



Total Process Control

Controlling the Process

Printing
Applications



Total Process Control

Temperature Management





Total Process Control

Heat Generators

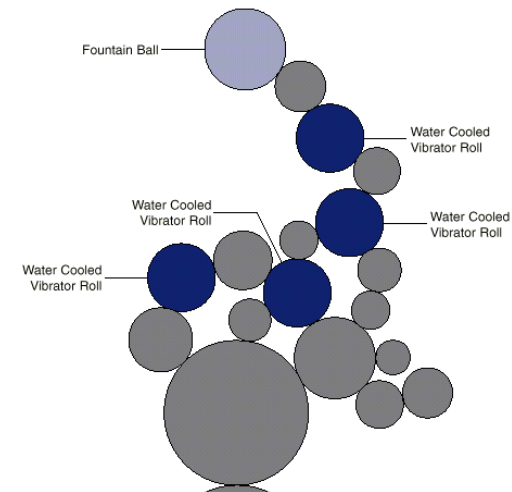
- Ambient Temperatures
- Friction
- Gears, Bearings, Bushings
- Increased Speeds
- Rollers, Durometer – Settings – Pressure
- Ink, Pigmentation – Tack – Viscosity,
- Ink Transfer by Temperature
- Ovens, IR, UV, EB



Total Process Control

Determine Heat Loads

- Ambient is Critical
- Rollers,
- Ink Ball
- Ink, Tack, Color, Coverage
- Speed
- Type of Substrates
 - Aluminum - Steel
 - Gauge of Metal

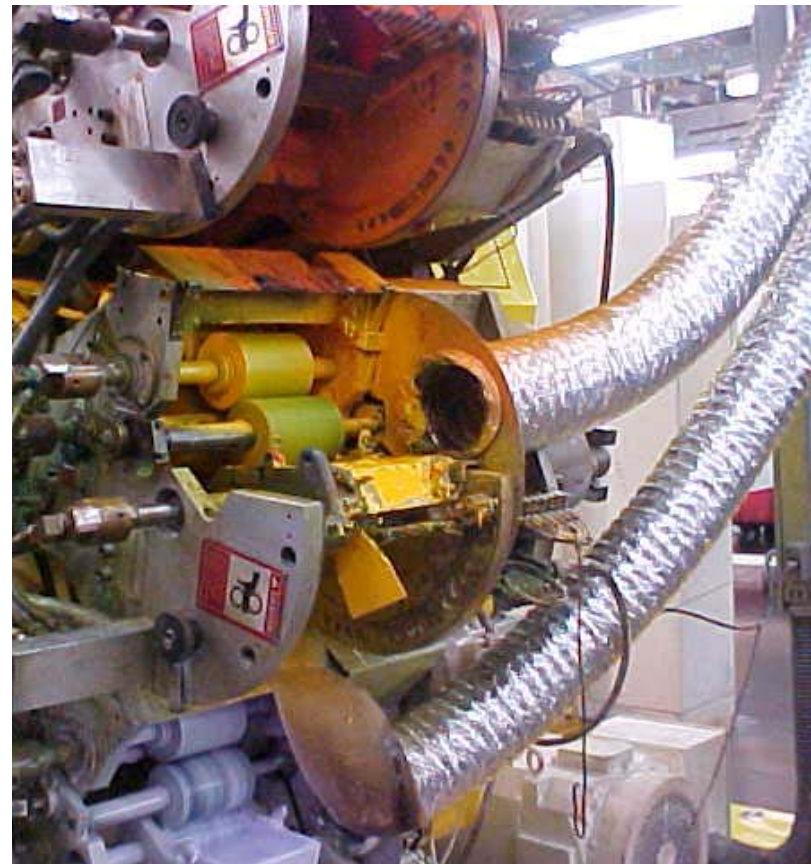




Total Process Control

Ink Rollers

- **Ideal 78 - 85F**
- **Below 70 F**
 - Increased Tack
 - Less Transfer Qualities
 - Less Water Pick Up
- **Above 87**
 - Ink Misting
 - Increase Solvent Release
 - Increase Water Pick Up
 - Increased Piling



