - Modular, configurable design
 - Offering mixed head type systems
 - (Head type A)decoration + (head type B) special effects (large drop)
 - New potential opportunities in labelling & packaging
 - Product differentiation/decoration/special effects

Cretaprint C3

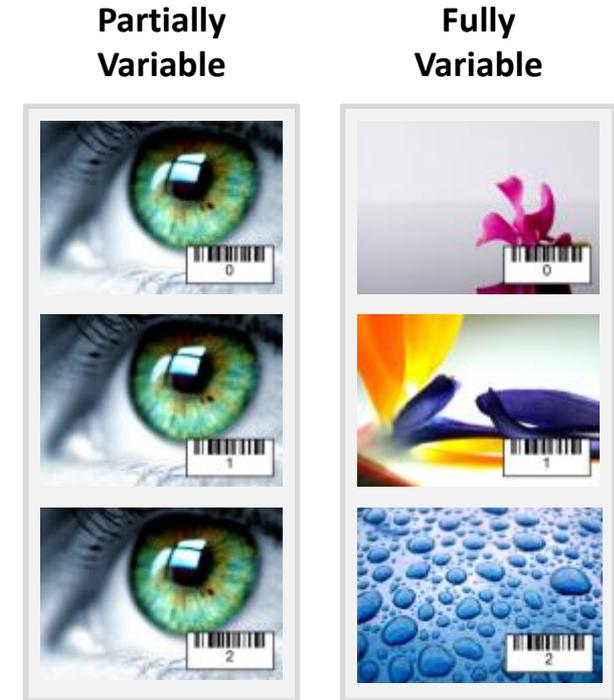


Mixed printheads



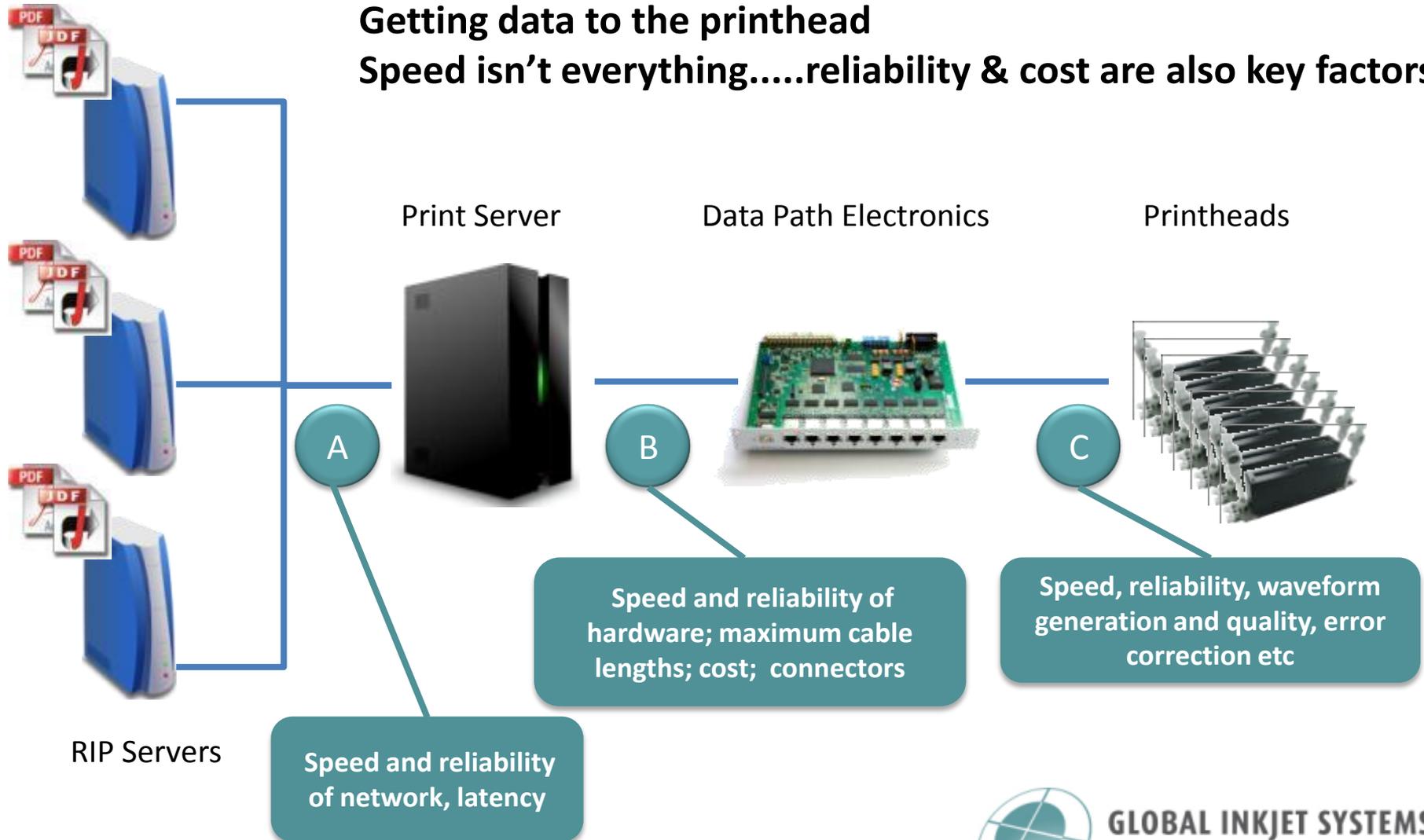
Increasing Demands on Print Data

- **Number of printheads**
 - Higher resolution
 - Greyscale
 - Increasing resolution and moving to greyscale all require more data per square mm
- **N colours**
 - Increase in colours
 - Process colour requires at least 4 x the amount of data of monochrome
- **Pre-coat & varnish**
- **Print speed**
 - 50m/min and higher
- **Variable data usage**
 - Partially variable
 - Fully variable
- **Wide widths**
 - >1m becoming well established
- **Increasing demands on datapath**

