

Continuous Induction Annealing line for ACR Copper Tube



IWCC Legal Disclaimer

The purpose of this presentation is to guide programs benefitting the copper industry and to provide attendees with information to make independent business decisions.



INDUCTOTHERM GROUP



Inductotherm Head Quarters, NJ,USA

Inductotherm Group India

Inductotherm Group Australia



INDUCTOTHERM

An Inductotherm Group Company



GLOBAL YET LOCAL

STRONG BRAND NAME

ENERGY EFFICIENT &
RELIABLE PRODUCTS

PROVEN TECHNOLOGIES

24 X 7 CUSTOMER SERVICE

WIDE RANGE OF
PRODUCTS

MARKET
LEADERSHIP

AN INTERNATIONAL GROUP OF 40 COMPANIES

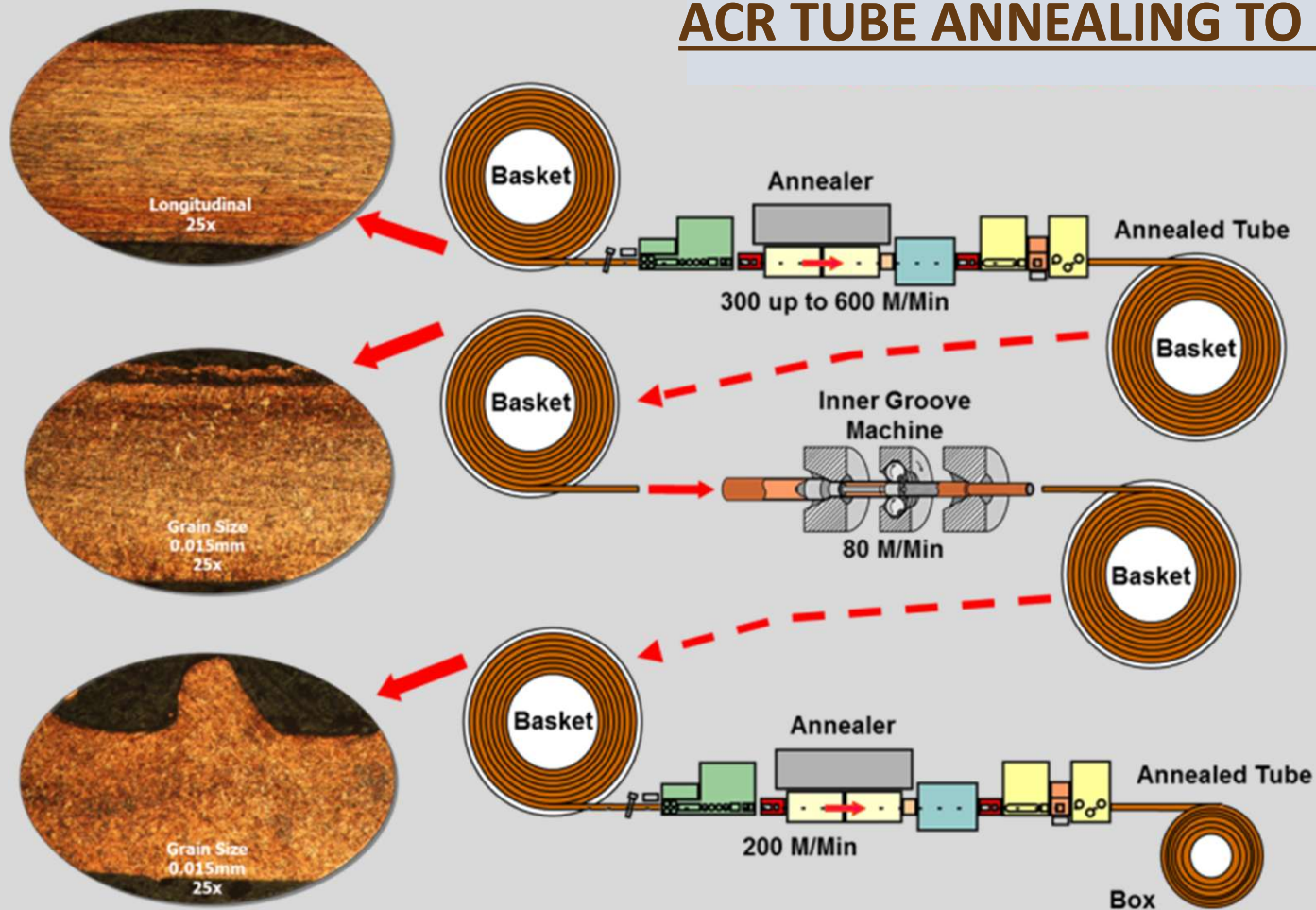
SINGLE OWNERSHIP

40000 + INSTALLATIONS

70 YEARS OF EXPERIENCE



ACR TUBE ANNEALING TO FINISHED PACKING



INTERSTAGE TUBE ANNEALING

- TUBE : 7 ~ 16mm Dia
- WALL : 0.35 ~ 0.5mm
- SPEED : 600 MPM

FINISHED TUBE ANNEALING

- TUBE : 5 ~ 12.7mm Dia
- WALL : 0.25 ~ 0.35mm
- SPEED : 200 MPM

ANNEALED TUBE SPECIFICATION

Grain Size : 0.015 ~ 0.035 mm
 Tensile Strength : 220 to 245 N/mm²
 Elongation : Greater than 43%