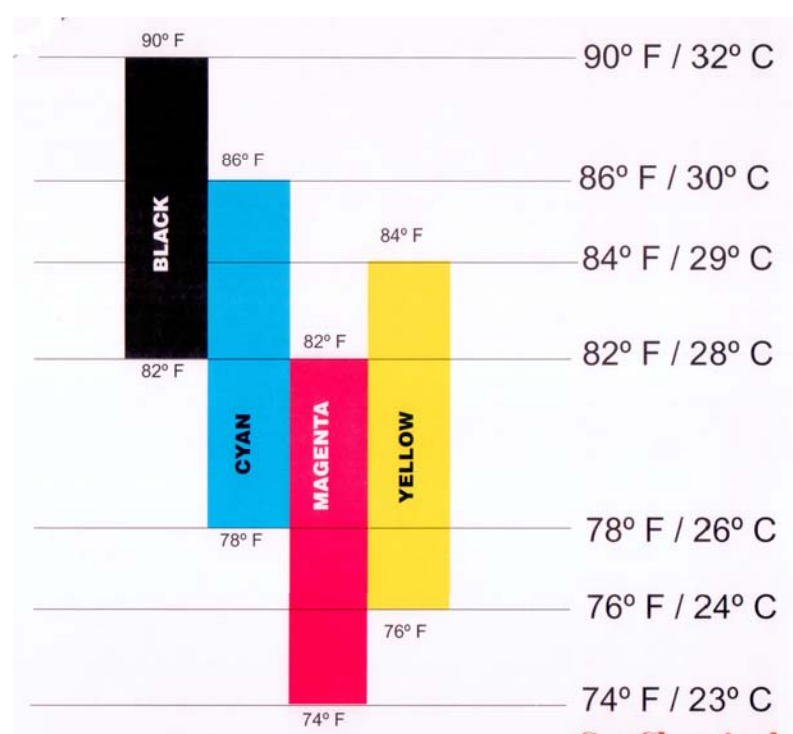


Total Process Control

Temperature Compatibility

- **Color & Temperature By Pigment Loads**

Black	82 - 90
Cyan	78 - 86
Magenta	74 - 82
Yellow	76 - 84

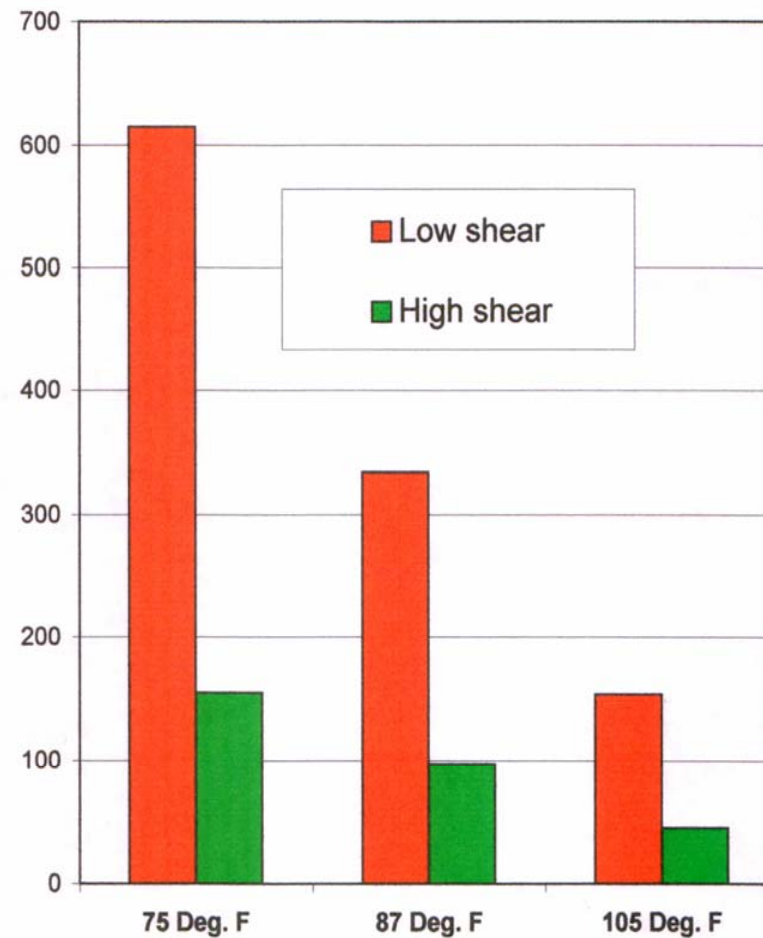




Total Process Control

Mechanics of Shear Rate

- Ink Cohesion
- Speed
