IES

Isothermal Extrusion SAI
Temperature Process Control

Isothermal Extrusion and Liquid nitrogen die cooling

2019

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Main Variables in Extrusion

AIM

- Quality
- Constant Profile Temperature

ACTION

- Extrusion Speed
- Billet Temperature

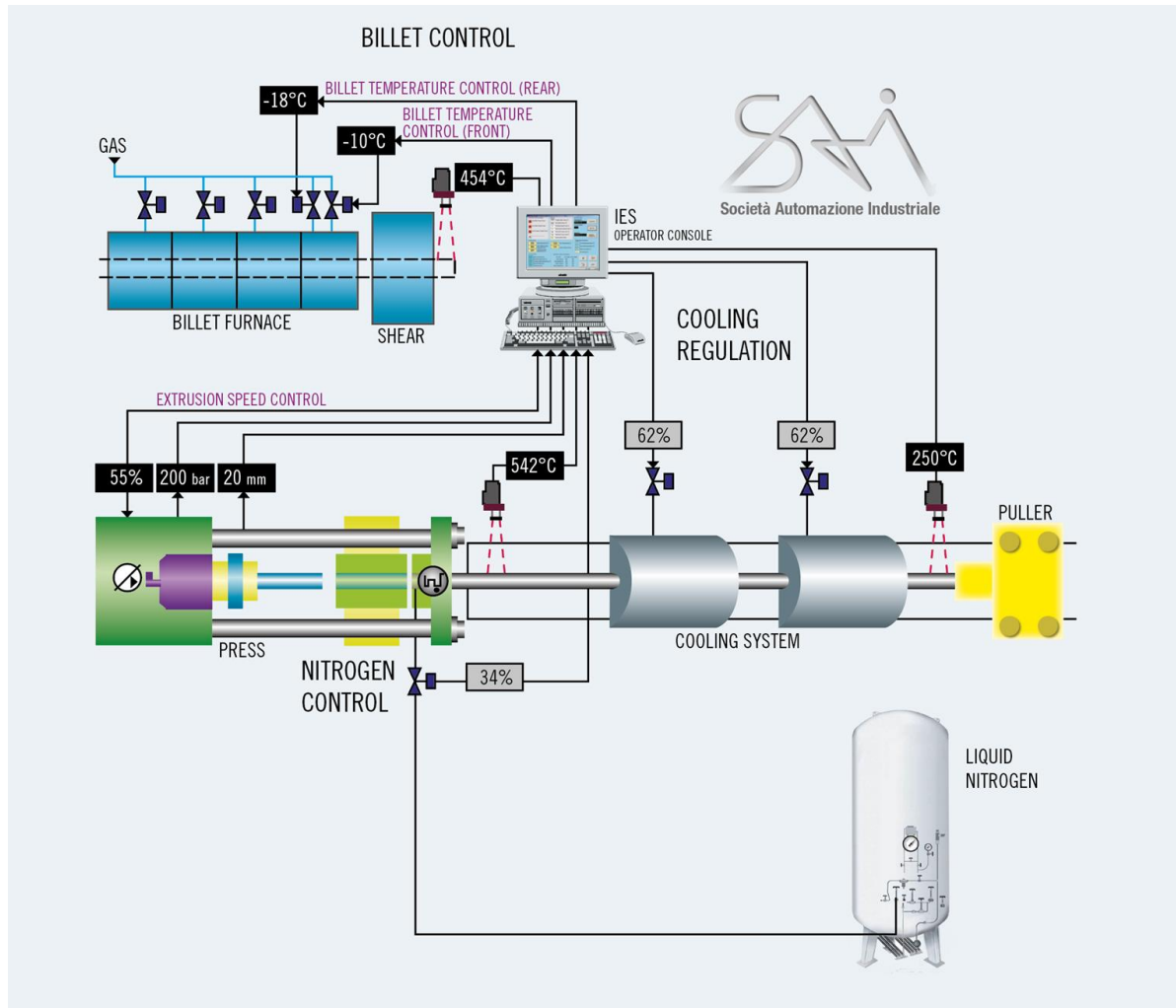Società Automazione Industriale

Targeted and effective action

Action on
Good Extrusion Time.

