

Print Quality Requirements of Industrial Inkjet Applications

産業用インクジェットアプリケーションの印刷品質要件

OIJC Inkjet Business Conference - 30-31 January 2020

Debbie Thorp

Business Development Director

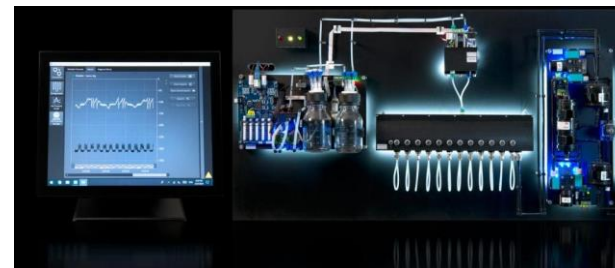
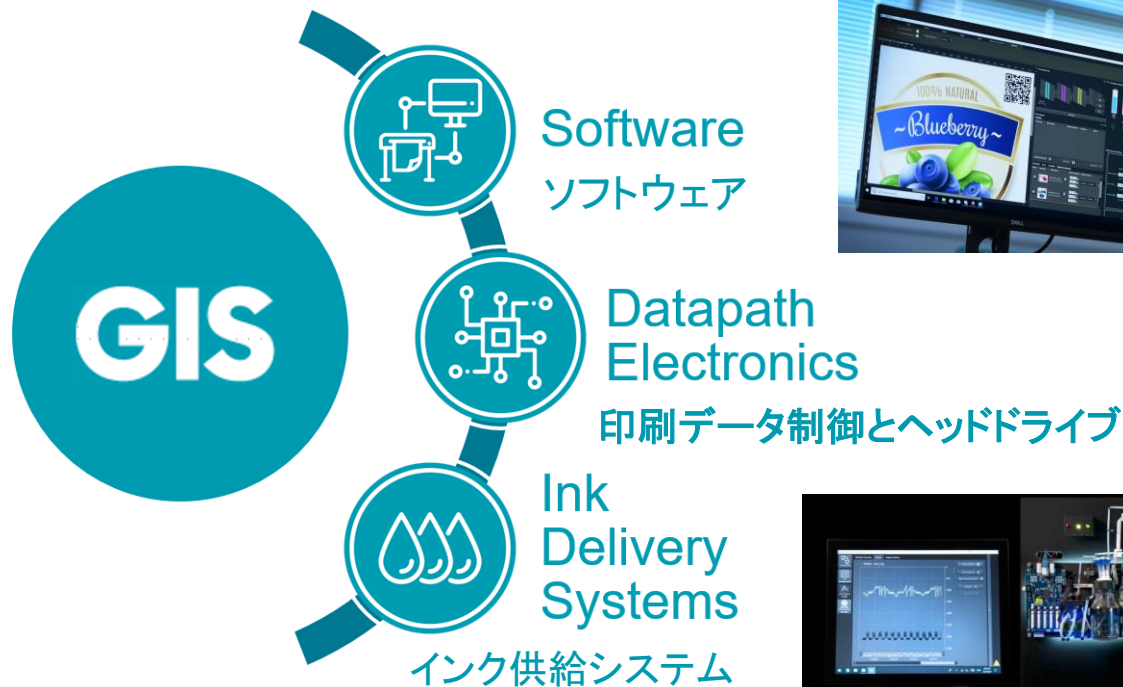
Ohno Inkjet Consulting

OIJC

**Inkjet Business
Conference**

GIS Introduction GISの紹介

Complete image management from pixel to drop



GIS customers - system builders, OEMs, integrators, fluid developers worldwide
in many different applications and markets

