

IES PLUS

Isothermal Extrusion SAI
Temperature Process Control

Isothermal Extrusion
Order and Dies &
Die Cooling
with Liquid Nitrogen

2019

Main Variables in IES PLUS

AIM

- Optimization and control of aluminium extrusion process
 - Quality
- Constant Profile Temperature

Main Variables in IES *PLUS*

ACTION

- Production planning with order managing
- Visualization of production data and parameter referred to orders

Schedule and manage orders

Lot Nr	Order Nr	Die Code	Holes	Bars Nr	Bars Len	Bill To Extr	Bill Len	Butt Len	Prof Len	Prof Weight	Fr Scrap	Bk Scrap	Extr Date	Next Ord	Oven Nr	Plan Alloy	Batch Nr	Seq	Quality
412922520	7608325	202465/1	1	350	3660	1	0	20	0	2347	1500	1500	22/06/2012	7		6005A	0	999	0
893948902	7695100	202352	3	181	5000	1	0	20	0	655	1500	1500	25/06/2012	0		6060	1	999	0
154140006	7695142	203208	6	133	5000	1	0	20	0	320	1500	1500	25/06/2012	0		6060	1	999	0
170552985	7691822	26407	4	43	5000	1	0	20	0	650	1500	1500	25/06/2012	0		6060	1	999	0
577362585	7691505	34740/+	4	60	6100	1	0	20	0	477	1800	1800	25/06/2012	0		6060	1	999	0
495611545	7698159	35948/+	1	45	5000	1	0	20	0	4903	1250	1250	25/06/2012	0		6060	1	999	0
606766001	7695098	36039/1	2	70	5000	1	0	20	0	988	1500	1500	25/06/2012	0		6060	1	999	0
052367513	7691480	GL01815/2M	1	96	6100	1	0	20	0	1967	2000	2000	25/06/2012	0		6060	1	999	0
052367513	7695095	GL01815/2M	1	288	6100	1	0	20	0	1967	2000	2000	25/06/2012	0		6060	1	999	0
107942041	7691480	GL01815/3M	1	96	6100	1	0	20	0	1980	2000	2000	25/06/2012	0		6060	1	999	0
107942041	7695095	GL01815/3M	1	288	6100	1	0	20	0	1980	2000	2000	25/06/2012	0		6060	1	999	0
213203097	7695139	GL01971/1	4	394	5000	1	0	20	0	587	1800	1800	25/06/2012	0		6060	1	999	0
110029670	7695104	GL02046	4	325	6500	1	0	20	0	568	1800	1800	25/06/2012	0		6060	1	999	0
117369702	7695160	GL02048	4	354	6500	1	0	20	0	492	1200	1200	25/06/2012	0		6060	1	999	0
116321126	7695159	GL02053	3	277	6500	1	0	20	0	605	1800	1800	25/06/2012	0		6060	1	999	0
819008666	7695157	GL02054/1	4	1019	6500	1	0	20	0	494	1500	1500	25/06/2012	0		6060	1	999	0
694572697	7687839	36552	4	252	3600	1	0	20	0	691	1500	1500	25/06/2012	0		6063HIP	1	999	0
930354535	7687838	60156	2	158	3600	1	0	20	0	1047	1500	1500	25/06/2012	0		6063HIP	1	999	0
289970022	7695465	202649	1	5	5710	1	0	20	0	3642	1500	1500	25/06/2012	0		6060	2	999	0
427514724	7695367	35997/B	1	6	6100	1	0	30	0	3204	1500	1500	25/06/2012	0		6060	2	999	0
35993753	7695489	GL01660/1	3	47	5000	1	0	15	0	710	1800	1800	25/06/2012	0		6060	2	999	0
707372385	7695293	1-0800	6	479	4000	1	0	30	0	251	1400	1900	25/06/2012	0		6063HIP	2	999	0

LOT 412922520 SUMMARY DETAILS.

*****LOT IN EXTRUSION*****

Cuts per Bill (nr)	1	Bars Len (mm)	3660	Total Bars (nr)	350	Treat Type	T6
Bill per Cuts (nr)	1	Prof Len (m)	51.58	Total Bill To Extr (nr)	30	Alloy	6005A
Finish Saw Cuts (nr)	13	Saw Pos (m)	51.58			Alloy	0
		Fr Scrap (mm)	2000	Bill Len (mm)	1116		
		Bk Scrap (mm)	2000	1° Bill Len (mm)	1116		

Comment D

- UTILITIES
- NEW ORDER
- EDIT ORDER
- MO FILTER
- BATCH FILTER
- ALLOY FILTER
- OPERATOR CONSOLE
- EDIT SEQUENCE**
- DIE CARD
- RECIPE DETAIL

IES PLUS provides tools to assist you in scheduling your extrusion presses: locally or remotely from ERP (SAP / EIS / AS400) by dedicated interfaces.