- Temperature
- Dynamics
 - Roller Diameter



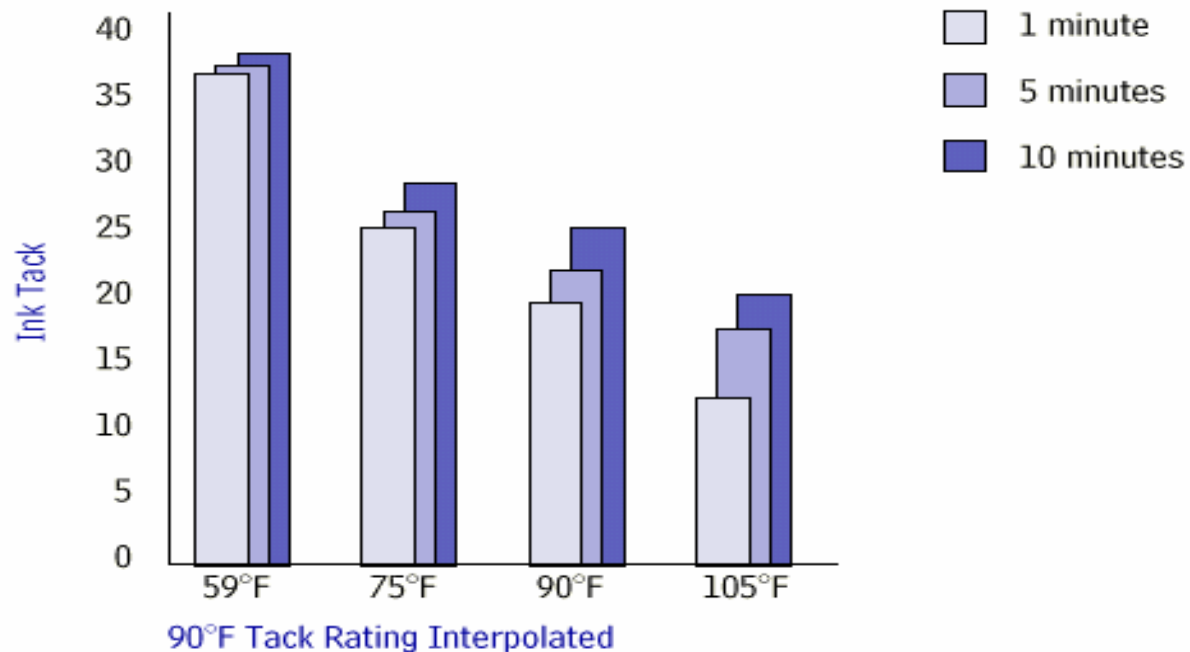


Total Process Control

Rheology of Solvent Base Ink

3.1 Tack

As the temperature of the ink train increases, the tack of the ink decreases. Figure 2 shows the tack of the ink at various temperatures as measured with an inkometer.¹

