ICE

Protect your Return On Investment

Installation and integration
Control of your process
Environmental impact controls
ICE Basics

• Canmaking is a process

• Each machine and process has a supplier and a customer

• Material specifications and proper use:
  – Metal
  – Lubricants
  – Tooling
  – Washer chemicals
  – Mobility Enhancer
  – Basecoat
  – Inks
  – OV
  – Inside Lacquer
The Stolle Global Solutions team recommends:

- Root Cause Analysis
- Seeking out of common issues
- Utilizing assistance to resolve problems
  - Material suppliers
- Always start by targeting biggest impact areas
- Kaizen approach to improve performance
I = Installation Integration

- Time line management
  - Cost of people, travel, and resources for installation and integration

- The importance of ascertaining needs vs. wants

- Layout – ease of sight / control / manufacture for efficiency
  - Cost implications on building/utilities for a given line footprint

- Foundations – design / project management

- Choice of equipment / suppliers by merit and trust rather than price (accepting that financial management is important)

- The importance of initial and follow-up training:
  - Can making
  - Specialization
  - Suppliers

- Use of suppliers at start-up and regularly after start-up
\[ C = \textit{Control of your process} \]

\textit{It’s not always the equipment}

- Many issues occur in a can plant – we often see plants start at the equipment with major ramifications due to changed specifications.

- While this is sometimes true, a strict methodology should be followed so as to ensure we tackle the \textit{issue} and not the \textit{symptom}:
  - What is the issue?
  - What do we see?
  - Where is it – and – where is it not:
    - Check thoroughly and have more than one person do an independent audit – this is an excellent task to include materials suppliers that could be involved in the issue.

- What can cause this issue?
  - It is always best to list these from easiest to most complex.

- What can we eliminate easily – what is a lion’s bite out of the problem?

- Do we see any orientation to grain, bodymaker ID, ink dot, etc.?
It would take weeks to touch on all the issues that can occur in a modern can plant.

Here are what we feel are some of the most common issues:

- Cup jams
- Tear-offs
- Conveyor spoilage
- Deco blow-offs
- Enamel ratings
- Necker damage

Find the issue that is causing the most “pain” to the overall plant efficiency and attack it first.

C = Control of your process
It’s not always the equipment
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Cup jams - Cupper

• Too much cupper lube causing cups to stick
• Too much cupper lube causing excessive wrinkling through slippage
• Too little cupper lube causing punch-outs
• Too little post lube causing punch-outs
• Metallurgy
• Laminations
• Clip-outs
Identifying Tear-off causes

- **Orientation**
  - Against grain
  - Against dome ID

- **Location and frequency**
  - Cupper station ID
  - Bodymakers

- **Height**
  - Consistent
  - Varied

- **Visual appearance**

\[ C = \text{Control of your process} \]

It’s not always the equipment
C = **Control of your process**

*It’s not always the equipment*

**Tearoffs**

- Too little cupper lube inside cup
- Concentration of coolant too low
- Esther content of coolant too low
- Tramp oil / coolant concentration out of balance
- High aluminum content of coolant causing pickup on dies
- Lubrication compromised because post lube / cupper lube / coolant do not compliment each other
- Water quality / microbiological management
- Slivers / whiskers
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Coil handling
$C = \text{Control of your process}$

*It’s not always the equipment*

**Coil handling**

Fork lift damage
$C = \textit{Control of your process}$

\textit{It’s not always the equipment}

Cup damage
C = Control of your process
It’s not always the equipment

Cup radius damage

30mm
Damage to bottom of cup confirmed by:

- Only on one cupper station
- Always at the same place compared to grain of metal
Excessive wrinkling on the redraw die will be evidenced by high earring and saw tooth on the cut edge.

$C =$ Control of your process

It’s not always the equipment

Cup damage

50mm
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Scrap-induced tear-off

Typical zipper
Scrap induced scoring
If the operator can save both halves of the tear-off, a more complete picture can be seen.
Typical bleedthrough caused by scuffing – this case was caused by the cup locator.

- It is important to note that damage to dies will cause the same appearance, but tends to be mid to top-wall and will have the same orientation to the bodymaker ID.