Even
small improvements
gets big results!

5%

15%

10%

5%

65%

Tempo di Estrusione,
Buona Qualità
*Extrusion Time,
Good Quality*

Tempo di Estrusione,
Cattiva Qualità
*Extrusion Time,
Bad Quality*

Down Time
Down Time

Tempo di Setup
Setup Time

Tempo Morto
Dead Time

SAI
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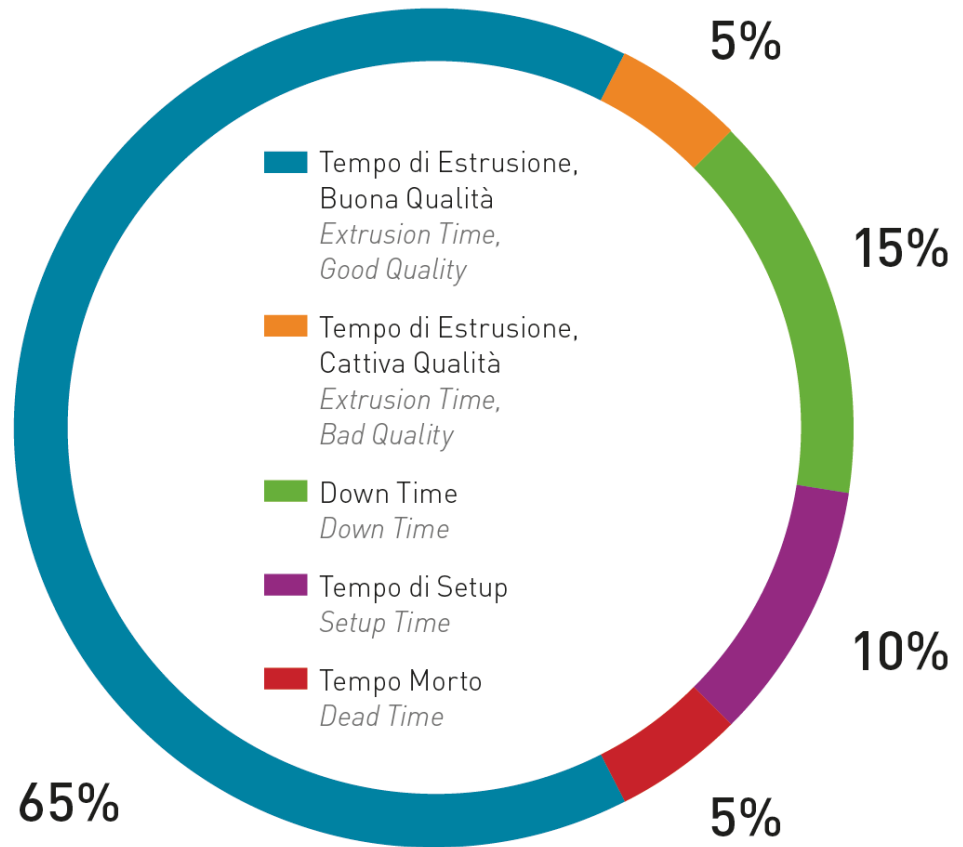
IES Configuration

