GRANCO CLARK HEATING AND HANDLING SYSTEMS

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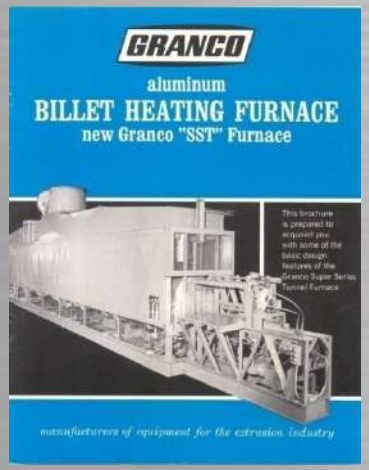
Company Background

GRANCO, INC



- Flame Impingement 1958
- Tunnel Furnace 1963

CLARK AUTOMATION

- Walking Beam Tables 1959
- Integrated Handling 1966

Company Background

GRANCO CLARK, INC

Hot Jet Recuperation Furnace	1978
First Automated Handling Supplier	1986
Cut-On-The-Fly Double Puller	1986
High Pressure Spray Quench	1988
Taper Quench	1990
Hot Billet Saw	2005
Fusion Bond	2008
High Pressure Log Washer	2013

Company Background

GRANCO CLARK HAS DELIVERED:

- More than 1200 Billet and Log Furnaces
- More than 450 Handling Systems
- Over 125 Automated Handling Systems

Design Considerations

How do we think about the Aluminum Extrusion process?

Company Video

Design Considerations

Our Priorities:

- Process Productivity
- System Yield
- Equipment Uptime

Design Considerations

Process Productivity

Extrusion Press Is The Constrained Resource.
Other Systems Must Match Press Speed:

- Billet Heating

Design Considerations

Process Productivity

Extrusion Press Is The Constrained Resource.
Other Systems Must Match Press Speed:

- Billet Heating
- Profile Handling

Design Considerations

Process Productivity

Extrusion Press Is The Constrained Resource.
Other Systems Must Match Press Speed:

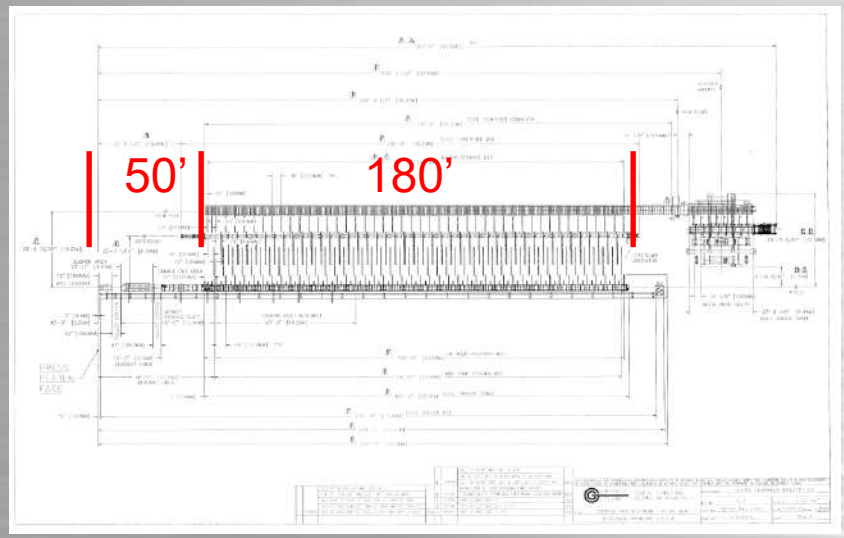
- Billet Heating
- Profile Handling
- Aging Systems

Design Considerations

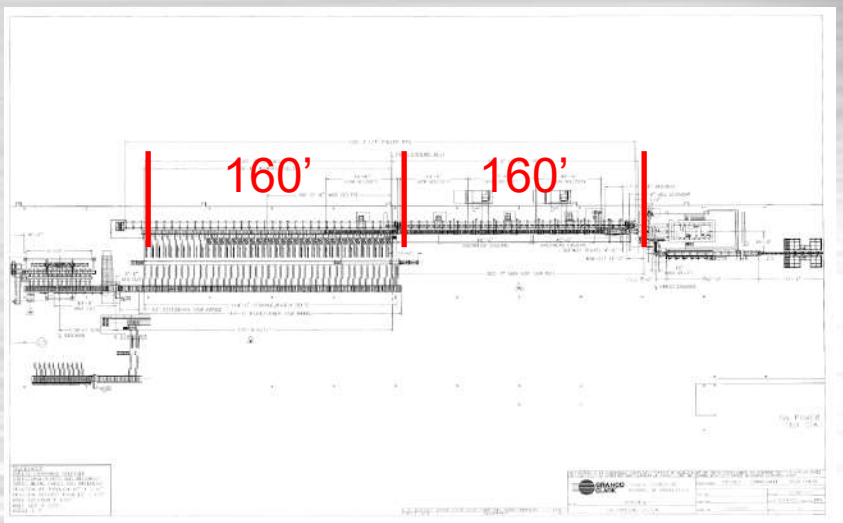
System Yield

- Cut On The Die Mark For Best Yield

Flying Cut



Double Length



Design Considerations

System Yield

- Cut On The Die Mark For Best Yield
- Handling System Protects Surface Finish

Design Considerations

System Yield

- Cut On The Die Mark For Best Yield
- Handling System Protects Surface Finish
- Saw System Provides Accurate Cut Lengths