The job orders move through the system from station to station.

Recipes – Parameters Main

DIE: 172750/1 **N° ORDER:** 23943064 **NEXT DIE**

Temperature Process Parameter

Target Profile Exit Temp: 550 °C
Minimum Profile Exit Temp: 520 °C
Dynamic Speed Offset Limit: 5 %
Step Speed Offset Limit: 5 %
Front of Billet Offset Limit: 15 °C

Minimum Quench Rate: 3 °C/s
Ave Ram Speed: 10.0 mm/s
Extrusion Ram Speed: 11.0 mm/s
Upset Pressure: 1300 psi
Call Billet Ram Position: 200 mm
Actual Weight: 623 gr/m
Specified Weight: 639 gr/m
Holes: 2 nr

Standard Target Parameters

Die type/Alloy	Exit temp	Billet temp
Solid 1 hole (°C)	550	460
Solid multi holes (°C)	550	460
Hollow 1 hole (°C)	550	460
Hollow multi holes (°C)	550	460

Furnace Parameters

Starter Billet Temp. Exit Front: 460 °C
Starter Billet Length: 400 mm
Billet Temp Exit Front: 460 °C

Puller Parameters

Type Of Cut: Fly Still/Flying
Calculated Saw Position: 26500 cm
Pullers Tension: 10 kg

Reference Parameters

Bolster: 38 Sub Bolster: 10
Insert:
Type: 0 S/H

Die Typ: 0
Descr: PH
Comments: NITRIDED BY BODYCOTE

Order Parameters

Production Qty: 210 nr
Finished Length: 6425 mm
Run Out Length: 26500 cm
Number of Billets: 26 nr
Starter Billet Length: 542 mm
Billet Length: 542 mm
Last Billet Length: 542 mm
Butt Length: 45 mm

Order Comments

ATTENTION!! AUTOMOTIVE PRODUCT. ENTIRE BILLET ONLY.

PRODUCT CALCULATOR

Recipe Management

Recipe Locked: NO
Date Locked: 12/30/99

Reason Locked

UNLOCK

BEST EXTRUSION

CLOSE

IES PLUS at Press station acquires information from a relational database. It manages the extrusion process, enabling communication among individual pieces of equipment (Furnace, Press, Handling) using the recipes.

Optimizing length and scrap

DIE: N° ORDER:

Default Recipe Parameters

Holes	<input type="text" value="1"/>	nr	Number Of Holes In Die
Billet Diameter	<input type="text" value="203"/>	mm	Diameter Of Billet
Production Qty	<input type="text" value="100"/>	nr	Number Of Finished Pieces for Production
Finished Length	<input type="text" value="4500"/>	mm	Cut Length of Finished Piece
Saw Scrap	<input type="text" value="800"/>	mm	Estimated Scrap At Saw For Each Run Out Length
Stretcher Scrap	<input type="text" value="800"/>	mm	Estimated Scrap At Stretcher For Each Run Out Length
Butt Length	<input type="text" value="20"/>	mm	Butt Length
Pushes/Cuts Per billet	<input type="text" value="1"/>	nr	Number Of Pushes/Cuts Per Billet per Run Out Length
Billets Per Cut	<input type="text" value="1"/>	nr	Number Of Billets Per Cut Per Run Out Length
Number Finished Cuts (stacker)	<input type="text" value="9"/>	nr	Number Of Cuts/Pieces At The Finish Saw Per Run Out Length
Actual Prof Weight	<input type="text" value="1095"/>	gr/m	Actual Weight per Foot of the Profile

Calculated Production Parameters

Billet Length	<input type="text" value="572"/>	mm	Total Length Of Billet
Runout Length	<input type="text" value="42100"/>	mm	Total Profile Length Per Billet
Number Of Billets	<input type="text" value="11"/>	nr	Number Of Billet To Complete Order
Calculated Saw Position	<input type="text" value="5300"/>	m	Calculated Saw Position
Recovery	<input type="text" value="73.77"/>	%	Calculated Theoretical Recovery

Adjust for First And Last Billet Lengths

Target Starter Billet Length	<input type="text" value="650"/>	mm	Length Of Starter Billet In Recipe
Actual Starter Billet Length	<input type="text" value="572"/>	mm	Length Of Starter Billet For Production
Target Last Billet Length	<input type="text" value="650"/>	mm	Length Of Last Billet In Recipe
Actual Last Billet Length	<input type="text" value="572"/>	mm	Length Of Last Billet For Production

Product calculator

Increase productivity and reduce scrap: minimize weld scrap, backend profile defects, and optimize billet length to avoid extruding partial sections.