Presentation Agenda アジェンダ



Applications and Print Quality アプリケーションと印刷品質

- Key print quality issues and market demands



Challenges of Achieving Print Quality 印刷品質達成のための挑戦

- Key trends and requirements for inkjet systems
- Focus on software solutions



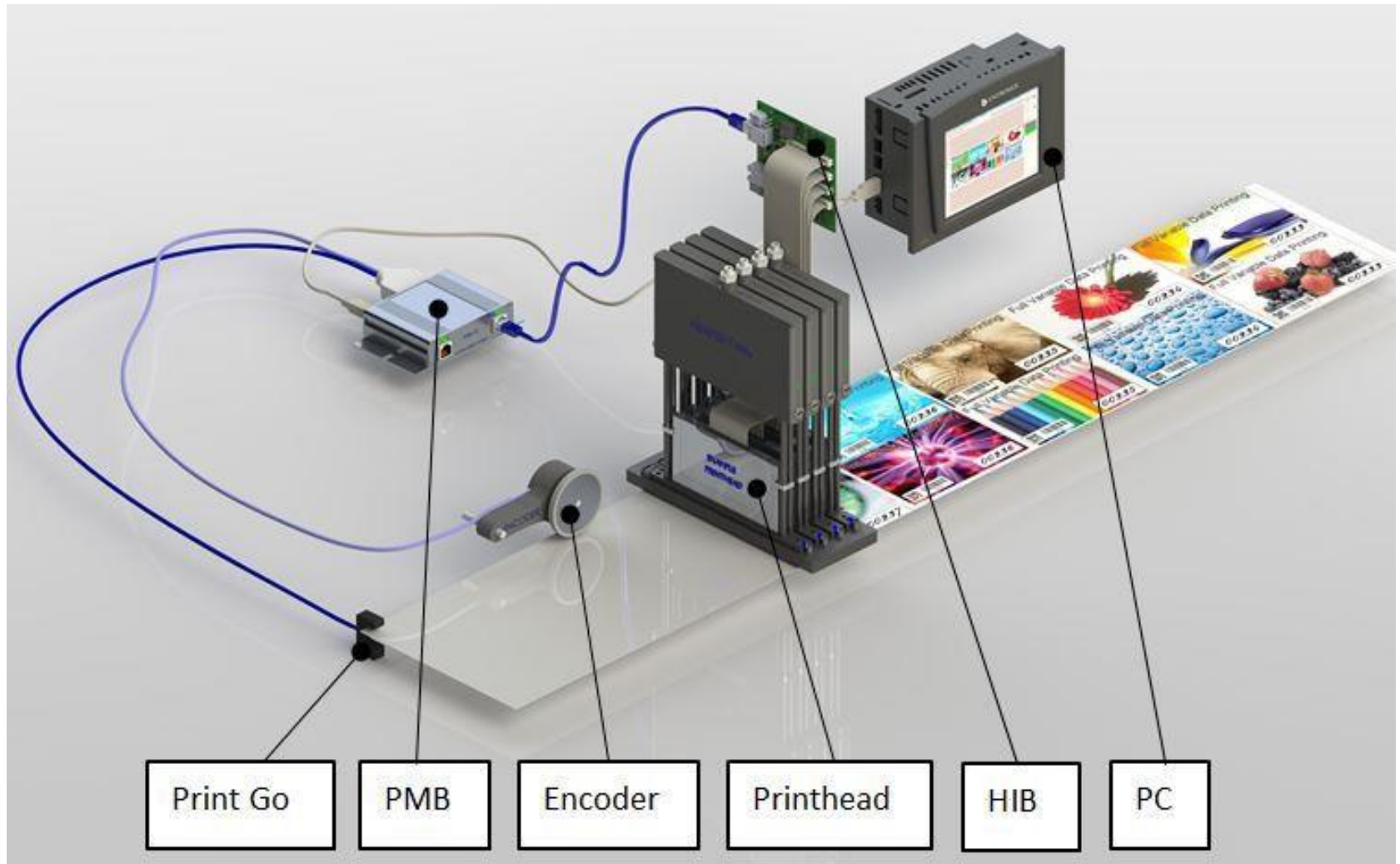
GIS Eco-System エコシステム

- GIS technology & solutions

Applications & Print Quality Requirements

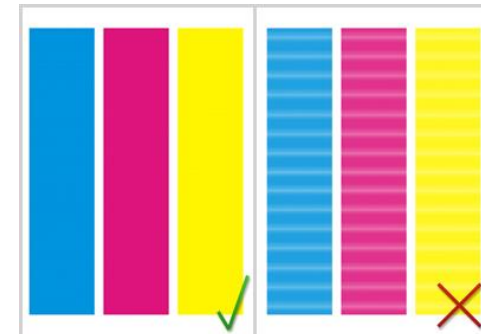
アプリケーションの印刷品質要件

How Difficult Can It Be? どれほど難しいのか?



Quality Issues...(Just a Few Examples)

- **Jetting errors** 吐出エラー
- **Image artefacts**
- **Poor edge definition**
- **Grainy images** 粗いイメージとなる
- **Density shift** 密度のシフト(バンディングなど)
- **Nozzle drop outs** ノズルからインクがでない
- **Poor registration** 印刷位置合わせ
- **Texture/unevenness in areas of solid colour**
- **Colour not stable** 色安定性
- **Colour bleed** 滲み
- **Ink supply issues** インク供給
- **Lack of thermal control** 温度制御
- **Reticulation** 網目



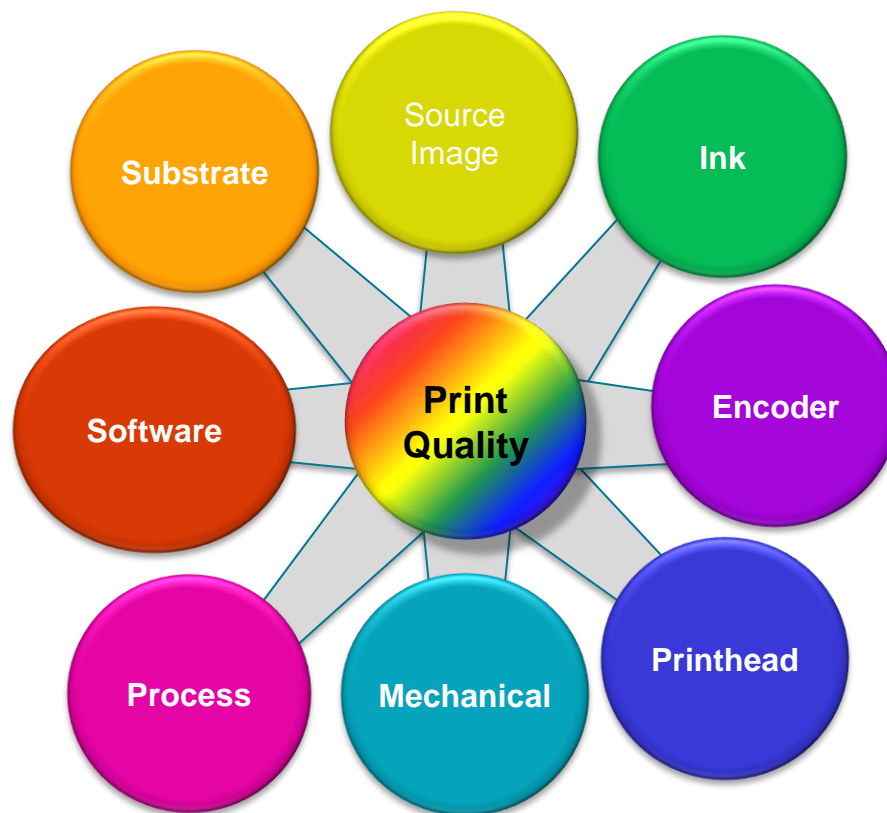
Factors Effecting Print Quality

影響するファクター



GLOBAL
INKJET
SYSTEMS

Inkjet printing systems have interacting & co-dependent parts



As inkjet enters more demanding applications – print quality requirements increase