**SALIENT
FEATURES
&
BENEFITS**

- ✓ **High Tube Yield – Max 1500mm being discarded from total coil Length of many Kilometres.**
- ✓ **Direct Energy Consumption are less than 200 kWh/Ton**
- ✓ **No Stand-by Losses**
- ✓ **Less Foot Print – Saving Floor Space**
- ✓ **High-End Automation allows High Productivity Gain**
- ✓ **System Run with only 1 Full Time Operator**
- ✓ **No Lengthy Shut down for Maintenance of Refractory**
- ✓ **Easily Integrated to ConveyORIZED Process System**
- ✓ **Adjustable Grain Size is Instantly Available**

'ACR' – BASKET TO JUMBO COILER

200 m/minute

ACR ANNEALER



OPTIONS AVAILABLE :
BASKET TO BASKET - Interstage Annealing
BASKET TO PAN CAKE COIL - Finish Product

FINISH PRODUCT – JUMBO COILER

System includes:-

- Pay-off table
- Pinch Drive, Straightener
- In-Feed Tensioner
- Cleaner
- Induction Power Unit
- Closed Water System
- Induction Coils & Enclosure
- Dwell
- Quench & Quench Water System
- Air Wipe
- Out-Feed Tensioner
- Bend Roll Arm
- Jumbo Coiler
- Controls system

**Jumbo coiler 200 M/min
and inter-stage annealing;
combination
ACR Induction heating System**

ACR LINE – GENERAL FEATURES PAY-OFF TABLE



- Motor & Gear Box driven Turn Table
- Ball Screw / Pneumatic Bellow for Raise & Lower
- Liner Bend Brake for Emergency Stop
- Combined load capacity of Basket & Tube – **2600kG**
- RPM Controlled by Dancer Arm

ACR LINE – GENERAL FEATURES DANCER ARM – BASKET PI CONTROL

PI Control
@ 200 MPM
and Up to
600 MPM

Simple
Program for
Varying
Basket
Diameter

Input
OD & ID of
Basket
& Line Speed
MPM

Rotary
Angle
Sensor



ACR LINE – GENERAL FEATURES PINCH DRIVE & STRAIGHTENER

Vertical Straightener

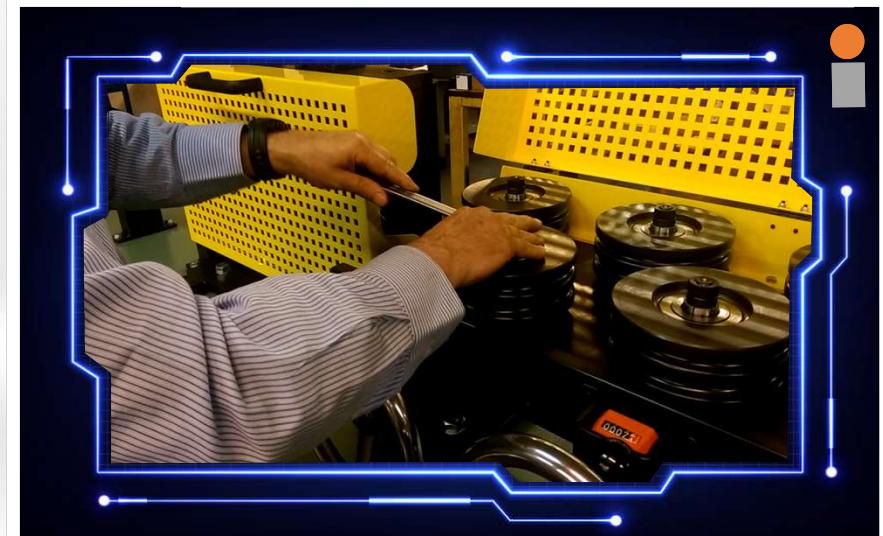
Pinch



- Infeed Pinch
- Horizontal Straightener
- Vertical Straightener
- Double Groove Rollers
- Ease of Roll Change