Calculation is optimized in agree with ordr/die.

Extrusion Sequence

S.A.I. AUTOMATION - BRESCIA (ITALY) ECN - EXTRUSION CONTROL ** ORDERS MANAGER P7 ** EN Englo (/dom)

Lot Nr	Order Nr	Die Code	Holes	Bars Nr	Bars Len	Bill To Extr	Bill Len	Butt Len	Prof Len	Prof Weight	Fr Scrap	Bk Scrap	Extr Date	Next Ord	Oven Nr	Plan Alloy	Batc Nr	Seq	Quality
412922520	7608325	202465/1	1	350	3660	1	0	20	0	2347	1500	1500	22/06/2012	7		6005A	0	1	0
893948902	7695100	202352	3	181	5000	1	0	20	0	655	1500	1500	25/06/2012	0		6060	1	2	0
154140006	7695142	203208	6	133	5000	1	0	20	0	320	1500	1500	25/06/2012	0		6060	1	3	0
170552985	7691822	2-6407	4	43	5000	1	0	20	0	650	1500	1500	25/06/2012	0		6060	1	4	0
577362585	7691505	3-4740/+	4	60	6100	1	0	20	0	477	1800	1800	25/06/2012	0		6060	1	5	0
289970022	7695465	202649	1	5	5710	1	0	20	0	3642	1500	1500	25/06/2012	0		6060	2	6	0
107942041	7691480	GL01815/3M	1	96	6100	1	0	20	0	1980	2000	2000	25/06/2012	0		6060	1	7	0
107942041	7695095	GL01815/3M	1	288	6100	1	0	20	0	1980	2000	2000	25/06/2012	0		6060	1	7	0
213203097	7695139	GL01817/1	4	394	5000	1	0	20	0	587	1800	1800	25/06/2012	0		6060	1	8	0
010543975	7694521	112396/1M	4	765	3650	1	0	15	0	408	1800	1800	22/06/2012	0		6060	13	9	0
685928958	7637148	001234/004	1	158	3124	1	0	30	0	1962	1500	1500	22/06/2012	0		6063A	13	10	0
495611545	7698159	3-5948/+	1	45	5000	1	0	20	0	4903	1250	1250	25/06/2012	0		6060	1	11	0
606760601	7695098	3-6039/1	2	70	5000	1	0	20	0	988	1500	1500	25/06/2012	0		6060	1	12	0
052367513	7691480	GL01815/2M	1	96	6100	1	0	20	0	1967	2000	2000	25/06/2012	0		6060	1	13	0
052367513	7695095	GL01815/2M	1	288	6100	1	0	20	0	1967	2000	2000	25/06/2012	0		6060	1	13	0
110029670	7695104	GL02046	4	325	6500	1	0	20	0	568	1800	1800	25/06/2012	0		6060	1	14	0
117369702	7695160	GL02048	4	354	6500	1	0	20	0	492	1200	1200	25/06/2012	0		6060	1	15	0
116321126	7695159	GL02053	3	277	6500	1	0	20	0	605	1800	1800	25/06/2012	0		6060	1	21	0
819008666	7695157	GL02054/1	4	1019	6500	1	0	20	0	492	1800	1800	25/06/2012	0		6060	1	22	0
634572697	7687839	3-6552	4	252	3600	1	0	20	0	252	1500	1500	25/06/2012	0		6063HIP	1	999	0
930354535	7687838	6-0156	2	158	3600	1	0	20	0	252	1500	1500	25/06/2012	0		6063HIP	1	999	0
427514724	7695367	3-5997/8	1	6	6100	1	0	20	0	6100	1500	1500	25/06/2012	0		6060	2	999	0
35993753	7695489	GL01660/1	3	47	5000	1	0	20	0	5000	1500	1500	25/06/2012	0		6060	2	999	0
707372385	7695293	1-0800	6	479	4000	1	0	20	0	4000	1500	1500	25/06/2012	0		6063HIP	2	999	0
587073689	7698166	120833/1	1	113	3000	1	0	20	0	3000	1500	1500	25/06/2012	0		6063HIP	2	999	0
721348478	7695079	121144/002	1	55	6500	1	0	20	0	2940	1500	1500	25/06/2012	0		6063HIP	2	999	0
707484518	7695078	121264/3	2	220	6100	1	0	20	0	1089	1500	1500	25/06/2012	0		6063HIP	2	999	0
440297386	7688059	121431/18M	1	990	6000	1	0	20	0	1573	3000	2000	25/06/2012	0		6063HIP	2	999	0
689013864	7691761	202036	1	495	4120	1	0	15	0	1668	1500	1500	25/06/2012	0		6063HIP	2	999	0
102721870	7662187	2-6489/1M	6	367	3800	1	0	15	0	405	1500	1500	25/06/2012	0		6063HIP	2	999	0
100430158	7662189	2-6488/+	4	118	4000	1	0	30	0	421	1800	1800	25/06/2012	0		6063HIP	2	999	0
482039961	7688200	3-6782	1	50	3048	1	0	20	0	3542	1500	1500	25/06/2012	0		6063HIP	2	999	0
518875289	7695369	3-6816	1	36	3800	1	0	20	0	2028	1500	1500	25/06/2012	0		6063HIP	2	999	0
257607527	7691478	GL02009	2	60	5000	1	0	20	0	1245	1500	1500	22/06/2012	0		6060	13	999	0
199248028	7660721	093437/004	1	114	4600	1	0	30	0	1420	1400	1900	22/06/2012	0		6063A	13	999	0
432857999	21046	200446	2	46	5100	1	0	20	0	2245	1500	1500	22/06/2012	0		6063A	13	999	0
337160039	21155	200574	1	11	6120	1	0	30	0	3509	1500	1500	22/06/2012	0		6063A	13	999	0
340787559	21156	200574	1	5	4910	1	0	30	0	3509	1500	1500	22/06/2012	0		6063A	13	999	0
341936999	21158	200574	1	15	4100	1	0	30	0	3509	1500	1500	22/06/2012	0		6063A	13	999	0
184323225	7691295	ANG438/4	3	60	5500	1	0	20	0	977	1800	1800	22/06/2012	0		6063A	13	999	0