Design Considerations

System Yield

- Cut On The Die Mark For Best Yield
- Handling System Protects Surface Finish
- Saw System Provides Accurate Cut Lengths
- Stacker For “No Handling”

Service & Support

Equipment Uptime

- Standard Equipment and Programs
- Supervisory Computer System Diagnostics
- Internet Based PLC Support Device
- Design, Components, Workmanship, Are All of The Highest Quality

Equipment Overview

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Die Heating

Video

Chest Style Die Heater

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Mult-Compartment Die Heater

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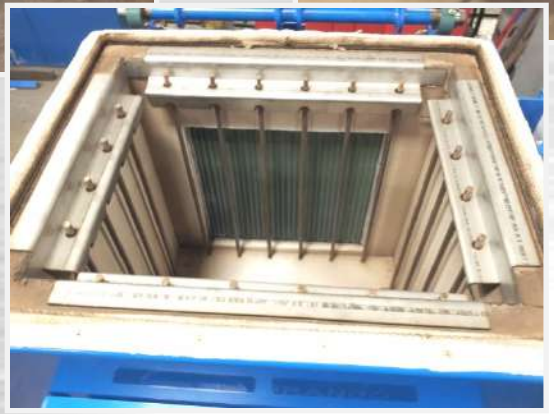
Infrared Die Heater



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Press Feed Equipment

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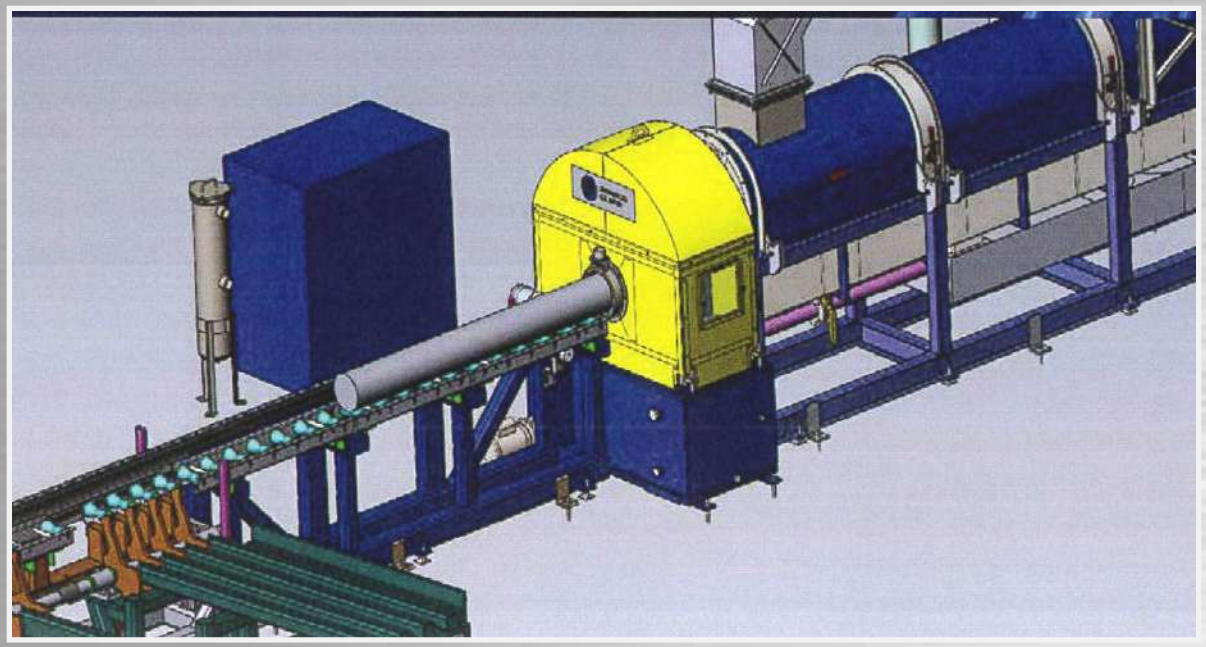
Log Washer