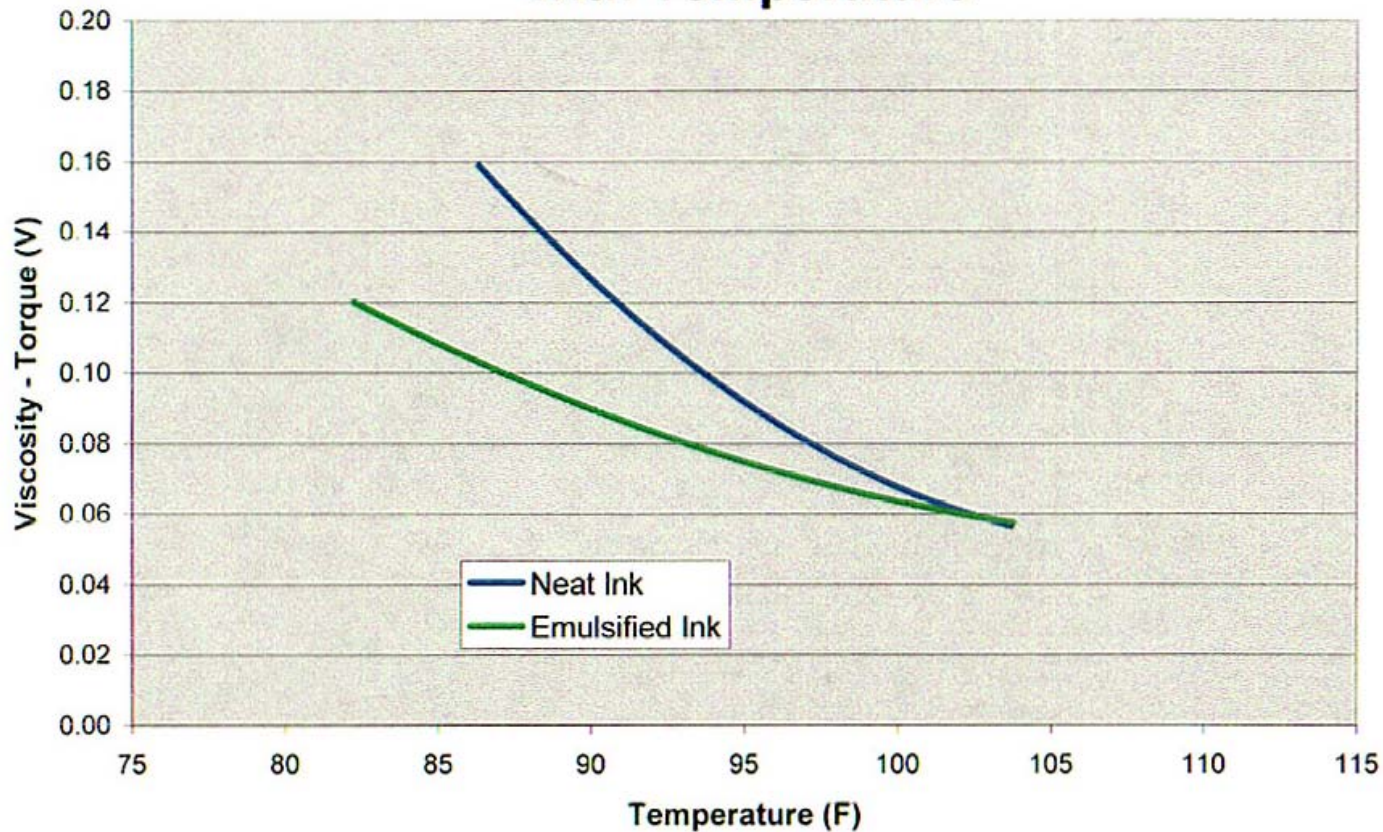




Total Process Control

Rheology of Non-Solvent Inks

Variation of Neat and Emulsified Ink Viscosity with Temperature





Total Process Control

It's Not Just Temperature

Relative Humidity

With

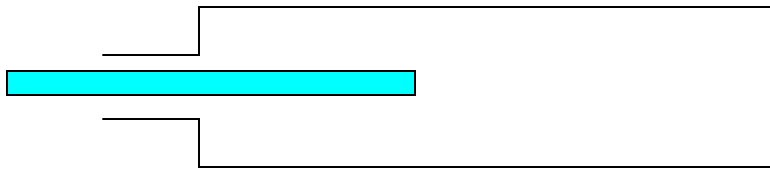
- Temperature