\( C = \text{Control of your process} \)

It’s not always the equipment.
Old cup locator is swollen due to heat and ingress of coolant. When the cup locator swells, it scores the cup as well as forces it into opposing anvil.

Bleedthrough caused by cup damage

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New cup locator
Here the cup guide has swollen as well and offers a new point of contact and bleedthrough.
When wrinkling becomes too evident, it causes bleedthrough at the top or cut edge of the can.
Bleedthrough related to either a match-gap on the cupper tooling, too high a lubricity in the same area, or dirty tooling
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Bleedthrough – other causes

- Compatibility between post lube/cupper lube can cause bleedthrough

Typical post lube/redraw-produced bleedthrough
Typical external bleedthrough

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\textbf{Linear bleedthrough}

- Lines are typically 2mm apart and linear in appearance
- It’s normal to find these lines internally as well

Typical external bleedthrough
Excessive wrinkling on the redraw die will be evidenced by high earring and saw tooth on the cut edge.

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*It’s not always the equipment*
If we are not successful in controlling because:

a) Match-gap too large
b) Hold down pressure too low
c) Surface too slippery through excessive cupper lube or lubricity

...we will see “wrinkling” of the metal.

If we control the metal successfully, we change the shape through the redraw (and the cupper tooling) and maintain a good flat surface.
Redraw sleeve picks up aluminium and in severe cases damages it due to “sympathetic damage to metal”

- Increased detergency of chemtool material loosens this build-up exacerbating internal linear bleedthrough

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Linear Bleedthrough

Pickup on redraw caused by transfer of damage through metal from redraw sleeve
All cows are animals, but not all animals are cows

Problem Solving

“All cows are animals, but not all animals are cows”

An issue can be created by many causes, but not the same one all the time, so...

Eliminate the causes one by one and there will be fewer issues
If you make good cans today, and tomorrow the process is the same – you will make good cans tomorrow.

If you don’t – something has changed.

Eliminate the variables and you will quickly be able to trace what has changed.

$C = \text{Control of your process}$

It’s not always the equipment.

Problem Solving Facts
$C = \text{Control of your process}$

$\text{It's not always the equipment}$

Conveyor Spoilage

- **Bodymaker to Washer**
  - Cans too clean – a little oil makes the can-to-can interaction slicker
  - Dead plates dry – once again dry dead plates will tip cans

- **Washer Oven**
  - Poor mobility

- **Washer to Basecoater / Decorator**
  - Poor mobility
  - Over-etching
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Basecoater/Decorator blow-offs

• No mobility
  – Stage 2 fluoride too active
  – Stage 4 fluoride too active
  – No mobility enhancer
    • Cans too etched
    • Heel dents due to immobile base
    • Damaged cans due to immobile sidewalls
    • Poor loading due to immobile inside sidewalls
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Typical twisted can - “Christmas cracker”
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Slip Angle Test

- Beverage = 15°
- Beer = 25°
- Retort = 40° +
  (when treatment induced)
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Enamel Ratings Too High

- Grease from Cupper / Bodymaker / Decorator
- Aluminum soaps in coolant / conveyor
- Silicon / silicone
  - Incoming water
  - Injected – mastic / polish / some defoamers
- Fungus
- Poor washing
- Lacquer
- Ink / over-varnish
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\textit{It's not always the equipment}

Black spot
It can be the ink, Jack: )

- Over-varnish
- Lacquer
- Can diameter/punch range

Necker damage

\[ C = \textit{Control of your process} \]

It’s not always the equipment
Coolant and washer makeup water

Always check before building a plant – operating costs could quickly ramp-up!

- Residual chlorine in water (PPM)
  - Too low can cause microbiological growth
  - Too high can stain aluminum

- Water hardness
  - Too hard can cause the production of hard water soaps and ultimately aluminum soaps
    - Poor tool life
    - Black spots
    - Tear-offs

- Silicon content
  - This will cause metal exposure and ink de-wetting
Biological content – bacteria / fungal
   - This will contaminate coolant and washers causing untold issues with tear offs / tool life / metal exposure / bleedthrough

Sulphate content
   - If this is too high you will have issues with staining due to sulphate poisoning in the treatment stage of the washer

Fluoride content
   - RmV (fluoride activity)
     - The use of fluoride in the washer is onerous at best due to its high toxicity, since it has to be used in the incoming water content
     - If too high, fluoride can cause issues with staining and mobility – check the geology of the intended site for fluorspar
Incoming materials