VALUES ALLOWED: '1' to '20' or '999'

UTILITIES NEW ORDER EDIT ORDER RETURN OPERATOR CONSOLE DIE CARD RECIPE DETAIL

It is possible to set orders by sequence and to change the sequence in every moment

Operator Console

Run To Recipe Monitor

	RECIPE SET-POINT	ACTUAL SET-POINT	CURRENT BILLET	PREVIOUS BILLET
Profile Temperature (°C)	550	550	542	563
Billet Temp Exit Front (°C)	460	460	400	400
Billet Temp Rear (°C)	440	440	462	462
Quench Rate (°C/sec)	3	3	8	8
Ave RAM Speed (mm/s)	10.0			10.5
Extrusion RAM Speed (mm/s)	11.0	11.0	0.0	
Butt Length (mm)	45	45		
Billet Length (mm)	400	522		
Upset Pressure (psi)	1300	1300		
Call Billet Position (mm)	200	200		
Die Temperature (°C)	420	420	452	

Breakthrough T (sec)	5
Current Extr T (sec)	110
Current Dead T (sec)	27
Total DownTime (sec)	437
Last Die ChangeTime	0

Locked status

UNLOCK

TPC Control Monitor

	CONTROL STATUS	OFFSET LIMIT	ACTUAL OFFSET
Dynamic Speed (%)	ON	5	0
Step Control (%)	ON	5	5
Total Speed Offset (%)	😊		5
Billet Temp Front (°C)	ON	15	-20
Billet Temp Rear (°C)		0	-10
Quench (%)	n/a	0	10
Nitrogen (%)	n/a	100	0

Auto Capture Target Temp (°C) OFF

BILLETS

Order	Die Total
25 / 48	25

Order Summary

Current Order	Next Order
WO 23825970	23943064
Die 1002395/1	172750/1

Shift: 1
Crew: Y

ORDER MANAGER CONFIRM DIE CHANGE
CONFIRM ORDER CHANGE

Company Logo

PRESS #1
Ver. 2.0 April 2015

Diagnostic

- Auto Parameters 1° Billet ●
- Auto Parameters ●
- Communication PC-PLC ●
- Communication Furnace ●
- Communication Press ●
- Communication Puller ●
- Extrusion ●
- Die Change ●
- Exit Sensor Auto Scan ●
- Quench Sensor Auto Scan ●

Refresh Trend

ATTENTION!! AUTOMOTIVE PRODUCT. ENTIRE BILLET ONLY.

ACTUAL EXTRUSION REPORT															
Date	Time	Extr Bill Nr	Profile Temp (°F)	Avg Ram Speed	Extr Time (s)	Break TTime (s)	Avg Extr Press	Peek Press (psi)	Billet Temp (°F)	Dead Time (s)	Down Time (s)	Offset Step Speed (%)	Offset Dyn Speed (%)	Offset Bill Temp (°F)	Offset Speed Tot (%)
02/09/2017	12:04:07	1216	563	10.6	30	4.4	187	251	400	27	25	5	1	-20	6
02/09/2017	12:05:31	1217	564	10.4	111	4.4	187	251	400	27	26	5	0	-20	5
04/21/2017	15:49:26	18865	563	10.6	51	5	188	250	400	27	25	5	2	-20	7
04/21/2017	15:50:26	18866	563	10.5	110	5	187	250	400	27	26	5	0	-20	5

10/29/2018 11:25 AM

The page is designed to be simple and intuitive. It provides the press operators with the current process data to see immediately the progress of the production.