Packaging パッケージング

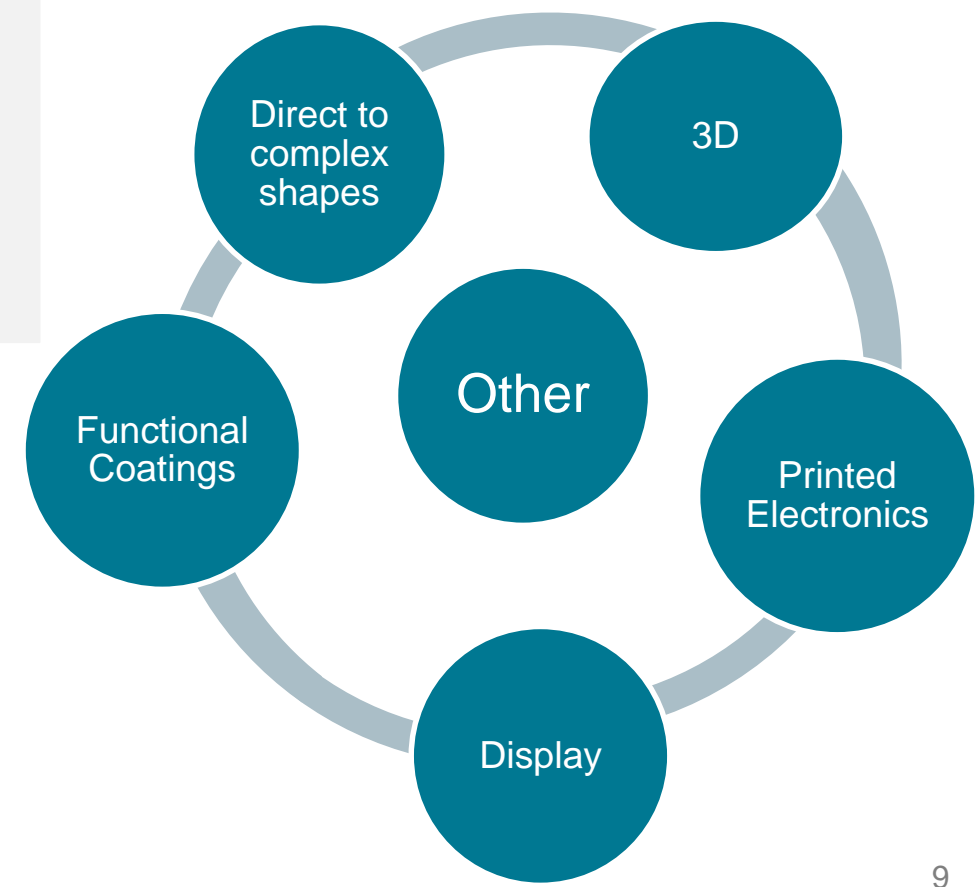
- **Growth in demand for:-**
 - Colour consistency
 - Solid flat colours
 - Stitching strategies
 - Missing nozzle compensation
 - Very high data rates
 - High resolution / high speed
 - Demand for 1200dpi
 - Closed loop workflows
 - Rotation / skew correction
 - Ink flow compensation
 - Image compensation for printing onto containers (bottles, cones, tubs)



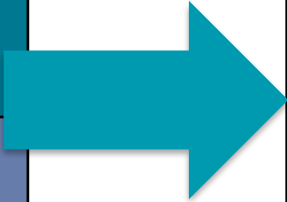
Other (Materials Deposition) 材料膜形成

• Key requirements

- Uniform layers / coatings
- Printhead density correction
- Stitching strategies
- Missing nozzle compensation
- Verification – closed loop workflows
- Image compensation for complex shapes – ink jet & robotics for injection molded parts



Different Applications - Same Challenges

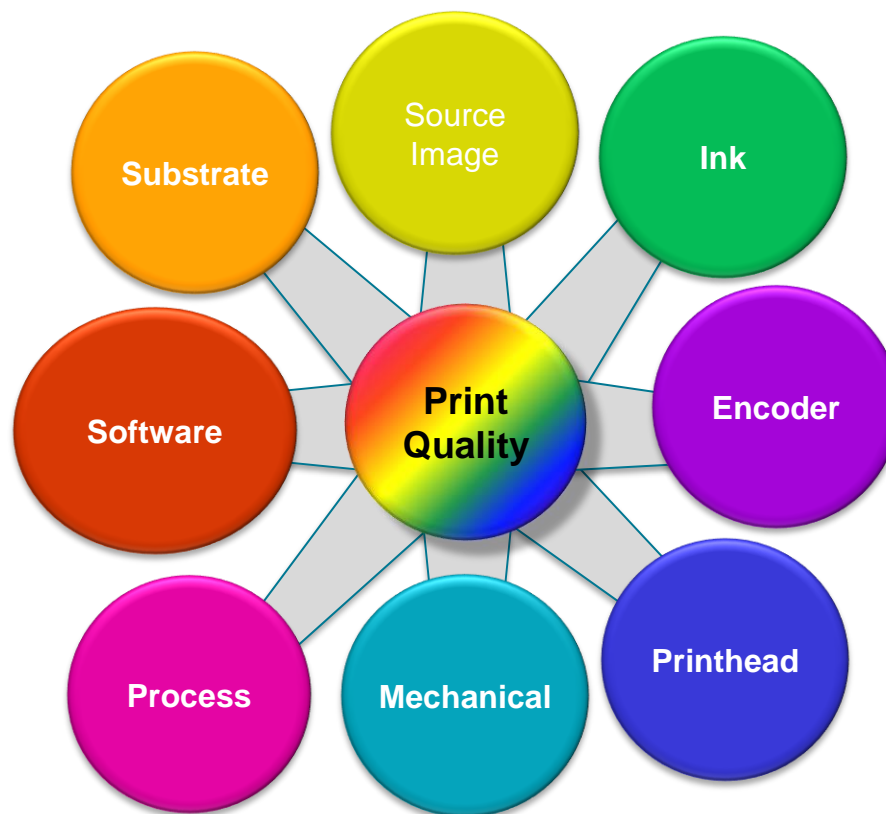
Graphics グラフィック	Wide format Textiles Packaging Labels Ceramics Glass Laminates Varnish		Need to achieve:- <ul style="list-style-type: none">• Flat colours• Uniform coatings• Invisible stitch zones• Colour consistency• Colour accuracy• Edge definition• Accurate drop placement• Registration Need to correct:- <ul style="list-style-type: none">• Uneven printhead density• Acceleration /deceleration issues• Missing nozzles• Rotation / skew• Banding
Materials Deposition 材料膜形成	Functional coatings Encapsulation layers Conductive tracks Colour filters		