Log/Billet Furnace

Video

Furnace PPT

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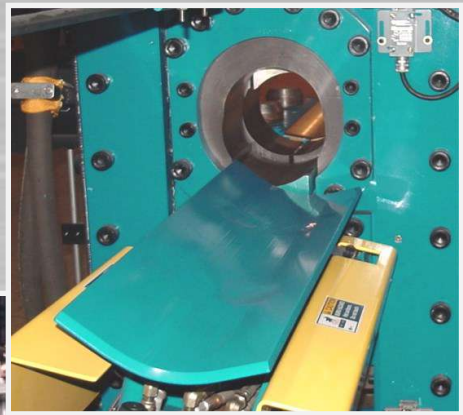
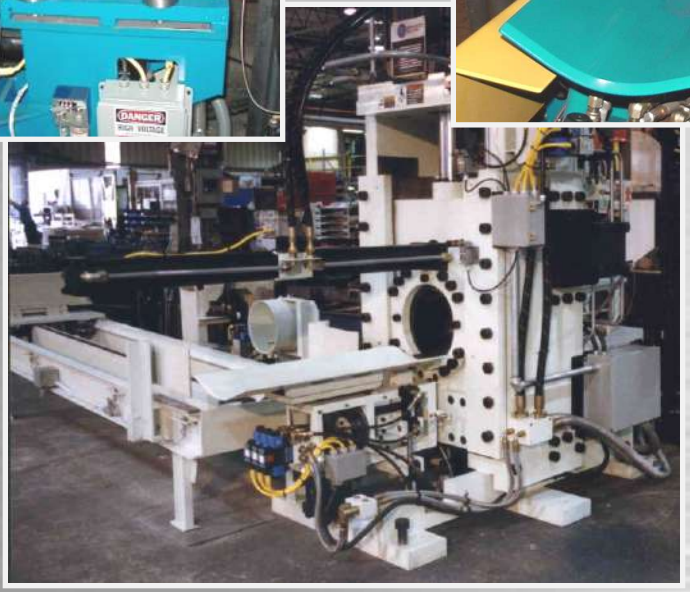
Log Shear





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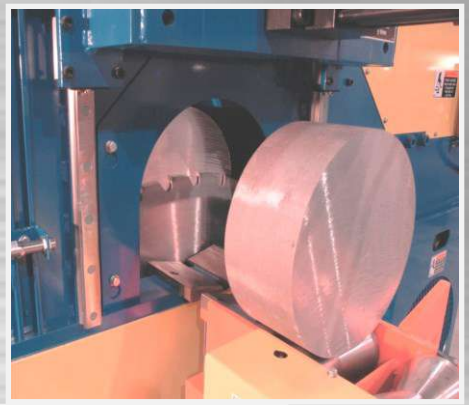
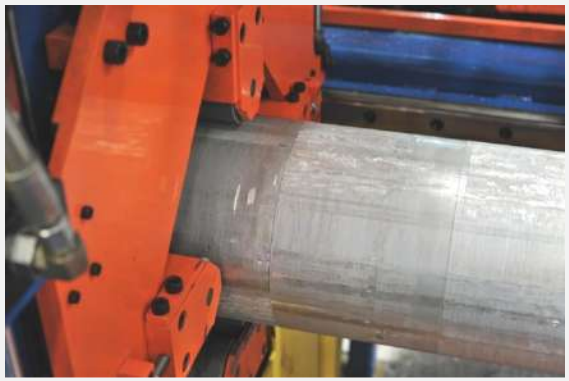
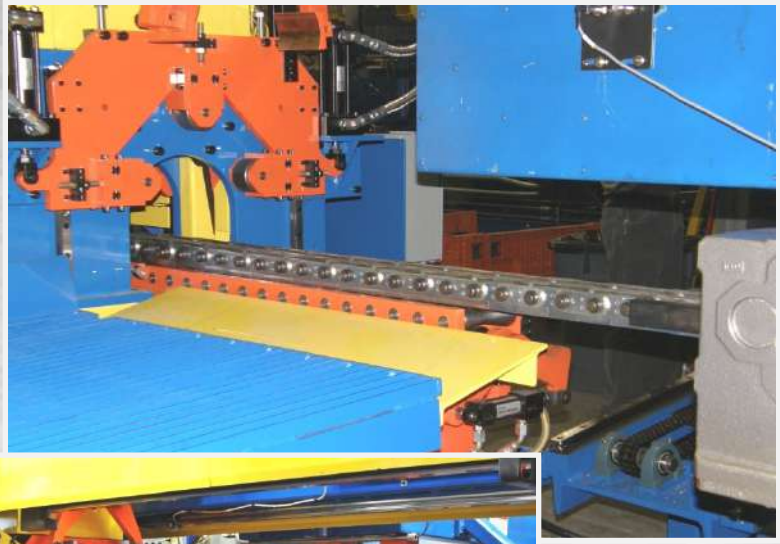
Granco Clark Hot Log Saw



Video

FusionBond





Video

Taper Quench

ET2000 ET1996 Video

Profile Handling Systems

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Adjustable Leadout Table/Profile Guide