IES Basic Components

MONITOR + PC → OR → PC - ALL IN ONE

INTERFACE PLC

SCANNER

DISPLAY

SENSOR

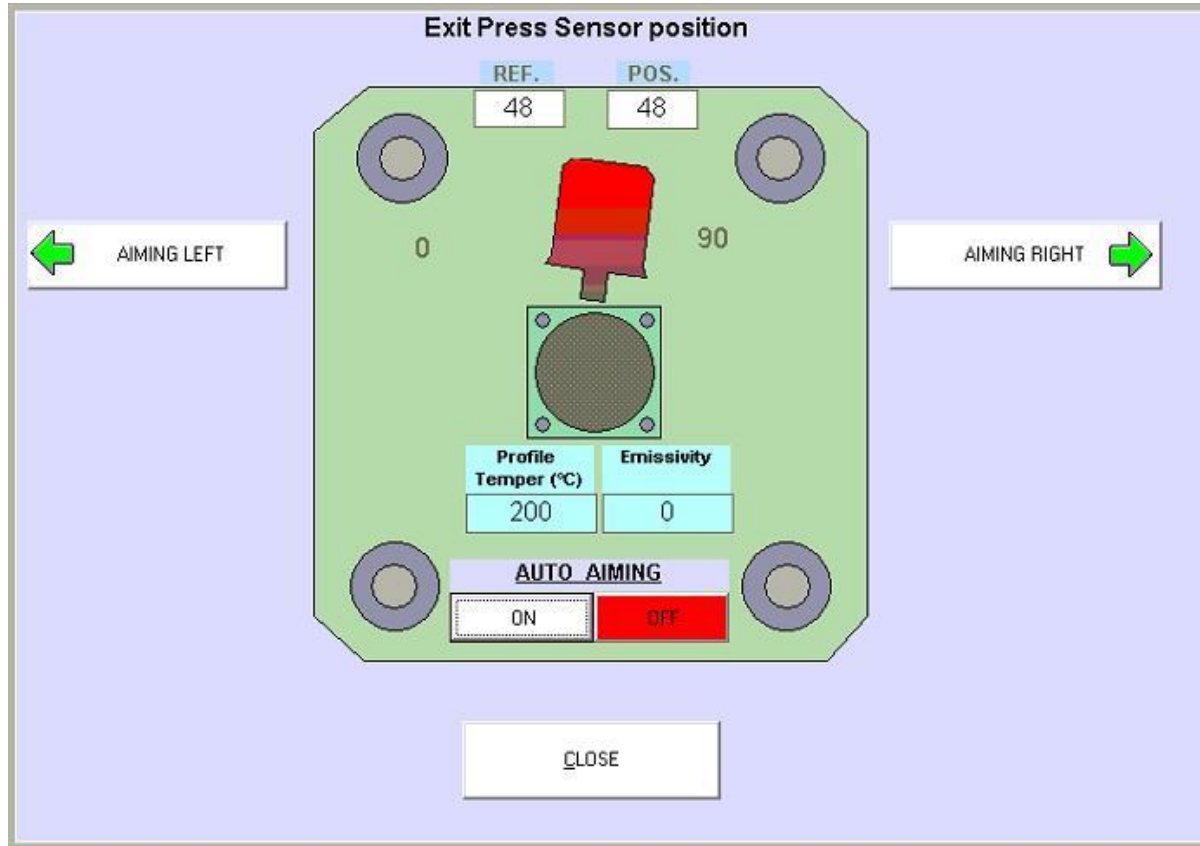Società Automazione Industriale

Scanner & Sensor

Automatic positioning

during the die change of
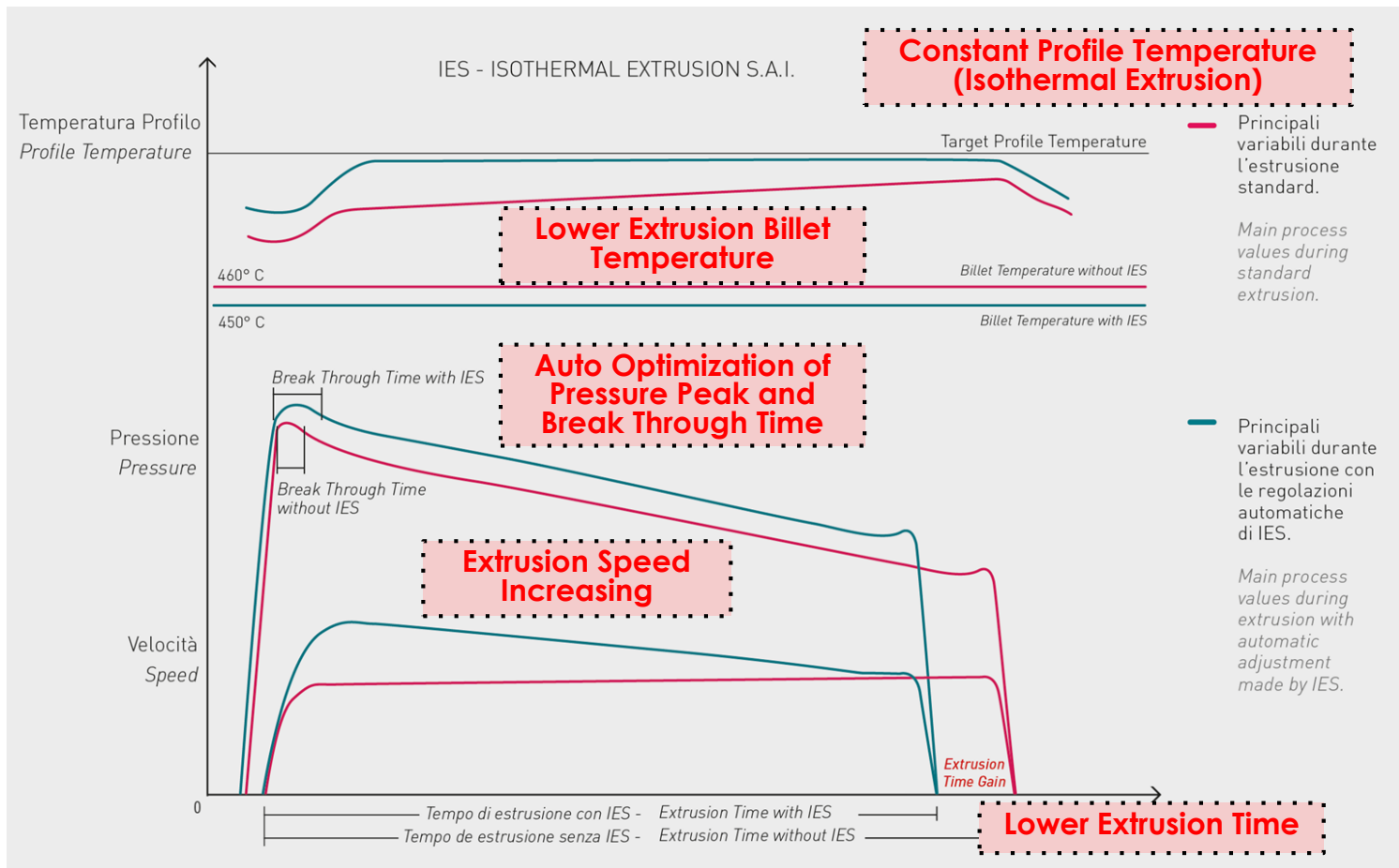
using the historic recipe

Automatic scan

when the profile is not in the

reading field

Manual positioning

using pushbutton in

dedicated page

IES – Sensor Position

Closed Loop Control and Optimization

Improving Reliability and Productivity of Aluminum Extrusion Process

- Maximize Throughput, Quality, & Profitability
  - Increase Press Speed 10-20%
  - Improve product quality with better surface finish, fewer defects, and reduced scrap
  - More consistent press performance with each operator running to Best Practices Standards

- Closed Loop Control automatically optimizes billet feed temperatures and profile temperatures at the exit of the press to increase speeds and assure high quality

- Detailed Process and Production Reports enable engineering and management to make informed decisions about process improvements