The operator console has been improved with more information on the Extrusion Parameters, Orders and Process Data.

Data collection & Reports

**** CURRENT EXTRUSION REPORT ****

Date	Shift	Time	Order Number	Die Code	Extruded Billet INr	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 SELECT FILTER

06/16/2009 Lookup By Date

06/16/2009 Lookup By Date And Die

06/16/2009 Lookup By Die

06/16/2009 Lookup By Order

06/16/2009 Lookup By Date And Shift

06/16/2009

AUTOMATION - BRESCIA (ITALY) ECN - EXTRUSION CONTROL

**** BILLET REPORT ****

Shift	Time	Order Number	Profile	Die Copy	Extruded Bil
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Lookup By Date

From : Month 11 Day 18 Year 2009

To : Month 11 Day 18 Year 2009

11/18/2009 11/18/2009

Die / Order : Please select one ...

Shift : 1 2 3 4

SELECT

#Record : 0

CLOSE DELETE SELECTION CURRENT EXTRUSION REPORT ALARM REPORT DIE REPORT DIE CHANGE REPORT DOWNTIME REPORT EXPORT SELECTION

The system collects all production data (billet-by-billet detail, billet temperatures, shear lengths, gross and net weight, etc.) in a SQL database.

Those are stored, allowing you to track the complete production process for internal review and statistics.