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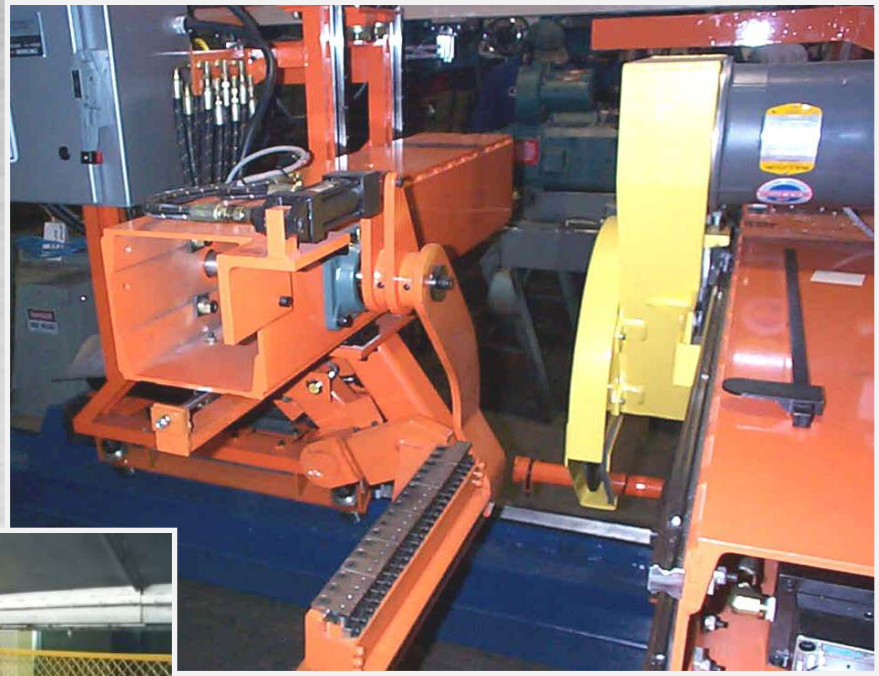
Puller Systems



Video

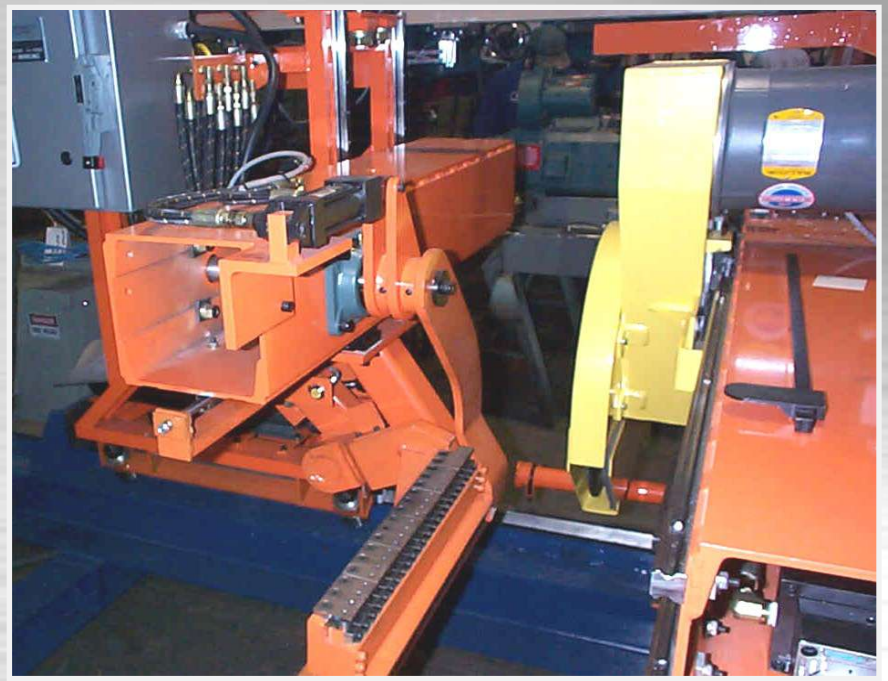
Double Puller with Integrated Hot Saw

Animation

Double Puller with Integrated Hot Saw

Key Technology Issues:

- Two Heads
- Double Length Program
- Flying Cut Program
- Proven – 235 Installations Worldwide