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Operator Console

Isothermal Extrusion

How to Use

1 Set Up Die

3 Set Auto vs Man and Offset

2 Set Exit Temperature

Auto Set Profile Temperature

Manual
press works as usually

Automatic
IES applies continuous adjustment

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Manual vs Automatic

Manual vs. Automatic During an Order
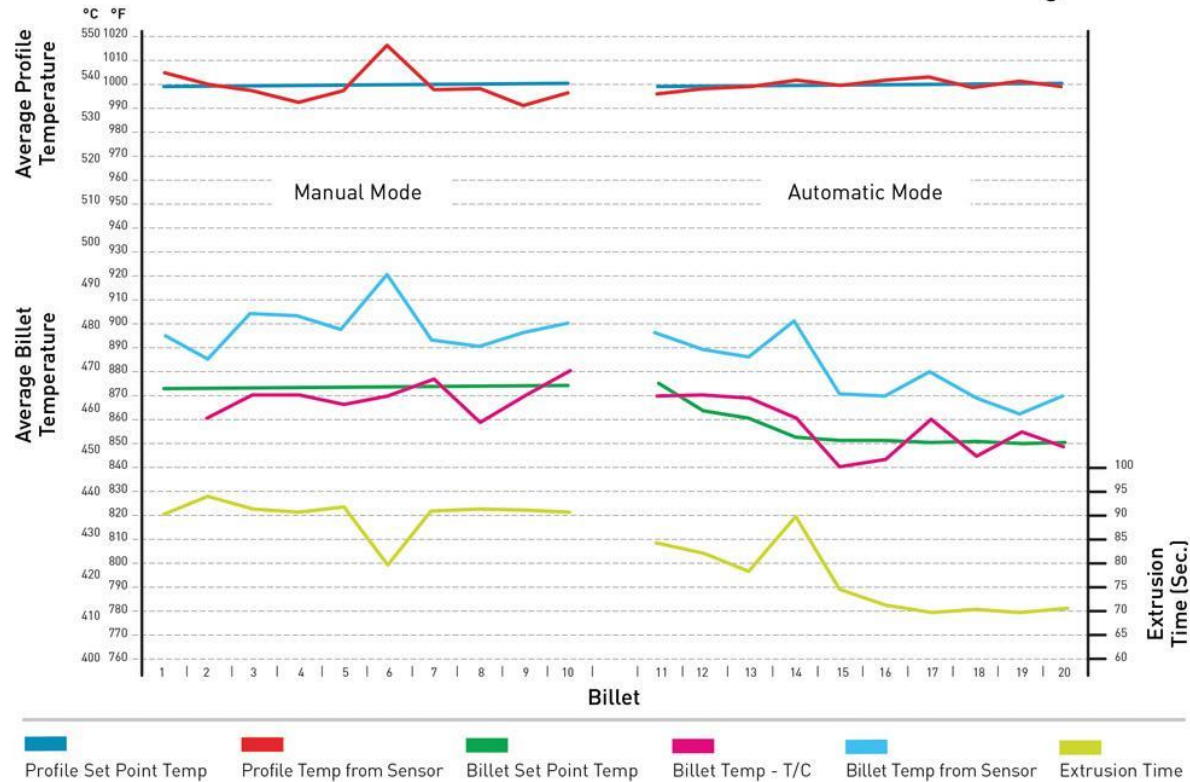
17% Reduction in Extrusion Time with no sacrifice in quality

Automatic Temperature Control with IES

In manual mode, the press operates with the same controls that are used today, and in the automatic mode IES makes continuous adjustments to maintain best practices standards

- Billet Temperature Control applies a temperature offset to the final zone of the Billet Furnace. Two temperature offset adjustments are available for furnaces with tapered heating capabilities (front and rear billet)

- Dynamic Speed Control continuously calculates and applies a percent change (offset) to the press speed in order to maintain the optimal press exit temperature during the extrusion of a billet

- Step Change Speed Control applies a "learned" percent change (offset) to the starting speed for the next billet on the same die