*Horizontal
Straightener*

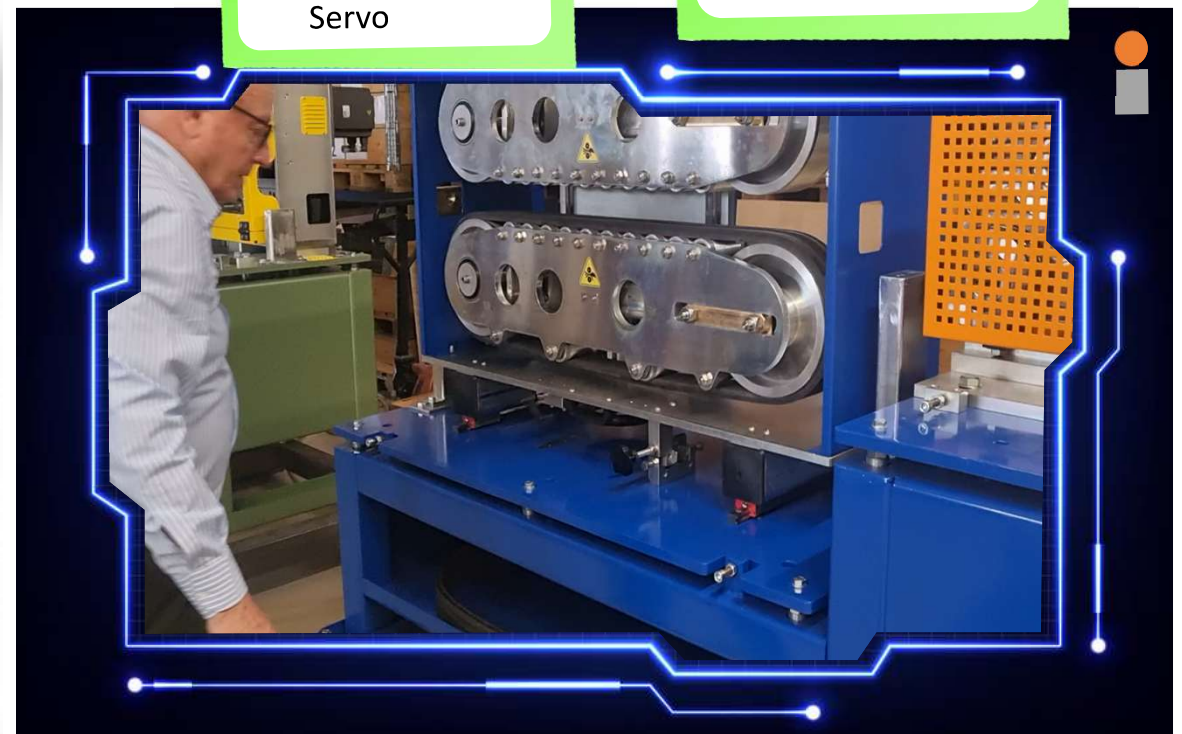
Quick Change



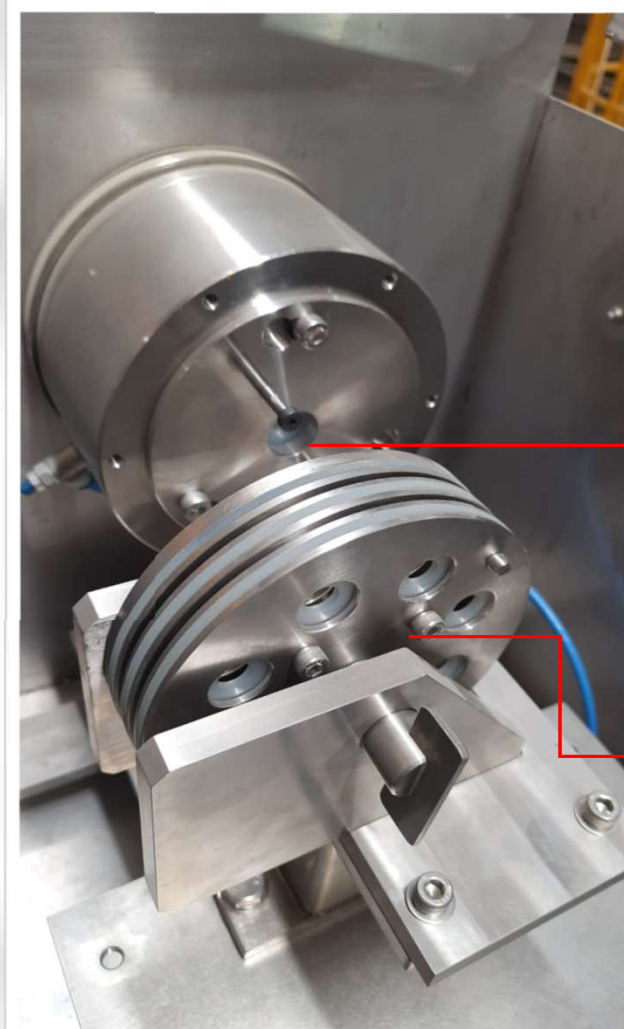
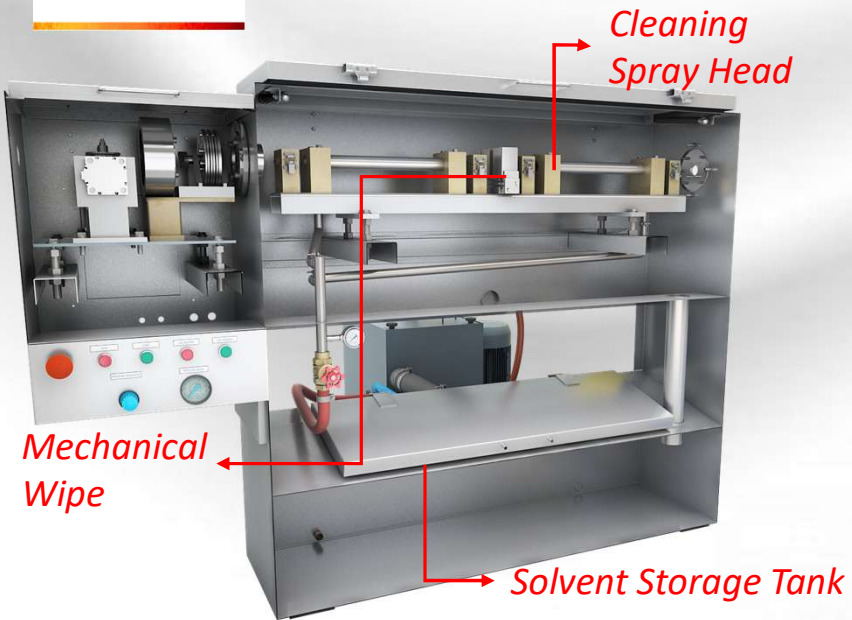
ACR LINE – GENERAL FEATURES BELT TENSIONER

- 3 Groove Belt
- Side Shift 3 Position
- Master Drive - Servo

- Counter Balance – Pneumatic
- Belt Tension
- No Tool Required for Belt Change



ACR LINE – GENERAL FEATURES TUBE CLEANER



- Solvent Storage Tank
- Diaphragm Pump
- Cleaning Spray Head
- Mechanical Wipe
- Air Curtain Wipe
- Silicon Wipe