Challenges of Achieving Print Quality

印刷品質達成への挑戦

Factors Effecting Print Quality 影響するファクター

Simple summary – reality is much more complex
現実をはるかに複雑です

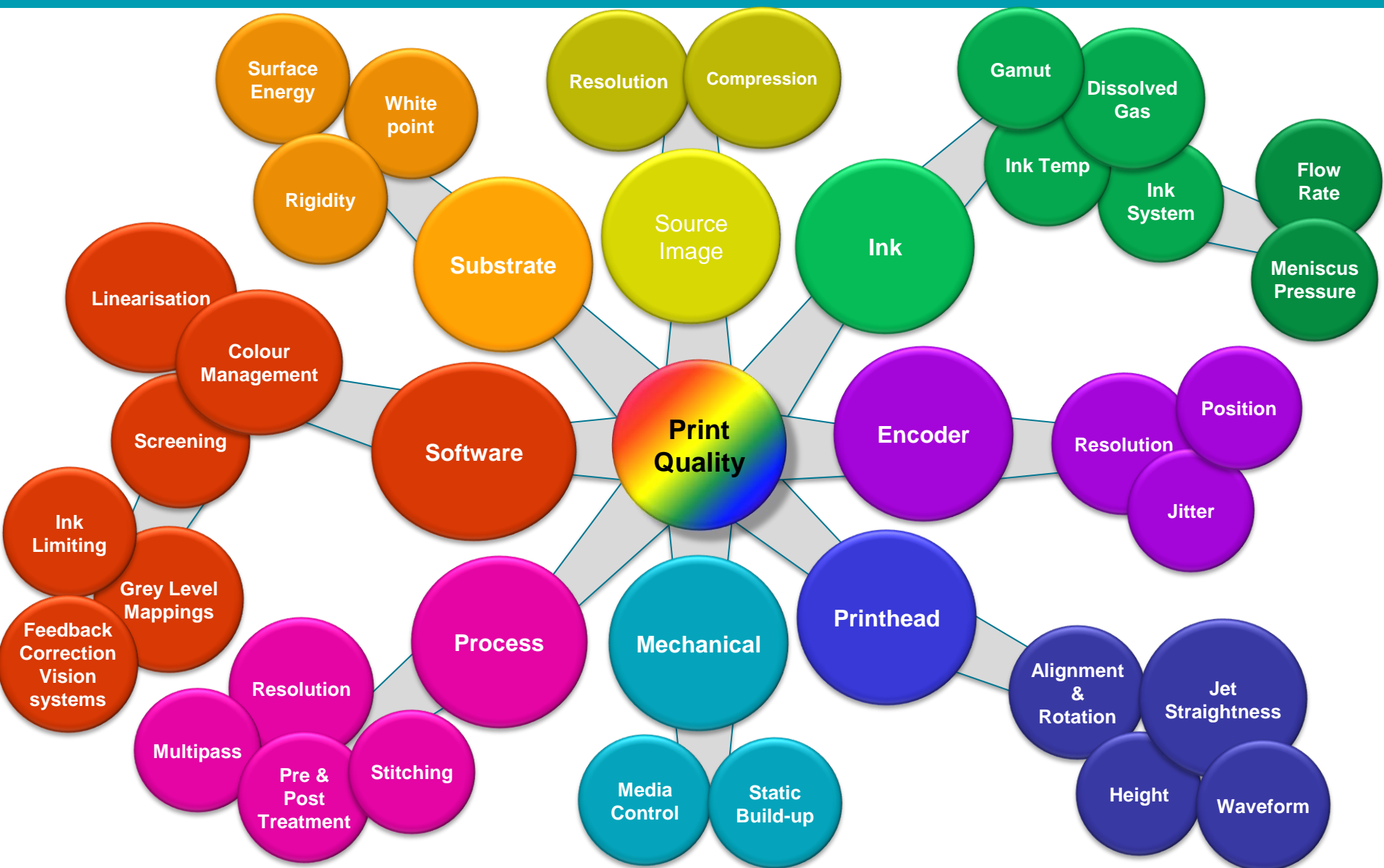


Factors Effecting Print Quality

影響するファクター

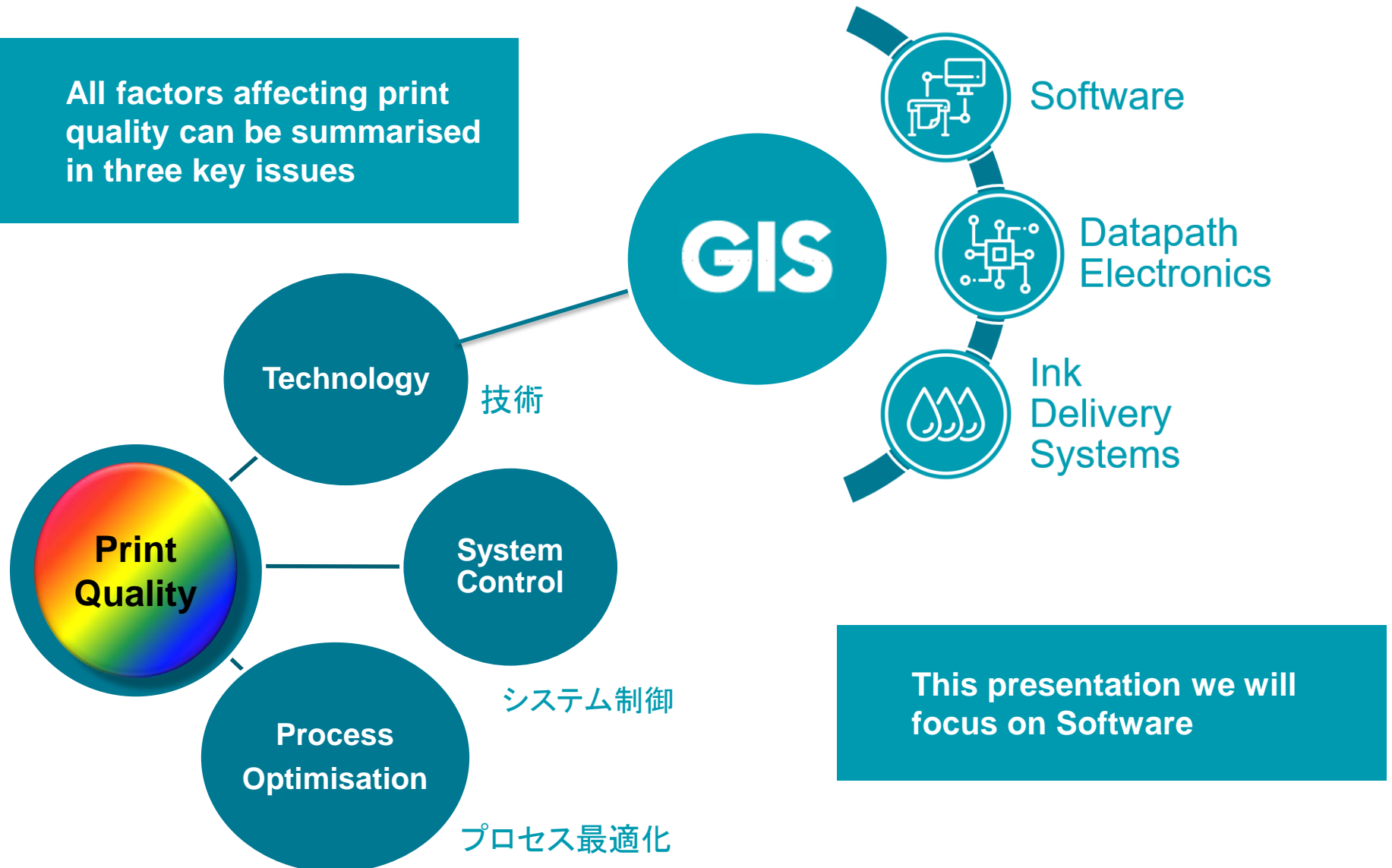
GIS

GLOBAL
INKJET
SYSTEMS



Achieving Print Quality 印刷品質の達成

All factors affecting print quality can be summarised in three key issues



This presentation we will focus on Software