Isothermal Extrusion

AIM

- Quality
- Constant Profile Temperature

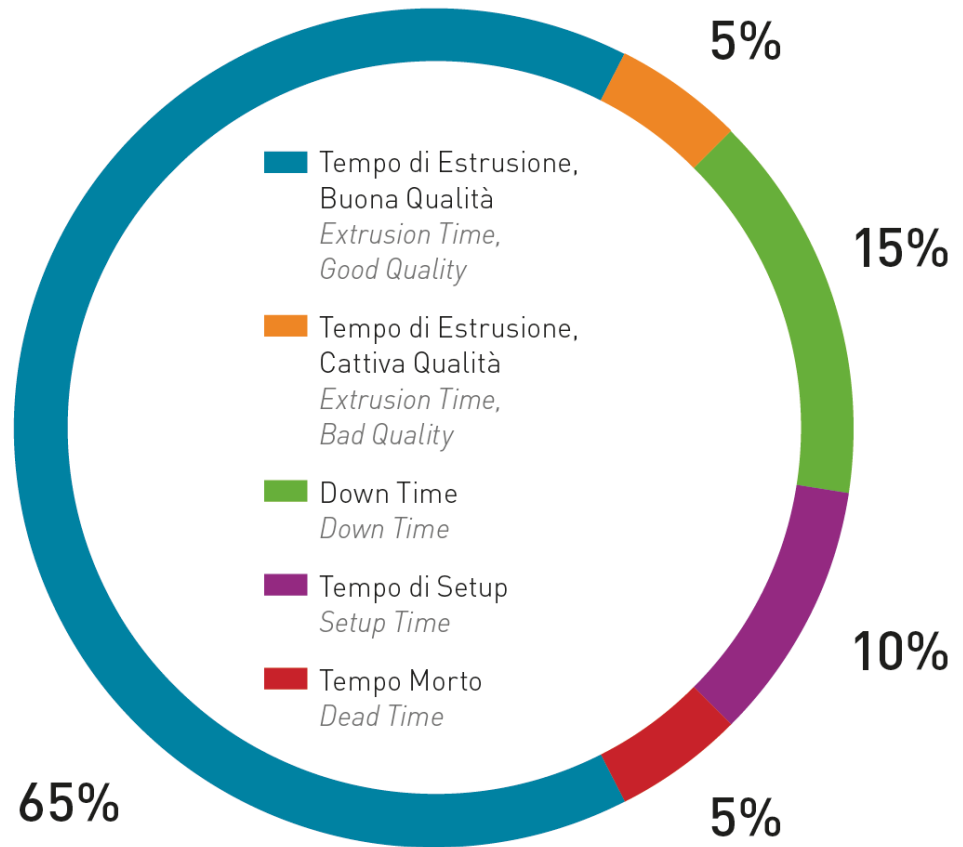
ACTION

- Extrusion Speed
- Billet Temperature

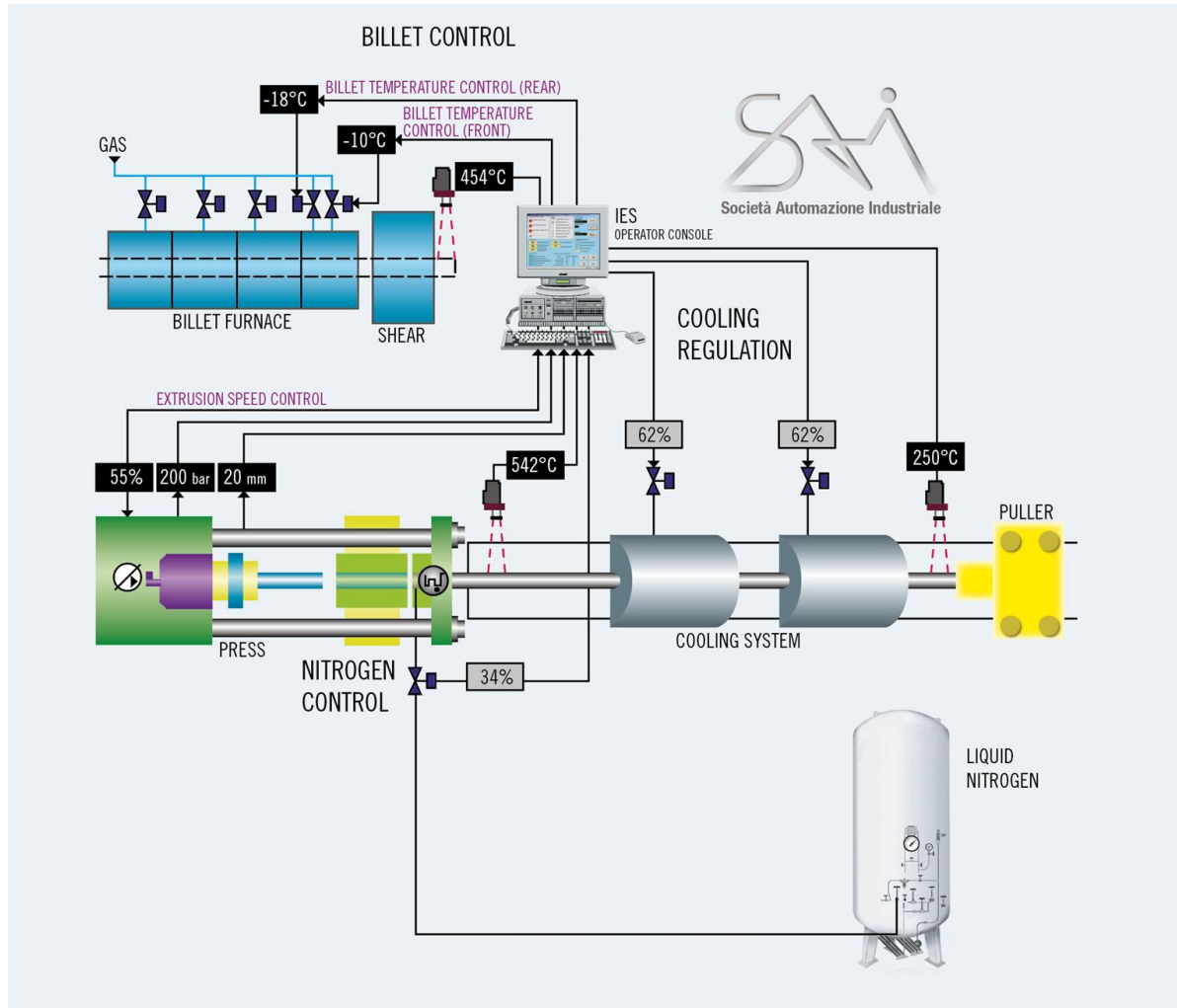
Targeted and effective action

Action on
Good Extrusion Time.

Even
small improvements
gets big results!