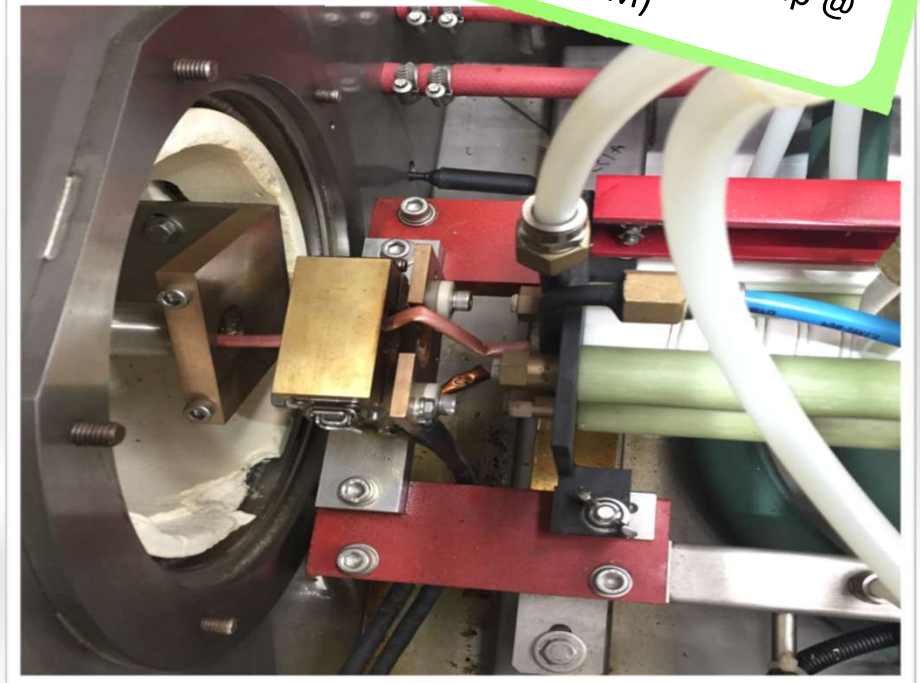
ACR LINE – GENERAL FEATURES HEATING ENCLOSURE

- Heating Enclosure with sealing
- N2 Purging
- Induction Coils
- Water Flow & Temperature Protection
- External Busbars
- Safety Switches
- Fume Extraction



ACR LINE – GENERAL FEATURES INDUCTION COILS & GUIDES

- Max. Electrical Coupling Efficiency
- Coil Quick Change
- Graphite Guides Quick Change
- Tube Jam Protection (Max 1/2 Meter Scrap @ 600 MPM)



ACR LINE-GENERAL FEATURES POWER SUPPLIES



“IGBT” BASED INDUCTION HEATING POWER SUPPLY

- 100% Solid State Design
- Low Electric noise
- Fast Response
- Highly reliable and efficient voltage source inverter.
- P.F. > 0.95
- Series tank circuit
- HMI to monitor Inverter Status and Fault Diagnosis
- Energy monitor

HIGH FREQUENCY POWER SUPPLY (For Smaller Diameter and Thin wall Tube)

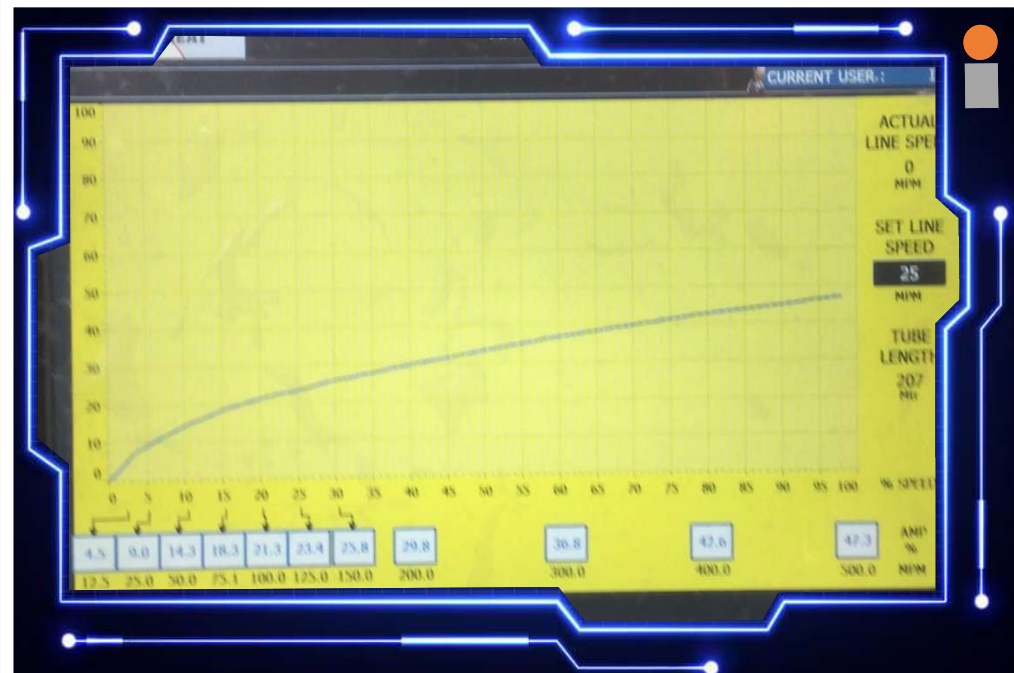
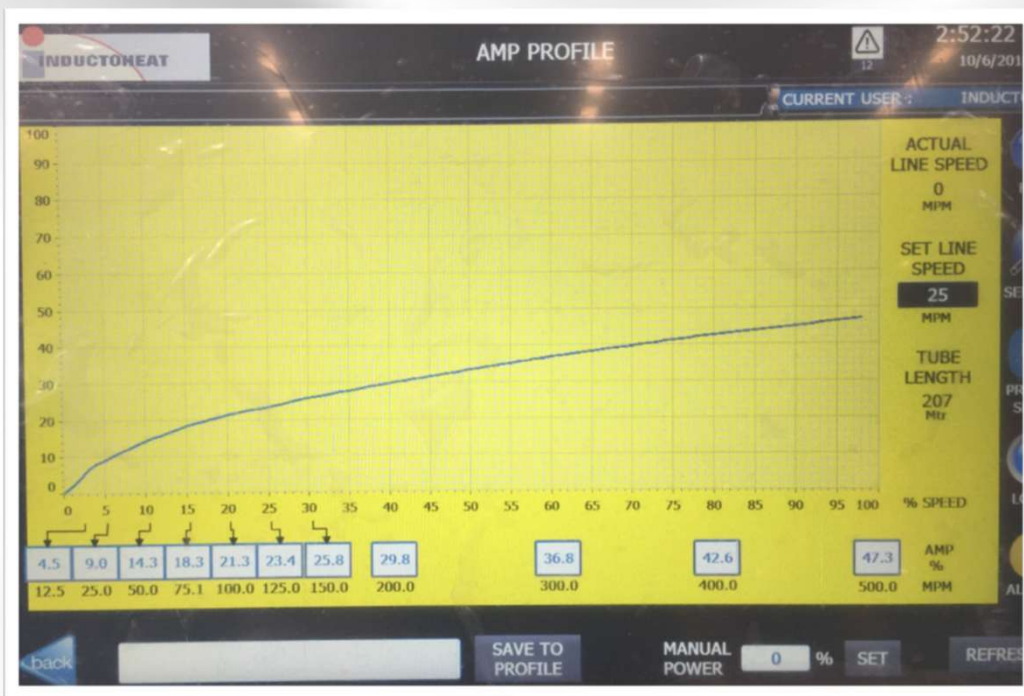
MEDIUM FREQUENCY POWER SUPPLY (For Plumbing Type Tube and Thicker Wall)