- Equals
- Condensation





Total Process Control

Short Tubes & Series Piping



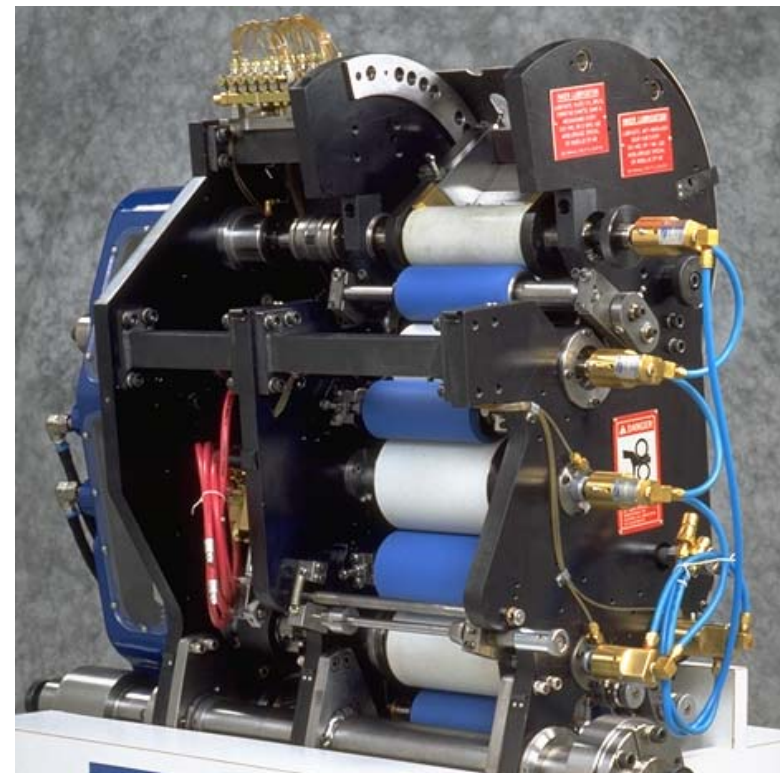
Short Tubes Cause

Short Cycling

Condensation

Piping in Series

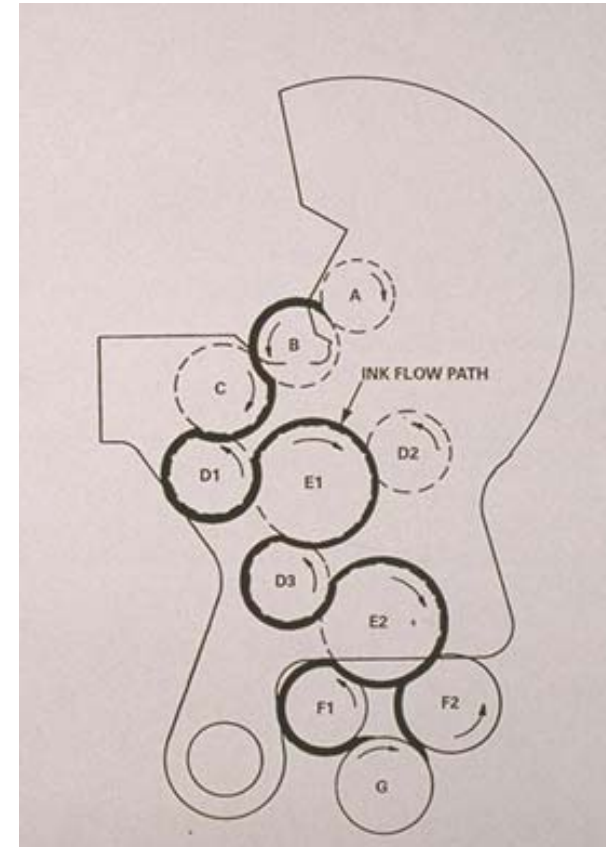
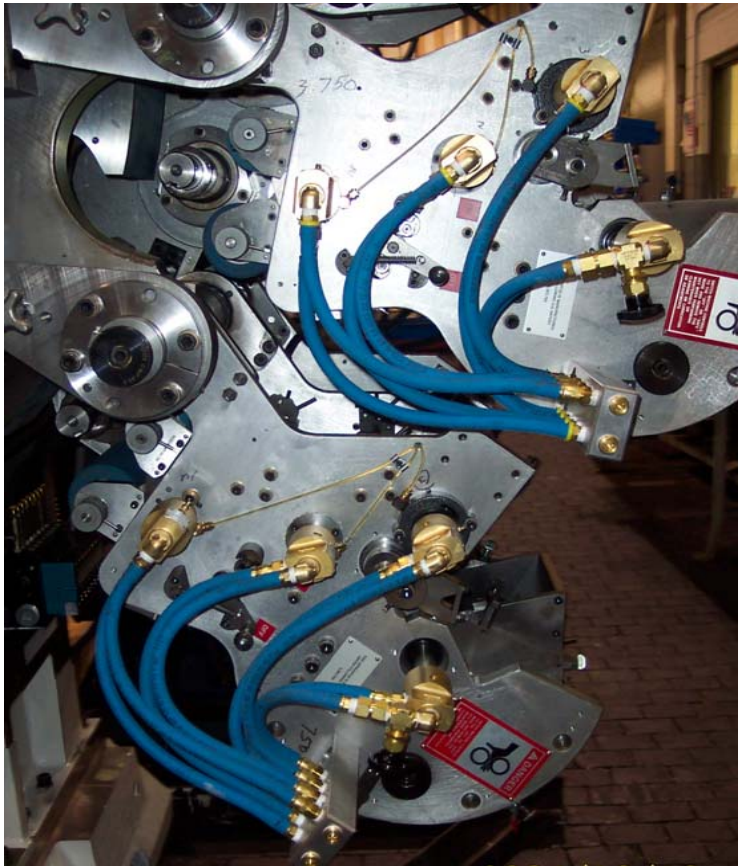
**Uncontrolled
Temperature**