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Process Trend
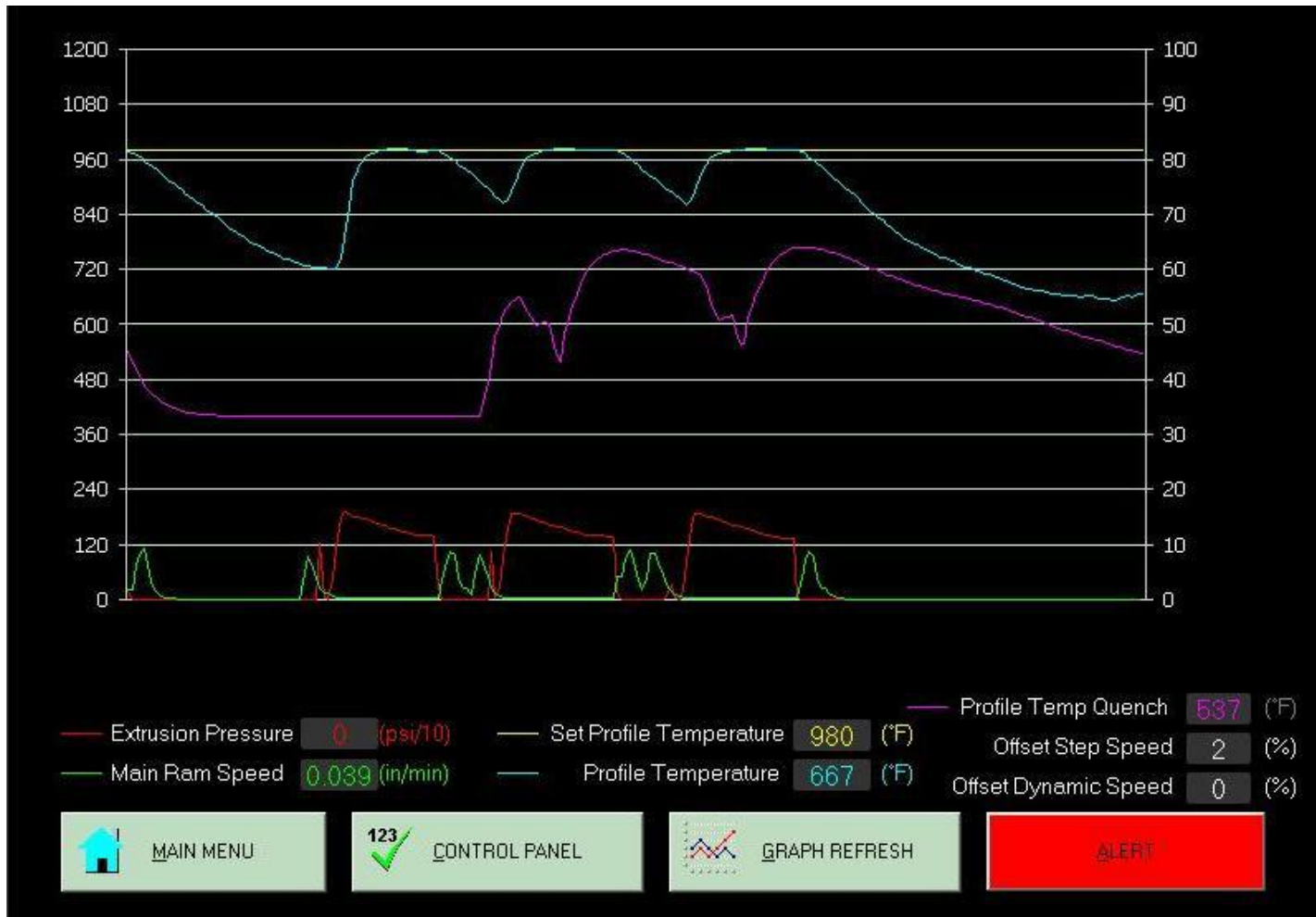
Data collection & Reports