ACR LINE-GENERAL FEATURES

AMP PROFILE

SPEED Vs POWER RECIPE



TYPICAL PERFORMANCE DATA – CONSUMPTION

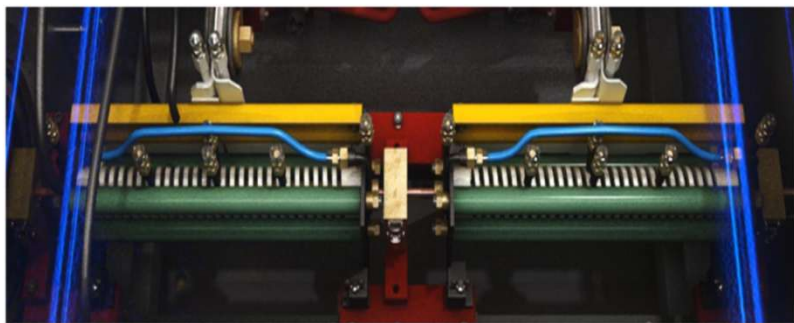
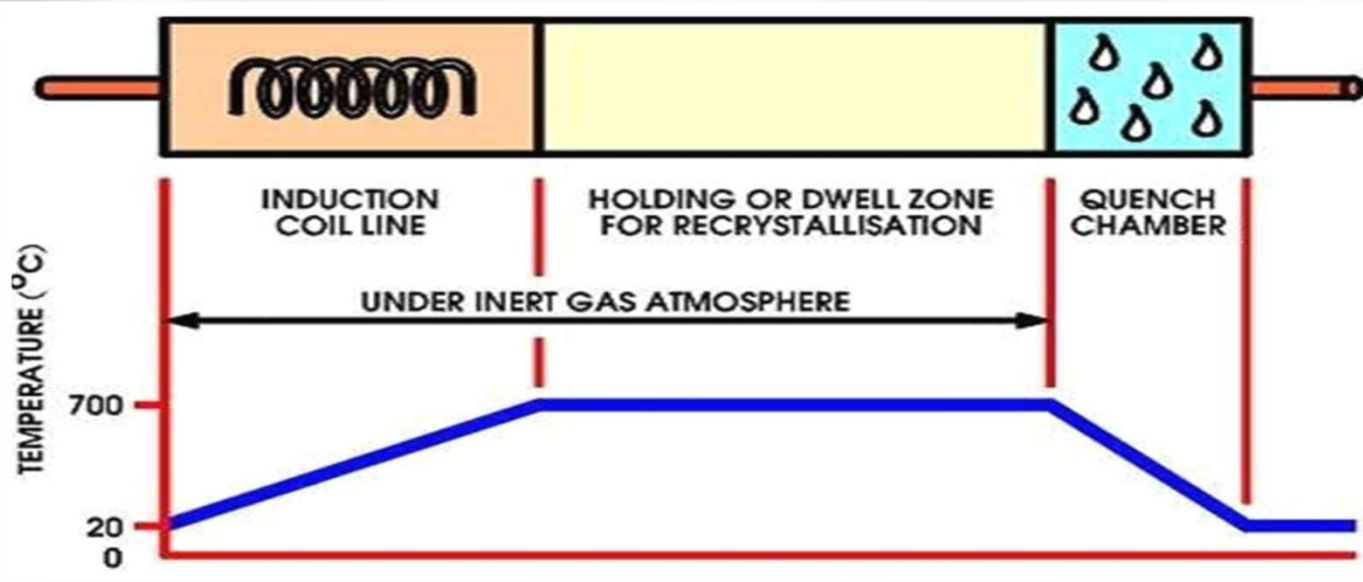
BASKET TO BASKET – 600 MPM @ 700 °C