Total Process Control

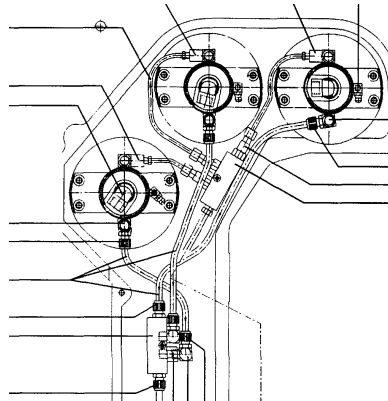
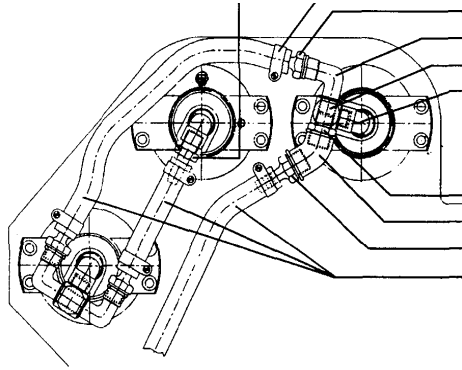
Rutherford Inker





Total Process Control

Series vs. Parallel





Total Process Control

Heat Exchangers

- Water to Water
- Water to Oil
- Water to Air
- Freon to Water/Oil





Total Process Control

Electrical Cabinets

- Sterile Environment
- Computer Boards
- Servos
- Relays/Contactors





Total Process Control

Multi-Zone Chiller (6 Zones)

Each Heat Load Individually

- **Cooling & Heating**
 - **Eliminate Condensation**
- **Controls Water Pickup As Well As Stability of Ink Transfer**
- **Required for UV, EB & Waterless Applications**

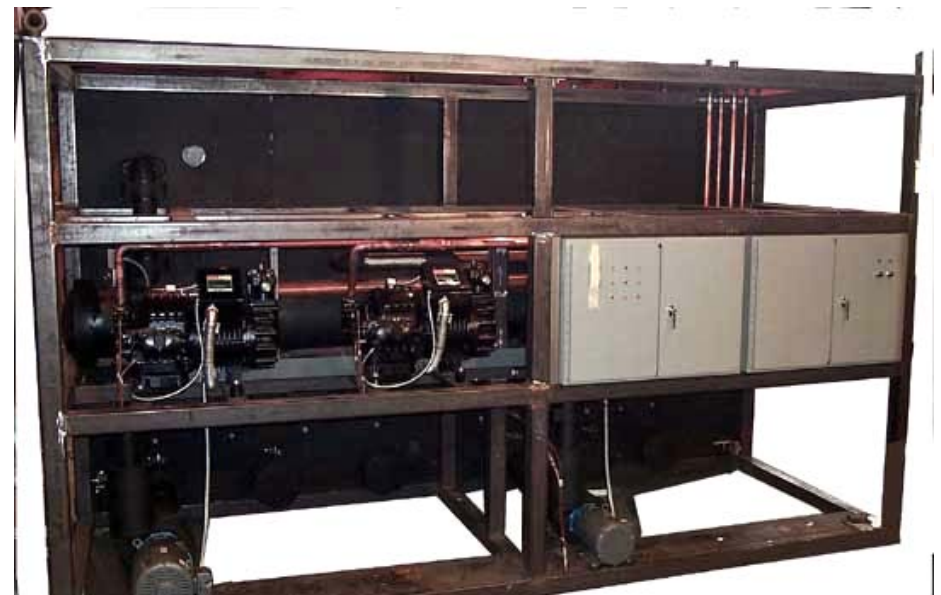




Total Process Control

Large Central Chillers

- **50 to 600 Tons**
- **Multiple Applications**
- **Two or More Presses**
- **Multiple Process**
- **Dual Circuit for
Redundancy**
- **Digital Image Diodes**