Software can compensate for many system imperfections

ソフトウェアにより多くのシステム欠陥を補うことができます



Here are some examples....

Software Correction – Example ソフト補正例

Rotation/ Skew / Stretch Correction 回転/曲がり/伸縮 補正

- Varnish
 - Roll to roll
 - Alignment to labels
 - Cut Sheet
 - Alignment to preprint
- Industrial components
 - Alignment to objects on a conveyor



Rotation



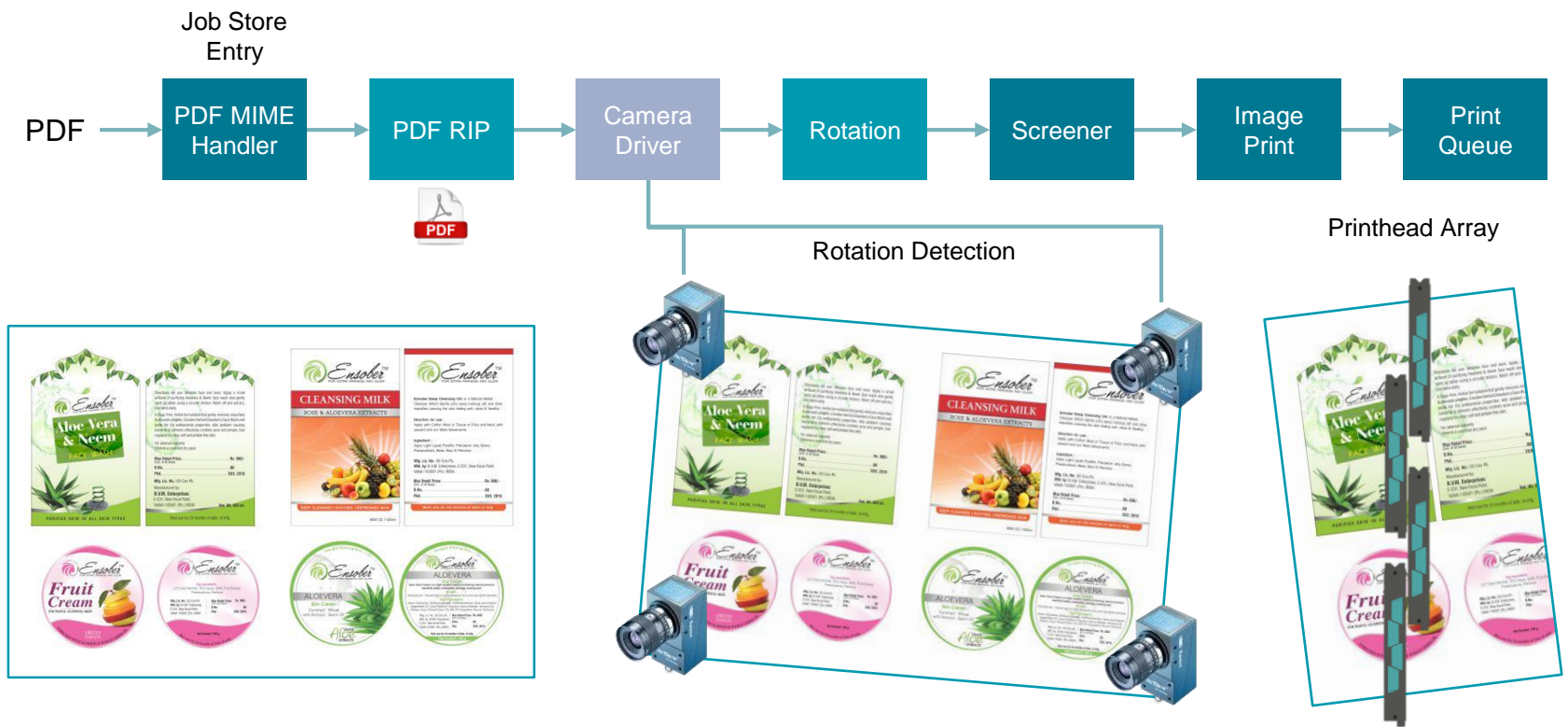
Trapezoid / Skew



Stretch and Compression (X & Y)