Dia X Wall mm	Speed M/Min	Kg/Hr	kW	Energy kWh/Ton
7.0 X 0.35	600	2369	762	277
9.52 X 0.30	600	2816	824	206
9.52 X 0.35	600	3267	883	220
12.2 X 0.30	600	3634	663	176
12.2 X 0.35	600	4222	740	189

BASKET TO BOX – 200 MPM @ 700 °C

Dia X Wall mm	Speed M/Min	Kg/Hr	kW	Energy kWh/Ton
5.0 x 0.20	200	326	115	354
6.35 x 0.24	200	498	130	262
7.0 x 0.25	200	573	135	235
7.94 x 0.26	200	678	142	210
9.52 x 0.27	200	874	154	182

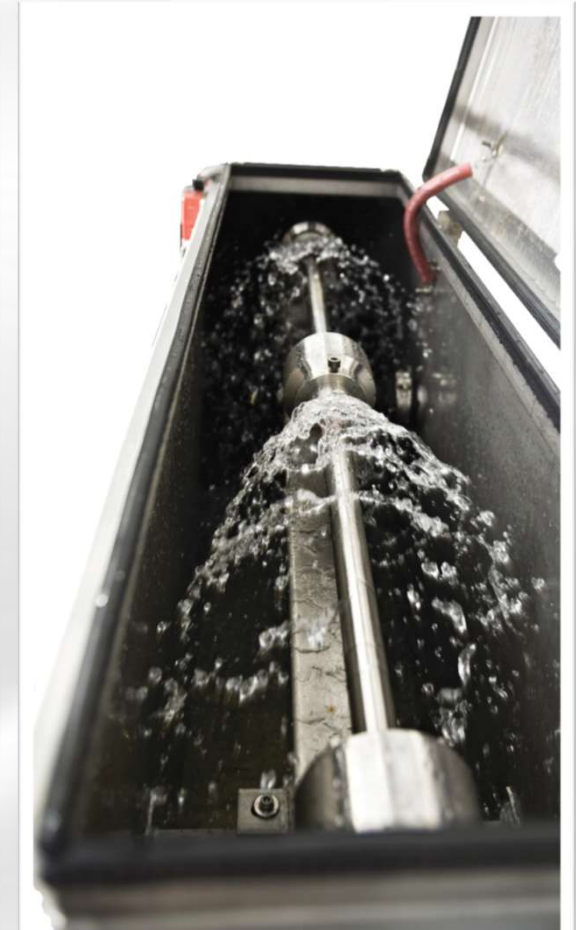
'ACR' – BASKET TO JUMBO COILER GRAIN RECRYSTALLISATION



INDUCTION COIL



DWELL ZONE



QUENCH CHAMBER

ACR LINE-GENERAL FEATURES

AIR WIPE



AIR WIPE



ATMOSPHERE GAS CHAMBER

- Advanced Air barrel design
- Rotary Silicon Wipe
- Fume Hood
- Solenoid for High Volume of N₂ pre-purge
- Interlocked with Cycle

ACR LINE-GENERAL FEATURES CASTING ARM 'JUMBO COILER'

- Servo driven Bend Rollers
- Length detection just before Bending Rollers
- Controls close to Coiling Arm



ACR LINE-GENERAL FEATURES 'JUMBO COILER' RECEIVING



- Turn Table – **1200 Kg Copper**
- Side Shift Servo Drive
- Lift Motor Servo Control
- Gas Capture for ID Purge
- Re-Start if, Tube Breaks
- Standard Pallet

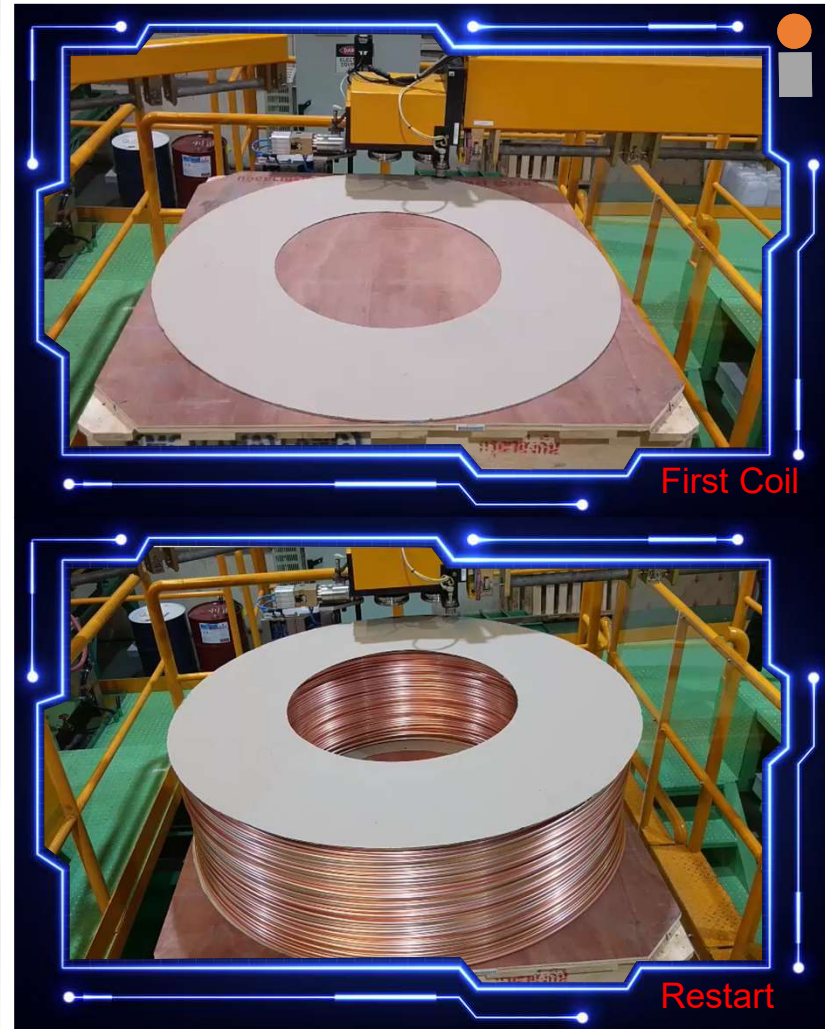
ACR LINE-GENERAL FEATURES 'JUMBO COILER' RECEIVING



Re-start
Coil

First Coil

1200mm OD x 600mm ID x 1500mm High
(weight depending on copper tube dimensions)