Total Process Control

Outside Condenser-Heat Rejection

- **Split System, Remote Condenser**
- **Rejection Rate of Heat
15,000 BTU per Ton**
- **7 Ton Chiller 105,000 BTU**

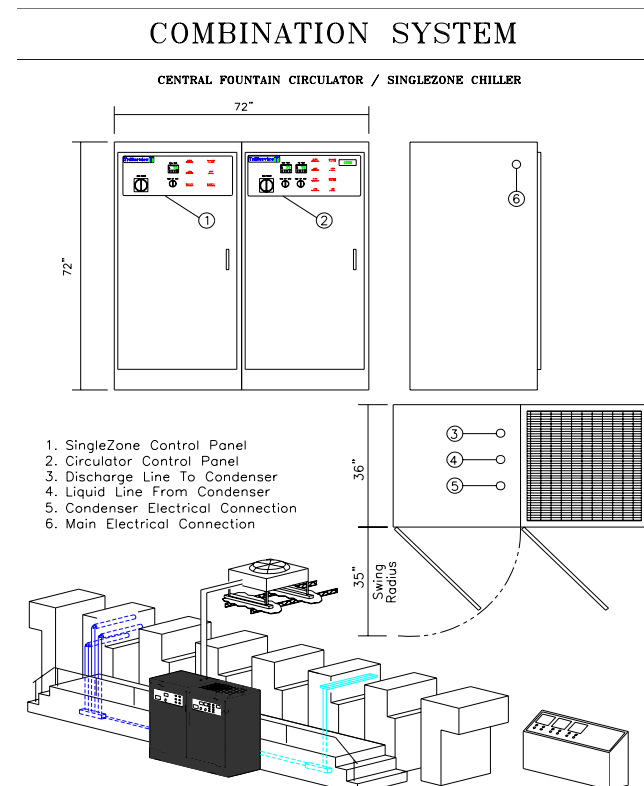




Total Process Control

Typical Layout of Equipment

- Modular Design
- Center of Press
- Touch Screen at Console of Press
- Remote Condenser





Total Process Control

Economizer = Additional Savings

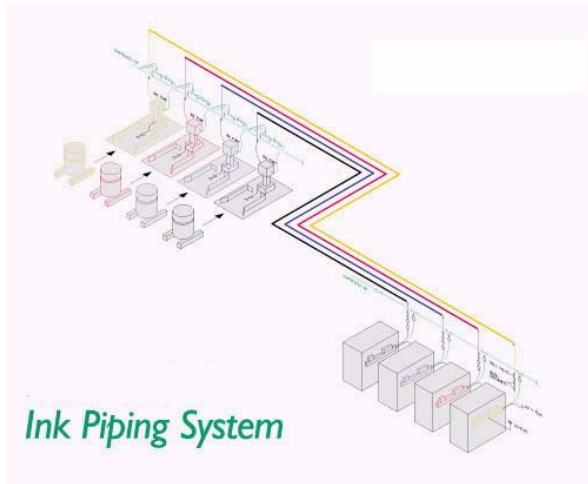
- **Below 50 Degree**
 - **Free Cooling**
- **Refrigeration System is silenced**
- **Extended Life of All Refrigeration Components**





Total Process Control

Ink Piping





Total Process Control

Product Overview

Mechanical Installations

Mezzanines

Pollution Controls

50 to 600 Ton Chilling

Progressive Chill Rolls

Mechanical Piping,

- Ink, Water, Coatings, Air, Glue

Central Circulators

UV Integration

Zone Controls

Venturi Plates

Custom Engineered
Systems



Total Process Control

- Sales/Service
- Engineering
- Training
- On Site Trouble Shooting

Master Printer on Staff

Regional support

Custom Engineering

Printing Solutions

Printing, Coating

Temperature Controls



Total Process Control

Thank You For Your Attention