Coil specification: Aluminum 3104 Alloy, H19 – all specs to be as rolled (pre-bake)

- Coil manufacturer
- Coil bow: range
- Width tolerance
- Strength – yield and tensile
- Elongation %
- Metallurgy – mg/si/mn in particular
  - All three cannot be at the top end of their spec or a reasonably hard material will work-harden, taking it out of spec

**C = Control of your process**
*It’s not always the equipment*
Incoming materials

• Can stock material
  – Gauge
  – Material width
  – Post lube specification (type) - very important
  – Post lube weight

• Cup quality
  – Inside diameter (ID)
  – Inner radius
  – Height (average)
  – Topwall thickness
  – Cup weight
  – Cup earring

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Incoming materials

- Cup lube specification (type)
  - Manufacturer
  - Neat Lube recommended (as applied by Unist)
  - Cup lube weight (g)
  - Temperature
    - If climatic, then temperature must be the same for night/day and summer/winter, or lube viscosity will alter and thus change laydown/cup film weights
Incoming materials

- D&I Coolant
  - Manufacturer
  - Coolant flow: LPM @ Bodymaker
  - Concentration of coolant in D&I coolant (%)
  - Tramp oil concentration – added or from Bodymaker leakage?
  - Bacteria present in lubricant (bug growth)
  - Biocide concentration
  - Compatibility of cup lube and coolant?
  - Should be the same supplier
  - Dirt load of can forming lubricant – ppm and size
  - D&I coolant pH
  - D&I lube hardness
  - Cup lube concentration in soluble oil

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Tooling quality checks

- Tooling measured per drawings (inspection reports)
- Verify tooling dimensions are consistent with match gap chart
- Punch finish
  - Is the punch designed for a crosshatch finish?
  - If not, don’t crosshatch it...
- Measurement equipment to include:
  - Bore gauges
  - Diameter inspection equipment
  - Radius inspection equipment / gauges
  - Angle inspection equipment / gauges

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Air quality

- Factories in the vicinity
  - What is in the air?
  - How will it affect the can quality?
    - Identify potential Issues when planning the facility
    - Avoid contaminants if possible
    - Understand how to deal with the factors that cannot be avoided
    - Be proactive when dealing with issues

$E = \text{Environment}$

*A duck isn’t the only thing that can be out of water*
Environment considerations

- Is the proposed building new or existing?
- Temperature and humidity range?
- What is the altitude (height above sea level) of the factory?
- Is there a water sample available (water treatment)?
- What is the discharge limits, waste water and emissions?
- Language of documentation?
- Are there any restrictions on production area size?
- Safety requirements - CE marking?
- Air quality?
- Water quality?
- Earthquake possibilities?
E = Environment
A duck isn’t the only thing that can be out of water

Can this....
E = Environment

A duck isn’t the only thing that can be out of water

....turn into this?
\[ E = \text{Environment} \]

A duck isn’t the only thing that can be out of water

....or this?
Finally...
Stolle’s Global Presence

- Englewood CO, USA
- Centennial CO, USA (Stolle HQ)
- Canton OH, USA
- Sidney OH, USA
- Carlisle, UK
- Bahrain
- Amazonia, Brazil
- Indaiatuba, Brazil
- Shanghai, China
- Brisbane, Australia
- Ho Chi Minh City, Vietnam
- India

- Stolle Location
- Authorized International Agent
Stolle Machinery offers the widest selection of equipment supply to the canmaking industry in both can and end making.

Couple this with our full engineering and integration capabilities backed by our insurance of efficiency guarantees and there’s no question:

The buck stops with us...

...and we carry that mantle with pride.
Thanks for your attention!

Terima kasih atas perhatiannya (Indonesian)
Terima kasih atas perhatian Anda (Malay)
谢谢您的关注 (Mandarin)
உங்கள் கவனத்திற்கு நன்றி (Tamil)
Salamat sa iyong atensyon (Pilipino)
आपका ध्यान के लिए धन्यवाद (Hindi)
ขอบคุณสำหรับความสนใจของคุณ (Thai)
Cam on su chu cua qui vi (Vietnamese)