First Coil

Restart

ACR LINE-GENERAL FEATURES OPTIONS FOR TAKE UP

Jumbo Coiler



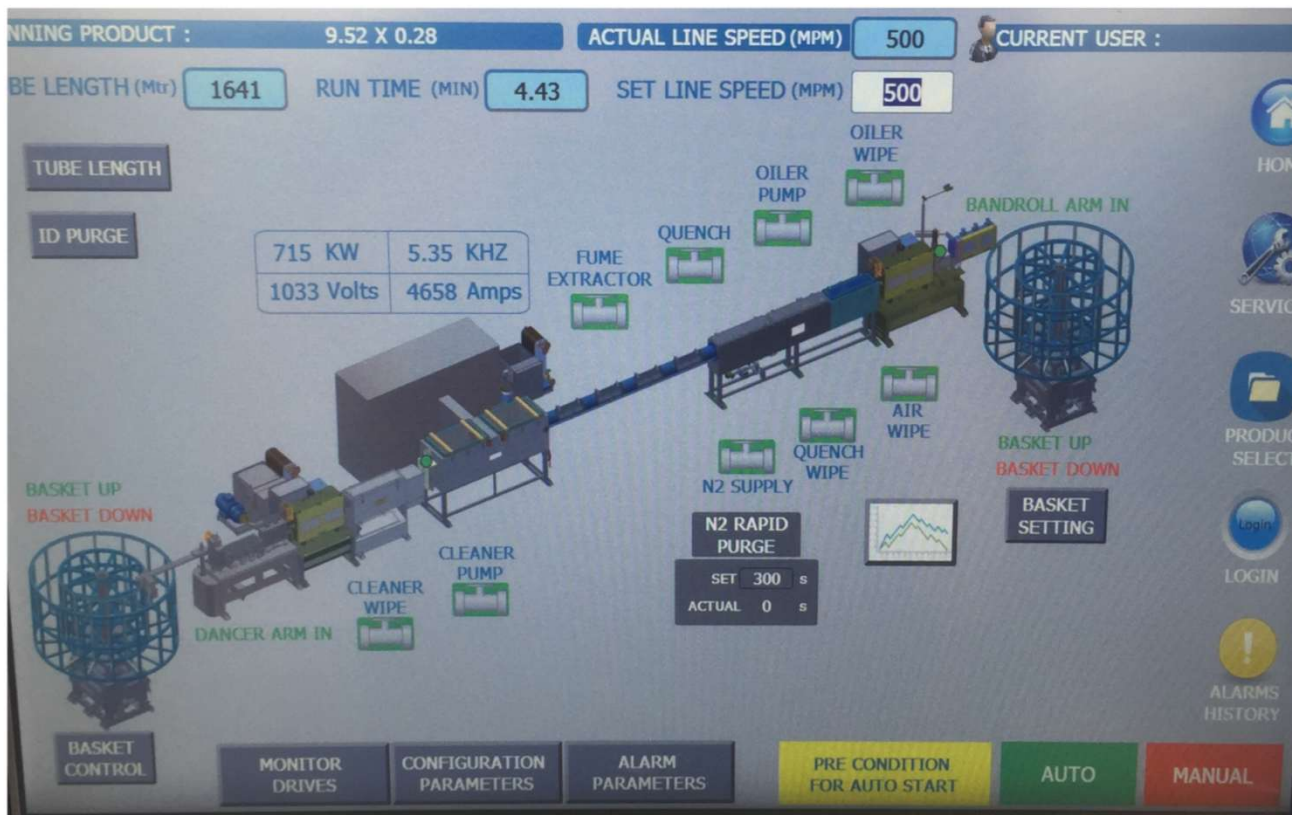
Annealed Pancake Coils



Basket to Basket

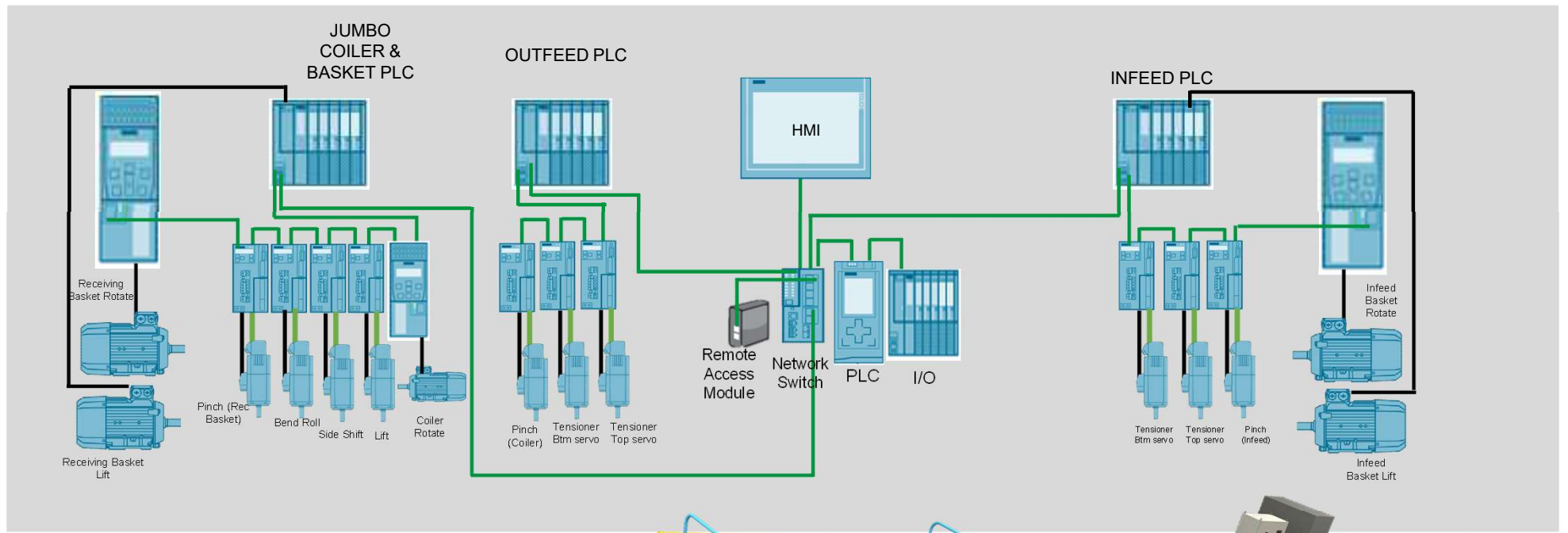


ACR LINE-GENERAL FEATURES MASTER CONTROL



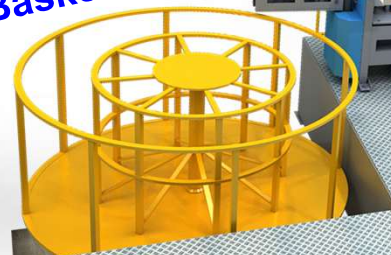
- Most of the parameters can be seen in single screen.
- Parameters like – Power unit KW, Current, Operating Frequency, Coil Voltage, Any Limits, etc.
- Running Product, Tube Length, Line Speed, Run Time
- N2 Pre purge timing and On/Off control as well as ID purge time setting.
- On/Off control and status of all valves, Pumps, Motors.
- Monitoring of All Drives.
- Alarm and Pre condition to start Auto operation.

ACR LINE-GENERAL FEATURES HI LEVEL CONCEPT

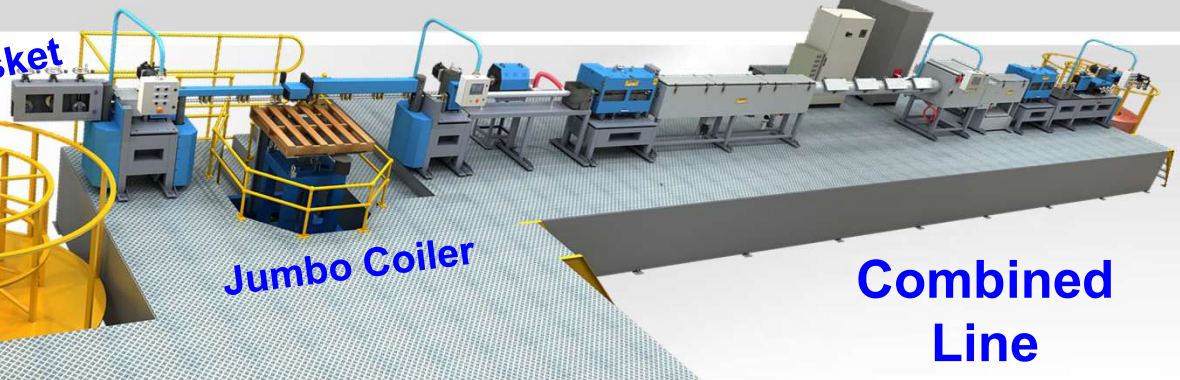


Pan cake Coil

Basket To Basket



Jumbo Coiler



Combined Line



INDUCTOTHERM GROUP

Where You'll Find Us

North America

- Alpha 1
- Clinton Machine
- Consarc
- EMSCO North
- EMSCO South
- EMSCO West
- EMSCO Installations
- Inductoheat
- Inductotherm
- Inductotherm Group Canada
- Inductotherm Group Mexico