Software Correction – Example ソフト補正例

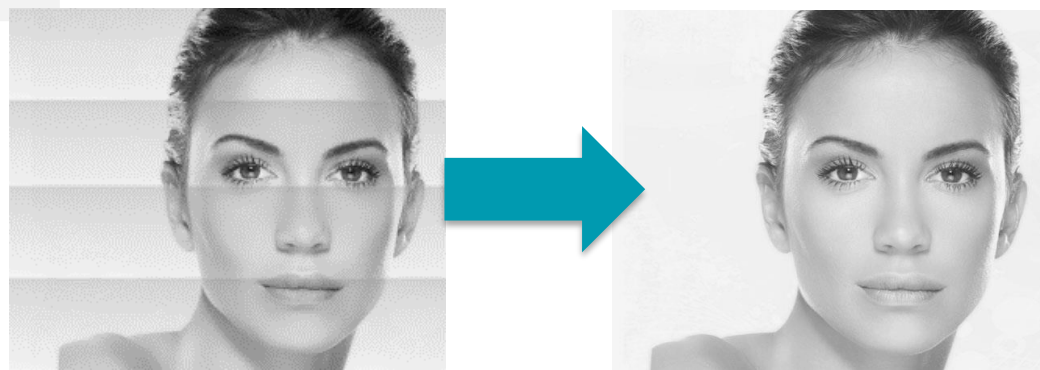
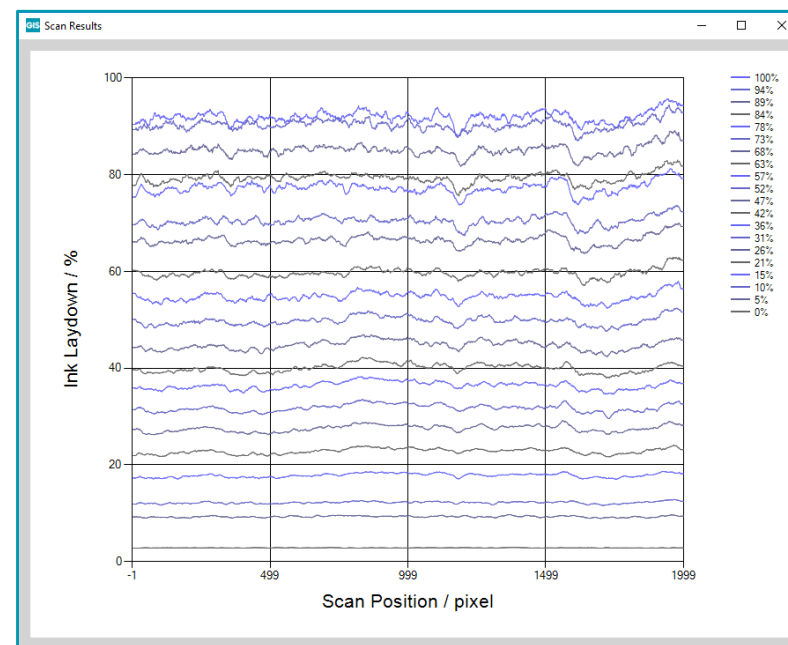
Rotation Correction for Spot Varnish – Real Time リアルタイム補正



Software Correction - Example ソフト補正例

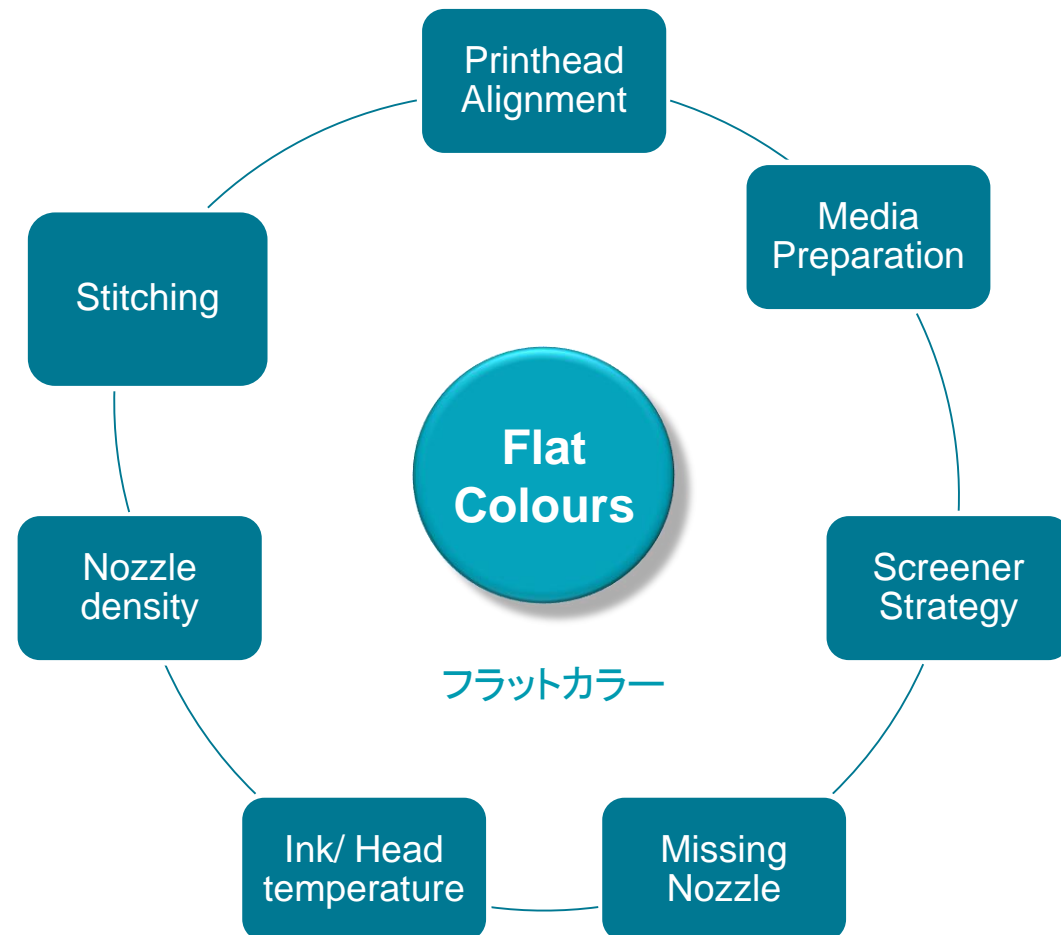
Printhead Density Correction – for Flat Colours / Uniform Coatings