By-Passing Twin Puller with Flying Hot Saw

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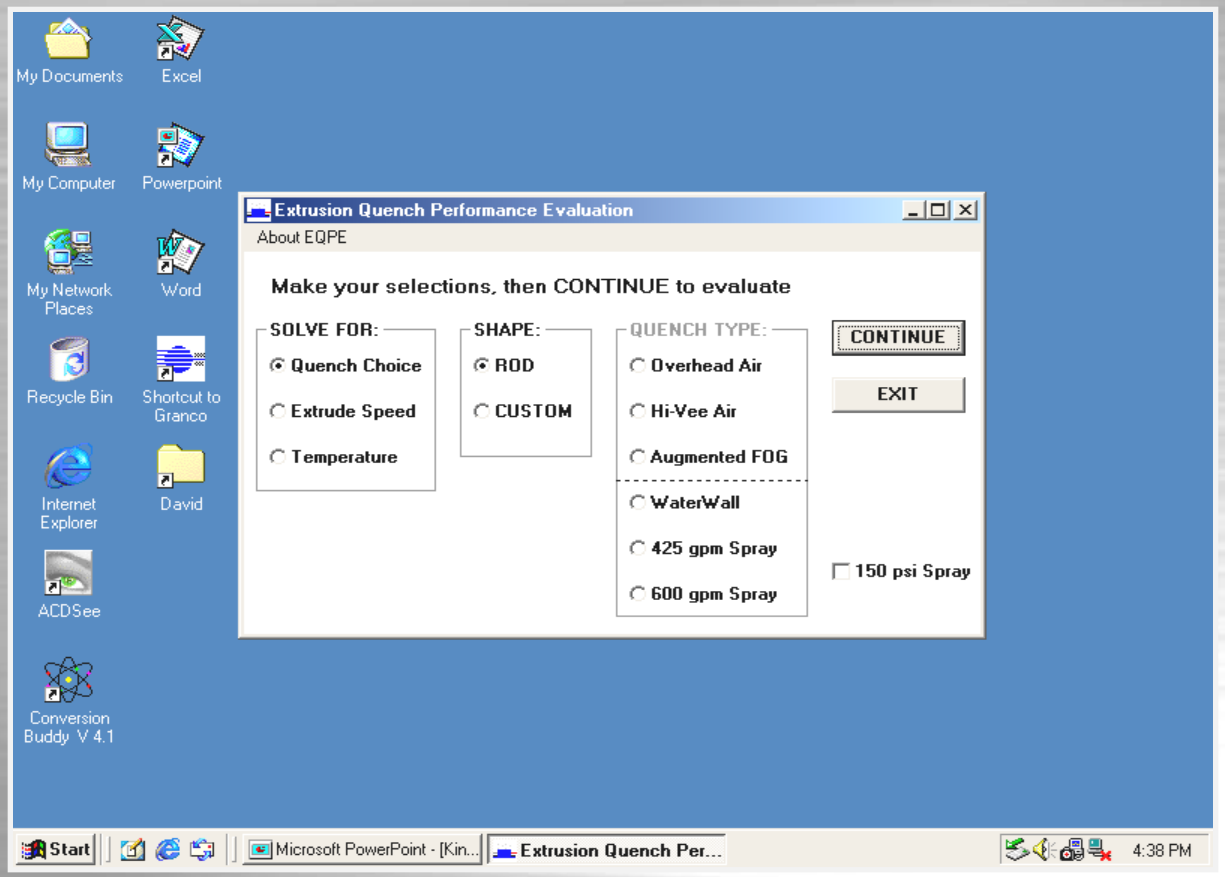
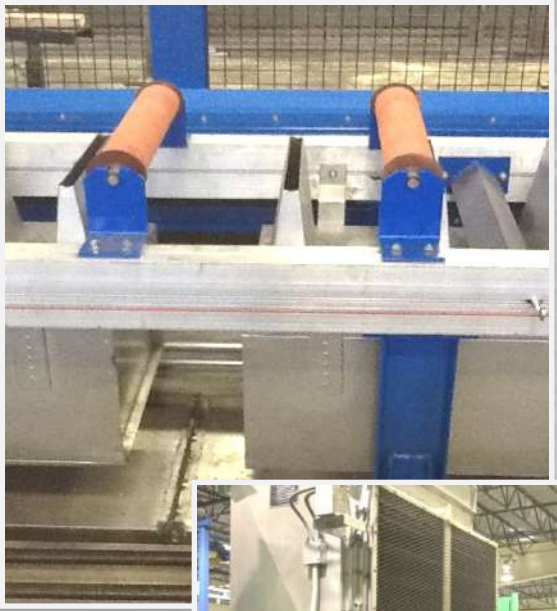
Quenching

FEA Video

Extrusion Quench Simulator



Integral Cooling



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Roller Runout Conveyor

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Roller Runout Conveyor

Key Technology Issues:

- Raise/Lower Conveyor
  - Maintains Transfer Belt Alignment
  - Simple and Reliable

Roller Runout Conveyor

Key Technology Issues:

- Raise/Lower Conveyor
- High Temperature Needled Felt Roller Covers
- Drop Away Rollers

Initial Cooling Station

Key Technology Issues:

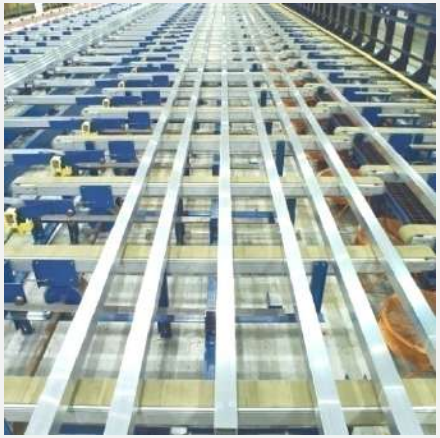
- Protects Belts from Heat
- Improves Belt Life
- Easily Replaced Kevlar Pads

Cooling Fans

Key Technology Issues:

- More Cooling To Assure Profile is Cold At The Stretcher

Belt Handling Systems



Video

Belt Handling Systems

Key Technology Issues:

- Cooling, Storage, And Saw Discharge Belts Are All Fixed Horizontal – No Lifting
  - Maintains Belt Alignment