- Inductotherm Heating & Welding
- Mexico
- Lepel
- PVT
- Radyne
- Savage Saws
- T&H Lemont
- Thermatool

South America

- Inductotherm Group Brasil
- ServMelt

Africa

- Inductotherm Group South Africa

Middle East

- Inductotherm Group Saudi Arabia



India

- Inductotherm Group India
- Inductotherm Group Pune

Australia

- Inductotherm Group Australia

Asia

- Inductotherm Group China
- Inductotherm Group Indonesia
- Inductotherm Group Japan
- Inductotherm Group Korea
- Inductotherm Group Thailand
- Inductotherm Group Taiwan

Europe

- Consarc Engineering
- EMSCO UK
- Inductoheat Europe
- Inductotherm Coating Equipment
- Inductotherm Group Deutschland
- Inductotherm Group Europe
- Inductotherm Group France
- Inductotherm Group Iberia
- Inductotherm Group Italy
- Inductotherm Group Russia
- Inductotherm Group Turkey
- Inductotherm Heating and Welding



INDUCTOTHERM GROUP

JOINING FORCES TO CREATE COPPER TUBE ANNEALING SYSTEM

India



Australia



● Inductotherm Group India

Inductotherm Group Australia ●



Thank You

Presented By



PARTHEY PATEL

Sales Manager

Inductotherm Group India