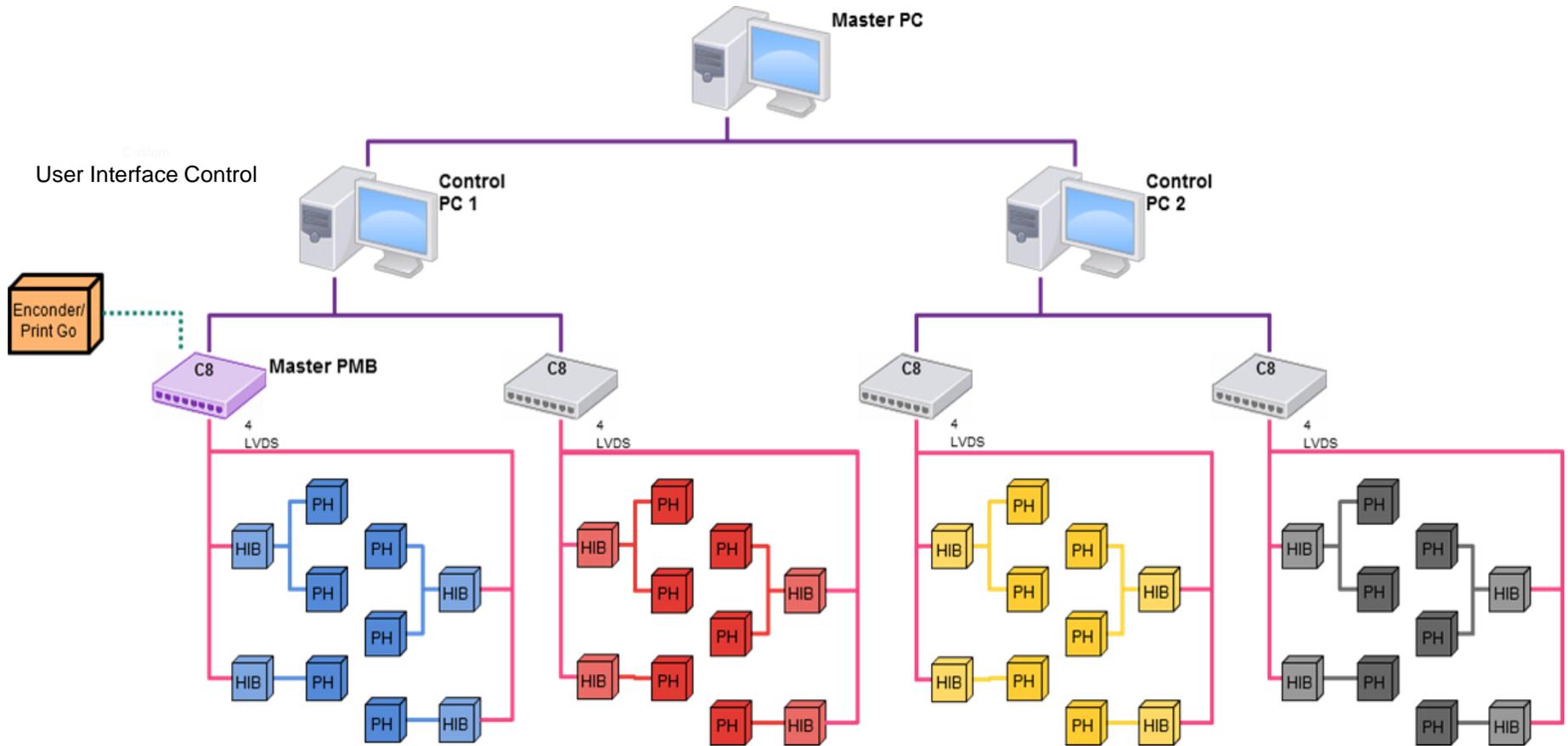


Challenges for System Builders

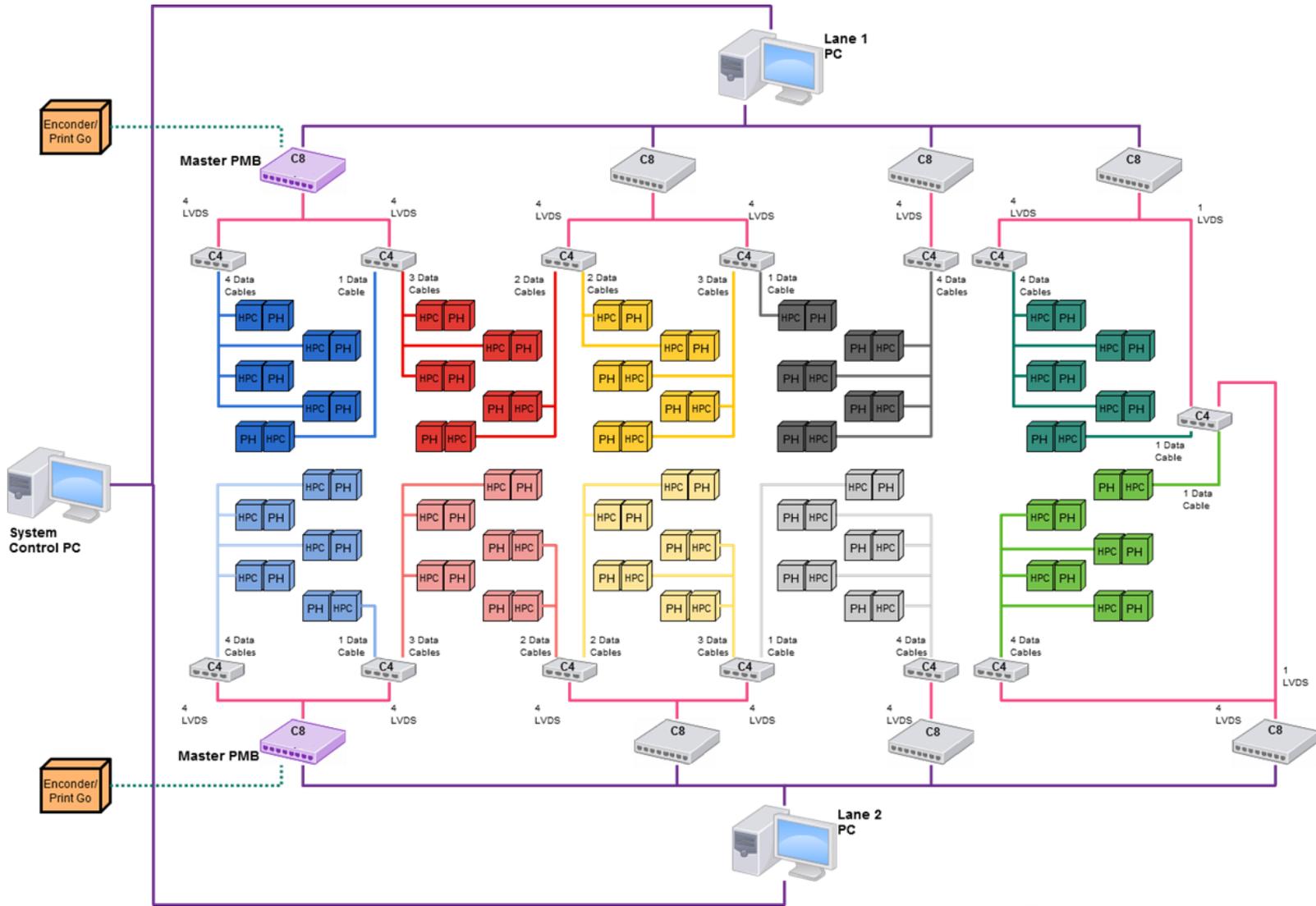
Getting data to the printhead
Speed isn't everything.....reliability & cost are also key factors



Print Bar Architecture Example



Print Lane Architecture Example



Summary

- **The printhead funnel will continue**
 - Speed/resolution/drop size – depending on target markets
- **Maximising capabilities of these printheads**
 - Innovative implementation of printheads
 - System architecture & datapath handling



Thank you – Any Questions?

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