- Aim is to achieve even density across a full printhead array for each grey level
- **Offline solution:** Print greyscale test pattern for each colour channel and measure the density across the printhead array at a range of grey levels
- **Inline solution:** closed loop with line scanner
- Adjust the grey level mapping at intervals across the printhead array



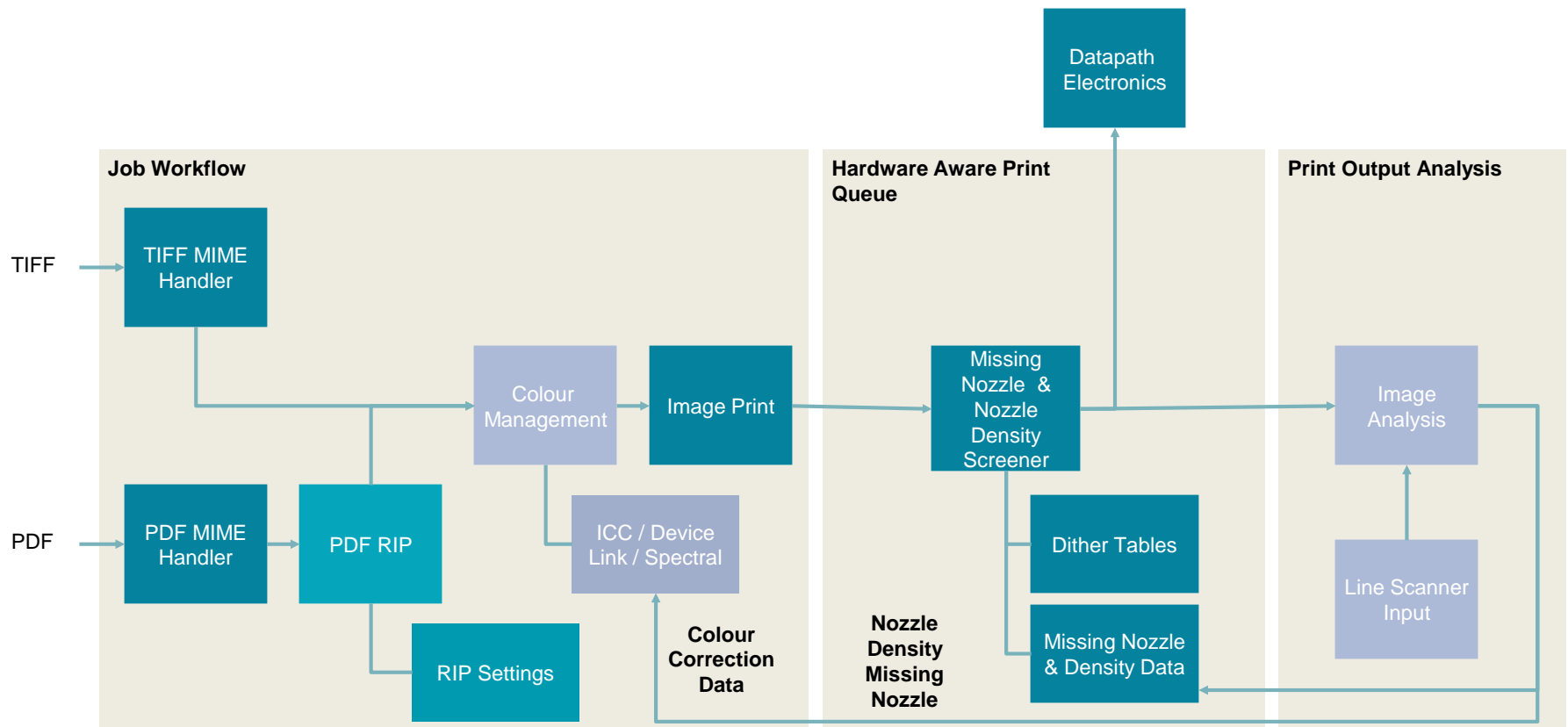
Software Correction ソフト補正例

- Many factors contribute to achieving flat solid colours / uniform coatings
- Inkjet printing systems have interacting & co-dependent parts
- Suite of technology solutions needed
- **Multiple strategies required for optimal results**



Closed Loop Workflows 閉ループワークフロー

- Closed loop software technology can combine many software corrections tools to achieve consistent print quality
- Missing nozzle compensation, printhead density and colour shift correction – required for high end systems
- Requires very high data rate and processing capability

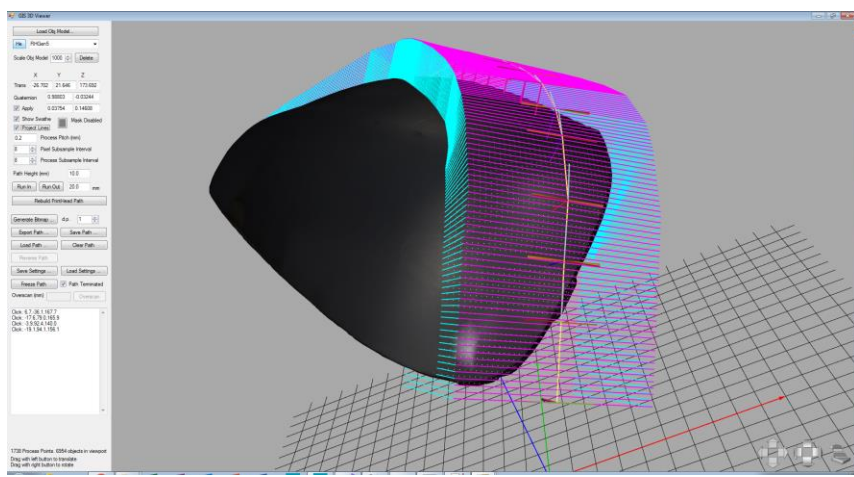


Software Unlocks New Markets ソフトによる市場開拓



Jetting Functional & Decorative Coatings on Industrial Parts

- Combined inkjet and robotics system control
- Unlocks new market opportunities in coating & decorating injection molded parts – automotive industry; industrial components
- Multiple software print quality tools enabled
- GIS Print Path Designer software