IES Configuration



Hardware Components



INTERFACE PLC



SCANNER



DISPLAY



SENSOR

Sensor Positioning

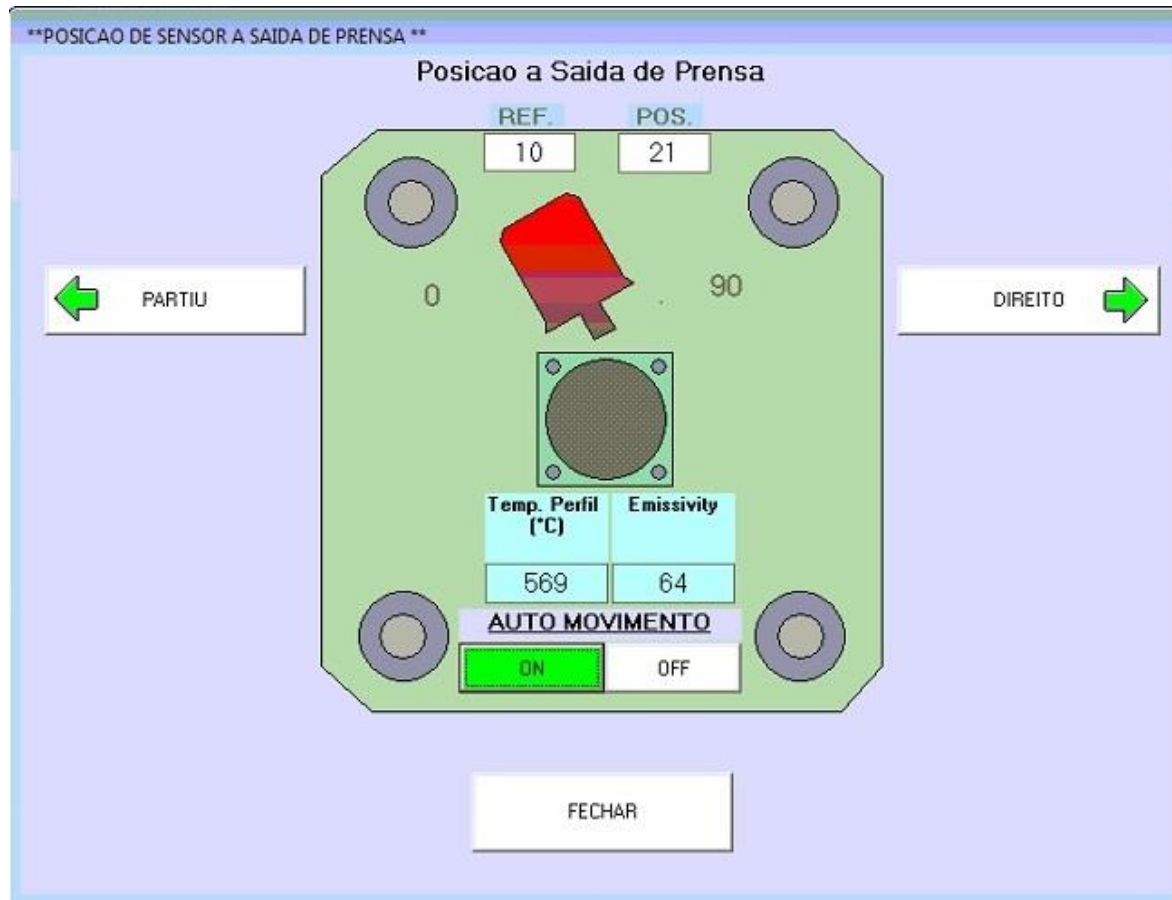


Automatic Positioning
during die change sensors
goes automatically at
position saved in recipes