Belt Handling Systems

Key Technology Issues:

- Cooling, Storage, And Saw Discharge Belts Are All Fixed Horizontal – No Lifting
- Large “Center-drive” Pulley So Belt Tension Can Be Low
  - Maintains Belt Alignment Better – Less Maintenance
  - Allows Belts to be Reversible

Belt Handling Systems

Key Technology Issues:

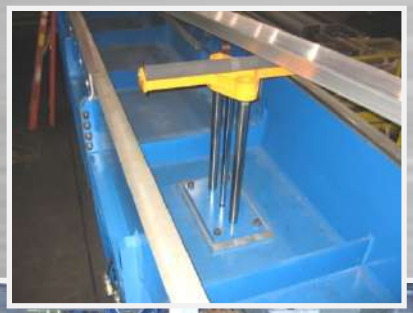
- Cooling Table Belts are High Temperature
- Various Belt materials available customer spec

Belt Handling Systems

Key Technology Issues:

- Stretcher Belts are Automatic with Stretcher Head Movement
  - Operator Does Not Have To Manually Move The Belts

Automatic Profile Stretchers



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Automatic Profile Stretchers

Key Technology Issues:

- Laser Locates Tailhead
  - Measures The Position Of Tailhead And Controls Load/Unload Belts
  - No Reset After Power Outage

Cam Jaw Video CVC Video

Automatic Profile Stretchers

Key Technology Issues:

- Laser Locates Tailhead
- Puller Places Extrusion In Line With Tailhead Lock Position

Automatic Profile Stretchers

Key Technology Issues:

- Laser Locates Tailhead
- Puller Places Extrusion In Line With Tailhead Lock Position
- Powerhead Has Sensor To Locate For Length Variation

Automatic Profile Stretchers

Key Technology Issues:

- Laser Locates Tailhead
- Puller Places Extrusion In Line With Tailhead Lock Position
- Powerhead Has Sensor To Locate For Length Variation
- Infeed Belts Raise, Shift Left/Right

Finish Saw and Gauge System

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Finish Saw and Gauge System

Video

Finish Saw and Gauge System

Key Technology Issues:

- ECS is Machine Tool Quality

Animation

Finish Saw and Gauge System

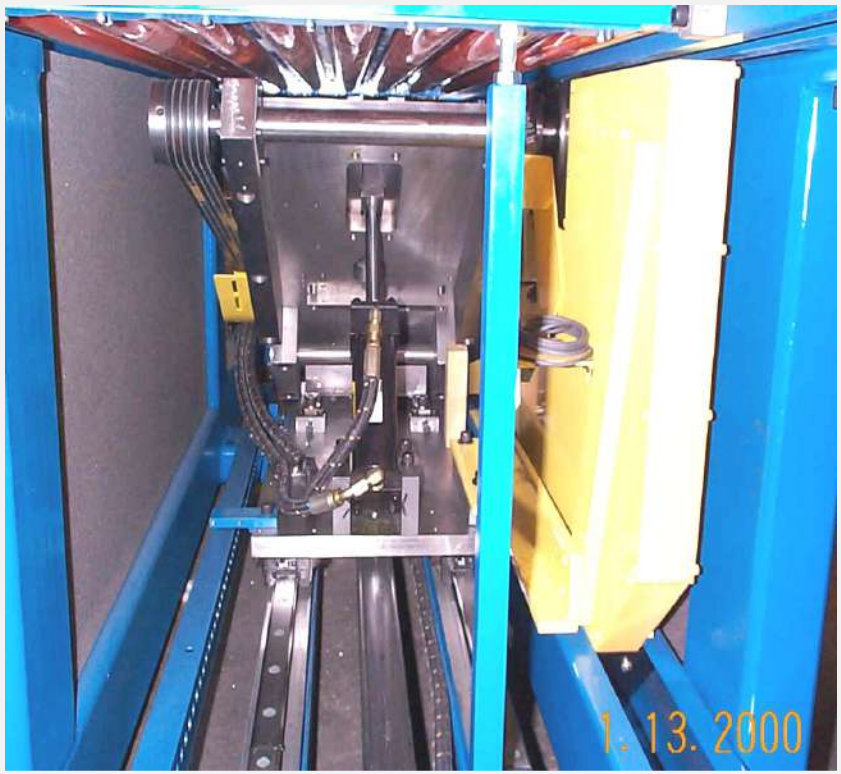
Key Technology Issues:

- ECS is Machine Tool Quality
  - One Piece Frame

Finish Saw and Gauge System

Key Technology Issues:

- ECS is Machine Tool Quality
  - One Piece Frame
  - Straightness 0.010” Across 40” Width



Finish Saw and Gauge System

Key Technology Issues:

- ECS is Machine Tool Quality
  - One Piece Frame
  - Straightness 0.010” across 40” width
  - Squareness 1/4 Degree

Finish Saw and Gauge System

Key Technology Issues:

- ECS is Machine Tool Quality
  - One Piece Frame
  - Straightness 0.010” across 40” width
  - Squareness 1/4 Degree
  - Chip Collection From Above And Below