Motion Control

Print Data



Please see GIS video at: <https://vimeo.com/376156000/b2a720f1e5>

Print Quality Summary 印刷品質

- Pressures on achieving & maintaining image quality will increase
- Advanced software capabilities and RIP technologies are key



Software compensation can significantly improve image performance for system inaccuracies and errors



Inkjet systems have interacting & co-dependent parts. Multiple print quality strategies required for optimal results



Some corrections can be carried out offline, others require real-time correction with closed loop systems



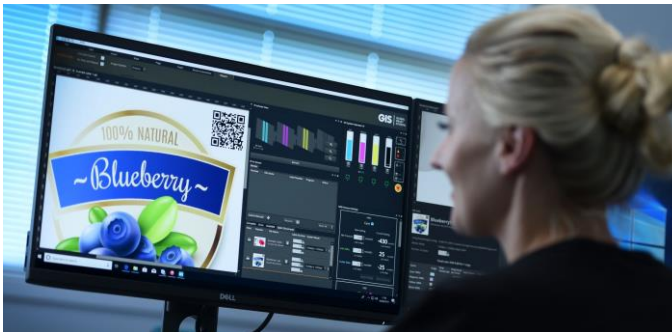
Innovative software can unlock new applications & opportunities

The GIS EcoSystem エコシステム



GIS Atlas™ Software

- Atlas Print Quality Tools
 - Printhead Density Correction
 - Missing Nozzle Compensation
 - Stitching Strategies
 - Geometry Engine
 - Rotation /Skew Correction
- Closed loop systems
- Customisable User Interface
- Atlas Screeners
- Atlas Variable PDF RIP
- Atlas Print Path Designer



The GIS EcoSystem エコシステム

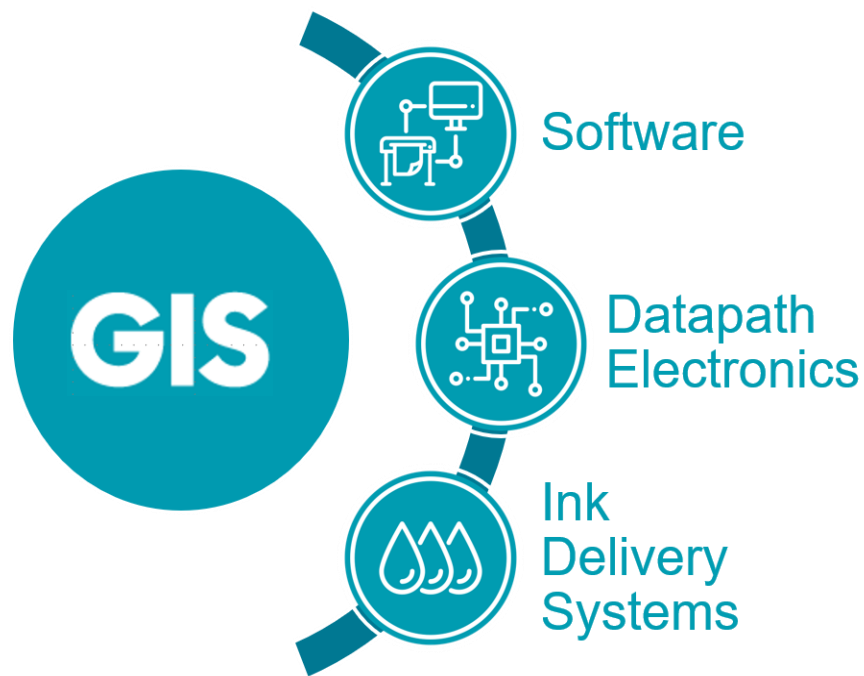


GIS Datapath Electronics

- Support printheads from Fujifilm Dimatix, Konica Minolta, Kyocera, Ricoh SII, Toshiba Tec & Xaar
 - Epson – in development
- Choice of USB or Ethernet platforms
- Modular scaleable architecture
- Continuous diagnostics & monitoring
- Robust / Production proven

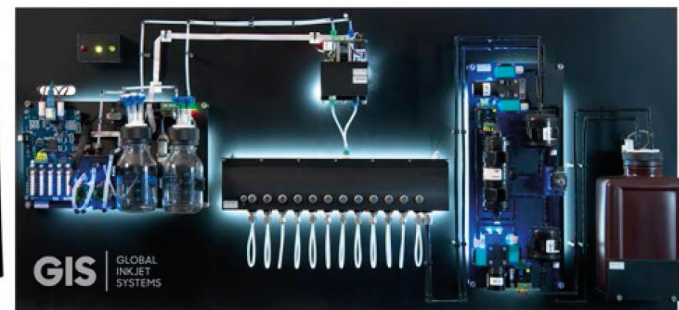


The GIS EcoSystem エコシステム

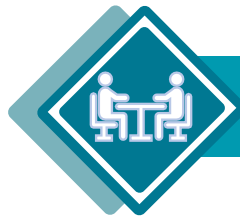


GIS Ink Delivery Systems




- Standalone product
 - Can be used with any datapath electronics
- Fully customizable
 - Family of header tank designs and sizes for different printheads
- All flow modes supported - including high pressure flow



GIS & Partnerships パートナーシップ



GIS - Importance of Partnerships

- Long term relationships with customers
 - Strong customer retention: 10+ years with customers
 - Strong reputation for customer support
- Strategic Partnerships
 -  **jetXpert**TM waveform development critical to many applications
 -  **Adobe**  **GLOBAL GRAPHICS**[®] - PDF Engines; so customers have choice
 - New strategic partnerships will be announced in 2020



Meeting GIS

- Please visit our tabletop here at the OIJC for more information
- drupa 2020 in Hall 3
- Welcome to visit us in Cambridge, UK

We look forward to working with you!



Nick Geddes

Founder & CEO

nick.geddes@globalinkjetsystems.com

Debbie Thorp

Business Development Director

debbie.thorp@globalinkjetsystems.com

Akihiro Kaneko

Sales Engineer

akihiro.kaneko@globalinkjetsystems.com

Global Inkjet Systems Limited

Edinburgh House
St Johns Innovation Park
Cowley Road
Cambridge CB4 0DS

Tel: +44 (0)1223 733 733

Web: www.globalinkjetsystems.com