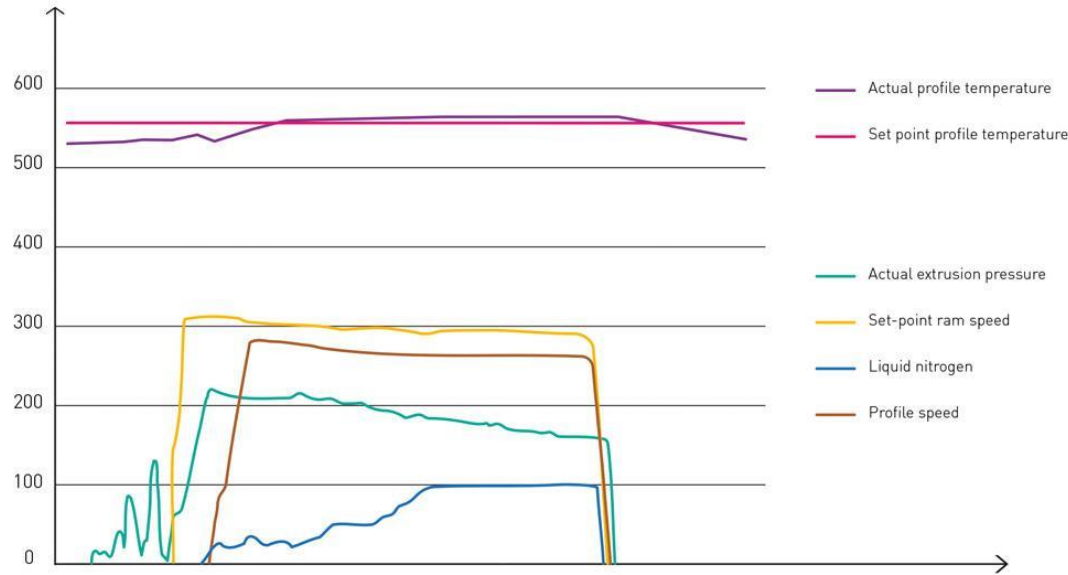| Date	Shift	Time	Order Number	Die Code	Extruded Billet Nr	Set Profile Temp (°F)	Average Profile Temp (°F)	Ram Speed Target (in/min)	Ave Ram Speed Target (in/min)	Extr Time (sec)
06/16/2009	1	09:51:49 AM	ORDER21	027157-100	1	1020	953	12	12	102
06/16/2009	1	09:54:22 AM	ORDER21	027157-100	2	1020	978	12	12	101
06/16/2009	1	09:56:56 AM	ORDER21	027157-100	3	1020	977	12	12	101
06/16/2009	1	09:59:30 AM	ORDER21	027157-100	4	1020	978	12	12	101
06/16/2009	1	10:02:03 AM	ORDER21	027157-100	5	1020	977	12	12	102
06/16/2009	1	10:20:42 AM	ORDER21	027157-100	12	1020	980	12	12	102
06/16/2009	1	10:22:26 AM	ORDER21	027157-100	13	1020	980	12	12	102
06/16/2009	1	10:24:50 AM	ORDER21	027157-100	13	1020	980	12	12	92
06/16/2009	1	10:25:01 AM	ORDER21	027157-100	14	1020	978	12	12	103
06/16/2009	1	11:35:34 AM	ORDER21	027157-100	41	1020	977	12	12	19
06/16/2009	1	11:36:57 AM	ORDER21	027157-100	42	1020	977	12	12	102

** CURRENT EXTRUSION REPORT **

#Records: 11

IES collects all production data and they are stored in a database.

Data referred to billet, die, alert and failure is disposable in every moment for internal review, statistics and maintenance.

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Liquid Nitrogen Die Cooling

——	Actual profile temperature
——	Set point profile temperature
——	Actual extrusion pressure
——	Set-point ram speed
——	Liquid nitrogen
——	Profile speed

TEST RESULT
Alloy: 6086L
Profile Type: Tube

35 mm diameter
3 mm thickness

Speed
Standard Value
With Liquid Nitrogen
Managed by IES

from 13 to 15 m/mm
26 m/mm

30% SPEED INCREASING

40% NITROGEN SAVING

20% DIE LIFE EXTENSION

Improved quality surface
- limited profile oxidation at the die exit;
- dimensional quality improved;
- scrap rate reduced;
- optical appearance improved.

Increased die life
- protection of die and backer from overheating and deformation;

Reduced press down time

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IES Configuration