Finish Saw and Gauge System

Key Technology Issues:

- ECS is Machine Tool Quality
  - One Piece Frame
  - Straightness 0.010” across 40” width
  - Squareness 1/4 Degree
  - Chip Collection From Above And Below
  - Easy Blade Change

Finish Saw and Gauge System

Key Technology Issues:

- ECS Is Machine Tool Quality
- Gauge System Is Automatic and Self-zeroing
  - "Go-to-position" From The Operator Touchscreen Panel

Finish Saw and Gauge System

Key Technology Issues:

- ECS is Machine Tool Quality
- Gauge System is Automatic and Self-Zeroing
  - "Go-to-position" From The Operator Touchscreen Panel
  - Servo Driven
  - Gauge Head Lifts During Cut For Fast Evacuation

Finish Saw and Gauge System

Key Technology Issues:

- ECS is Machine Tool Quality
- Gauge System is Automatic and Self-Zeroing
- Automatic End Scrap Handling
  - Scrap Belt Lowers And Powers The Scrap Down To Conveyor

Profile Stacker System

Video

Profile Stacker System

Key Technology Issues:

- Steel Or Aluminum Spacers
  - Aluminum Spacers Can Be Covered Or Uncovered
  - Steel Spacers Must Have Covers

Profile Stacker System

Key Technology Issues:

- Steel Or Aluminum Spacers
- Reliable Spacer Insertion Mechanism

Profile Stacker System

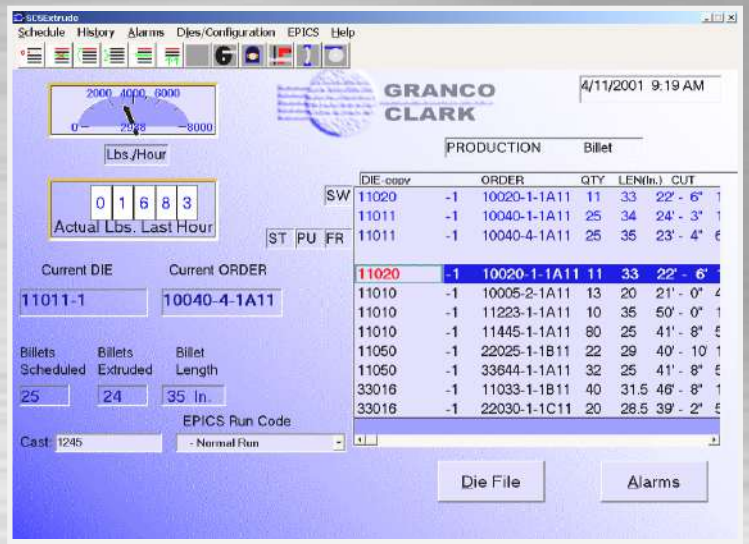
Key Technology Issues:

- Steel Or Aluminum Spacers
- Reliable Spacer Insertion Mechanism
- Spacer On Profile Or Spacer On Support Can Be Selected By Operator

Supervisory Computer System

Key Technology Issues:

- **SCS Extrude** - A Software System To Automate The Extrusion Process
  - Production Schedule Execution
  - Auto Equipment Setup (Recipes)
  - Data Collection
  - Fault Diagnostics



Supervisory Computer System

Web-based Interface

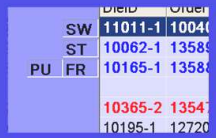
- A web server available as part of the core application
- Browser based interface to view real time data

Data Collection

- Fault History (Alarms)
- Production History
  - Billet Detail
  - Billet Length
  - Exit Temperature
  - Number of Pieces
  - Etc…..
- Downtime History
- Recipe Value Change Tracking

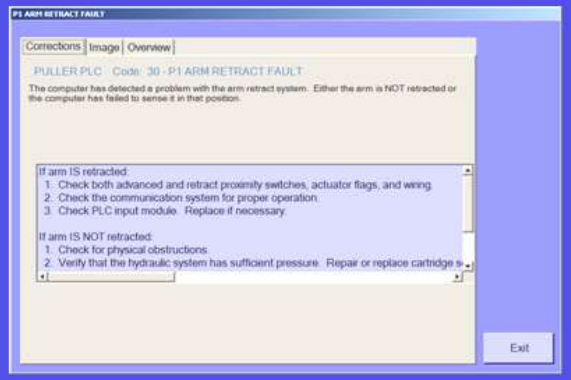
Fault Diagnostics - Detailed view

Auto Setup/Recipes



- LOAD/SAVE Die concept.
- Buttons on operator interface, (interfacing to the controls system).

Fault Diagnostics



Supervisory Computer System

•The supervisory computer system takes orders from the company order entry system, creates an electronic production schedule and automatically configures the equipment for each order. Other recipe software systems can be adapted to integrate with SCS. This provides great repeatability and allows operators of all skill levels to use the expertise of the lead operators by running the order with the stored parameters. This recipe information will be given to the SCS system via .txt files.

•Most extruders are drawn to the SCS because of the automatic equipment setup feature, but perhaps the biggest payback is the full “what’s wrong & how-to-fix” diagnostics, not just alarm-fault monitoring. The fault diagnostic system in many cases returns the system to service without the need for a service call, saving hours or even days of downtime

SCSExtrudeDemo.ppt SCSExtrudeUserGuide

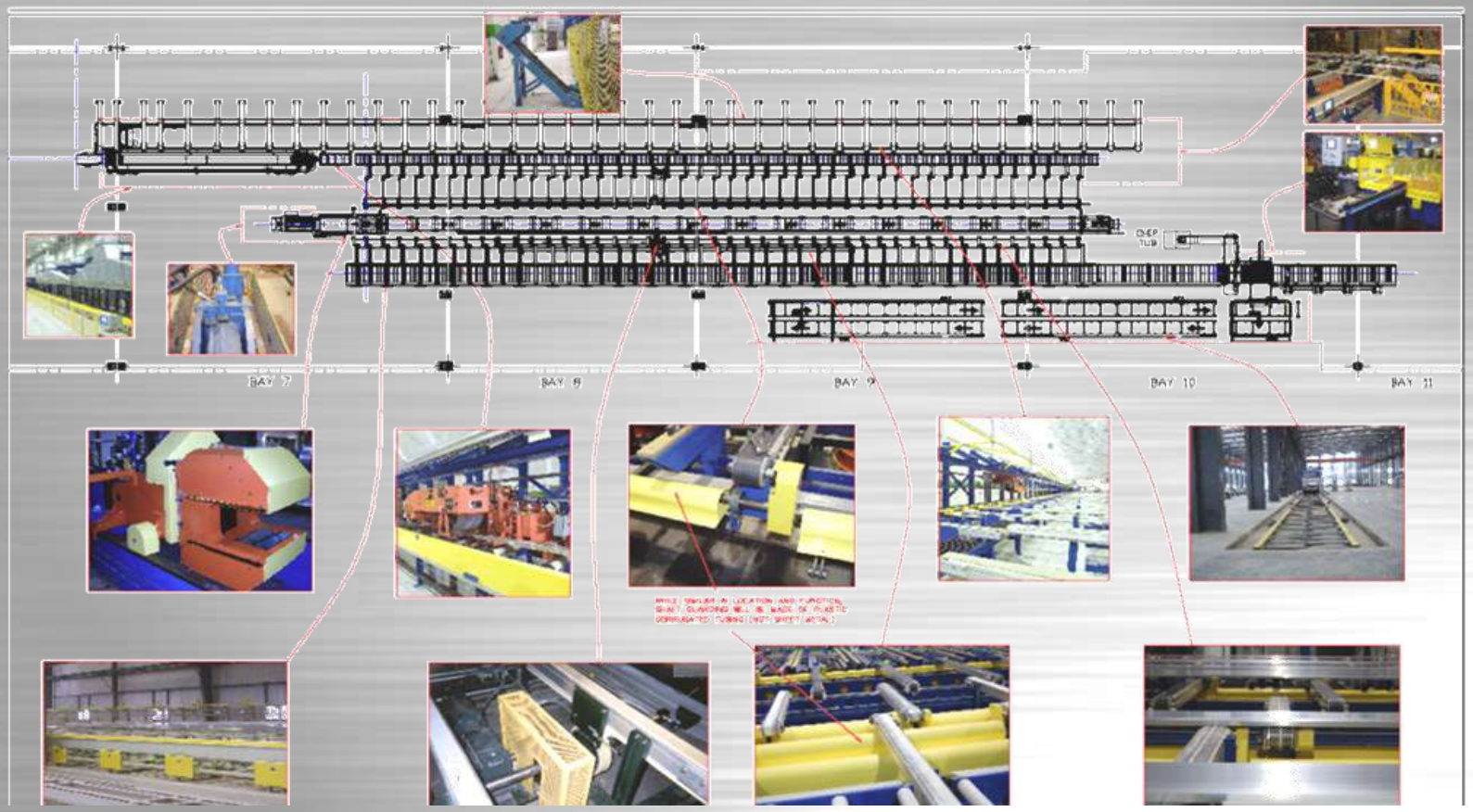
Guarding Package

Guarding as Supplied by Granco Clark

•The machine guarding that we are offering supersedes the OSHA minimum. Other European suppliers do not typically offer area guarding (e.g. puller fence, barriers around stretcher or leadout area, etc.). In addition to the area guarding, we include an array of personal protection guarding on the equipment itself, not only for pinch points but also for rotating shafts.

•While not considered guarding, we have included as standard, a full length catwalk system between the initial transfer belts for travel along the length of the system. This primarily is used for maintenance or others who require access to the “middle” of the system. Access to walkway requires the system to be shutdown automatically by way of a safety switch (on barrier door) when attempting to gain access to the stairway.

Guarding Package



Drawing

Aging Oven & Rack Handling System

Video

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Precision Finish Cut Saw

Video

Discussion Items