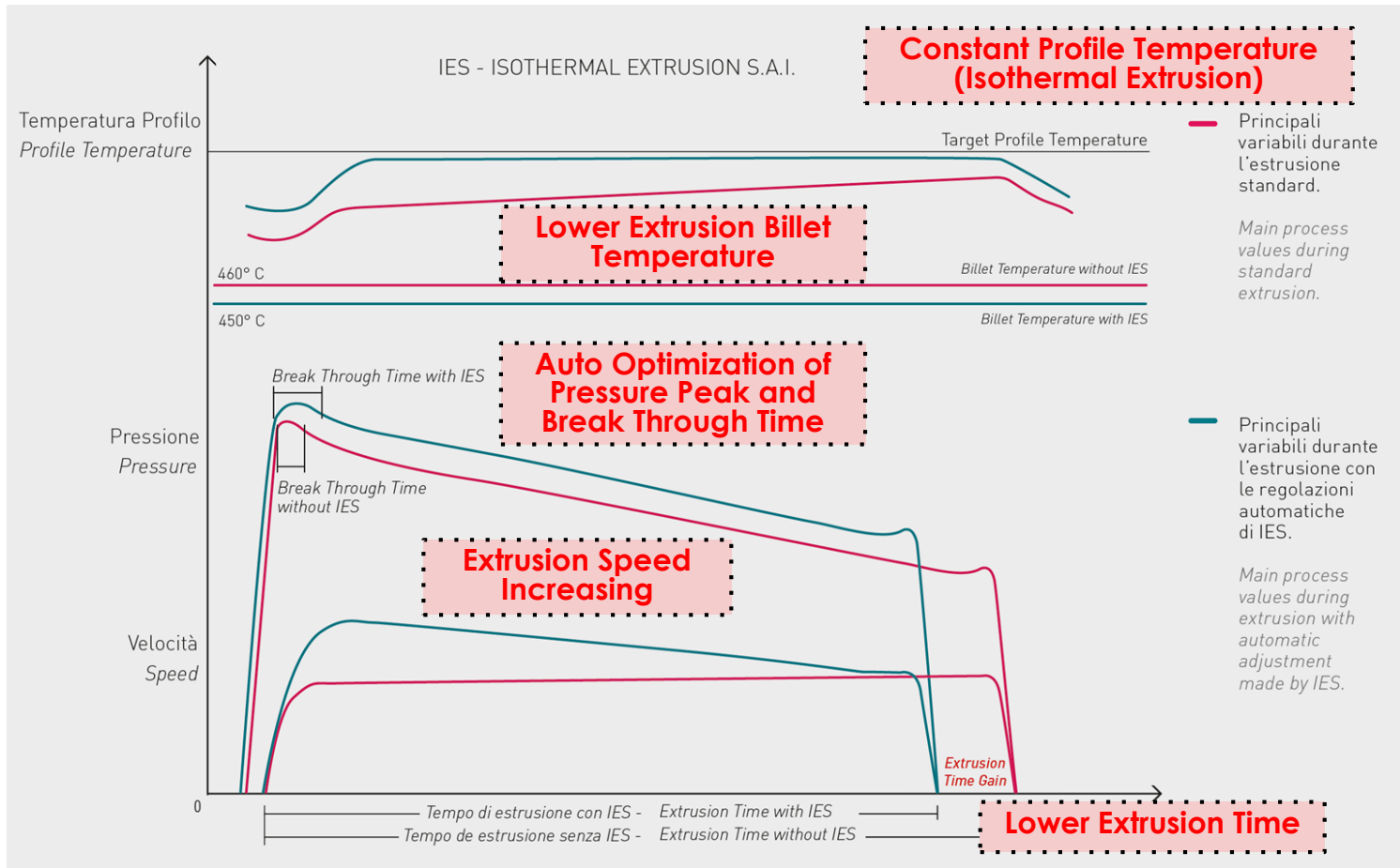
Automatic Scan
when the profile is not in
the reading range

Manual Positioning using
pushbutton in aiming page

Sensor Positioning



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

Operator Console

3

2

Run To Recipe Monitor

	RECIPE SET-POINT	ACTUAL SET-POINT	CURRENT BILLET	PREVIOUS BILLET
Profile Temperature (°C)	550	550	542	563
Billet Temp Exit Front (°C)	460	460	400	400
Billet Temp Rear (°C)	440	440	462	462
Quench Rate (°C/sec)	3	3	8	8
Ave RAM Speed (mm/s)	10.0			10.5
Extrusion RAM Speed (mm/s)	11.0	11.0	0.0	
Butt Length (mm)	45	45		
Billet Length (mm)	400	522		
Upset Pressure (psi)	1300	1300		
Call Billet Position (mm)	200	200		
Die Temperature (°C)	420	420	452	

Breakthrough T (sec)	5
Current Extr T (sec)	110
Current Dead T (sec)	27
Total DownTime (sec)	437
Last Die ChangeTime	0

Locked status
UNLOCK

PROCESS TRENDS | ALERT | **UTILITY** | CURRENT RECIPE | NEXT RECIPE

TPC Control Monitor

	CONTROL STATUS	OFFSET LIMIT	ACTUAL OFFSET
Dynamic Speed (%)	ON	5	0
Step Control (%)	ON	5	5
Total Speed Offset (%)	😊		5
Billet Temp Front (°C)	ON	15	-20
Billet Temp Rear (°C)		0	-10
Quench (%)	n/a	0	10
Nitrogen (%)	n/a	100	0
Auto Capture Target Temp (°C)	OFF		

BILLETS

Order	Die Total
25 / 48	25

Order Summary

WO	Current Order	Next Order
	23825970	23943064
Die	1002395/1	172750/1

Shift : 3
Crew : Y

ORDER MANAGER | CONFIRM DIE CHANGE | CONFIRM ORDER CHANGE

Company Logo

PRESS #1

Ver. 2.0 April 2015

Diagnostic

- Auto Parameters 1° Billet ●
- Auto Parameters ●
- Communication PC-PLC ●
- Communication Furnace ●
- Communication Press ●
- Communication Puller ●
- Extrusion ●
- Die Change ●
- Exit Sensor Auto Scan ●
- Quench Sensor Auto Scan ●

Refresh Trend

ATTENTION!! AUTOMOTIVE PRODUCT. ENTIRE BILLET ONLY.

****ACTUAL EXTRUSION REPORT****

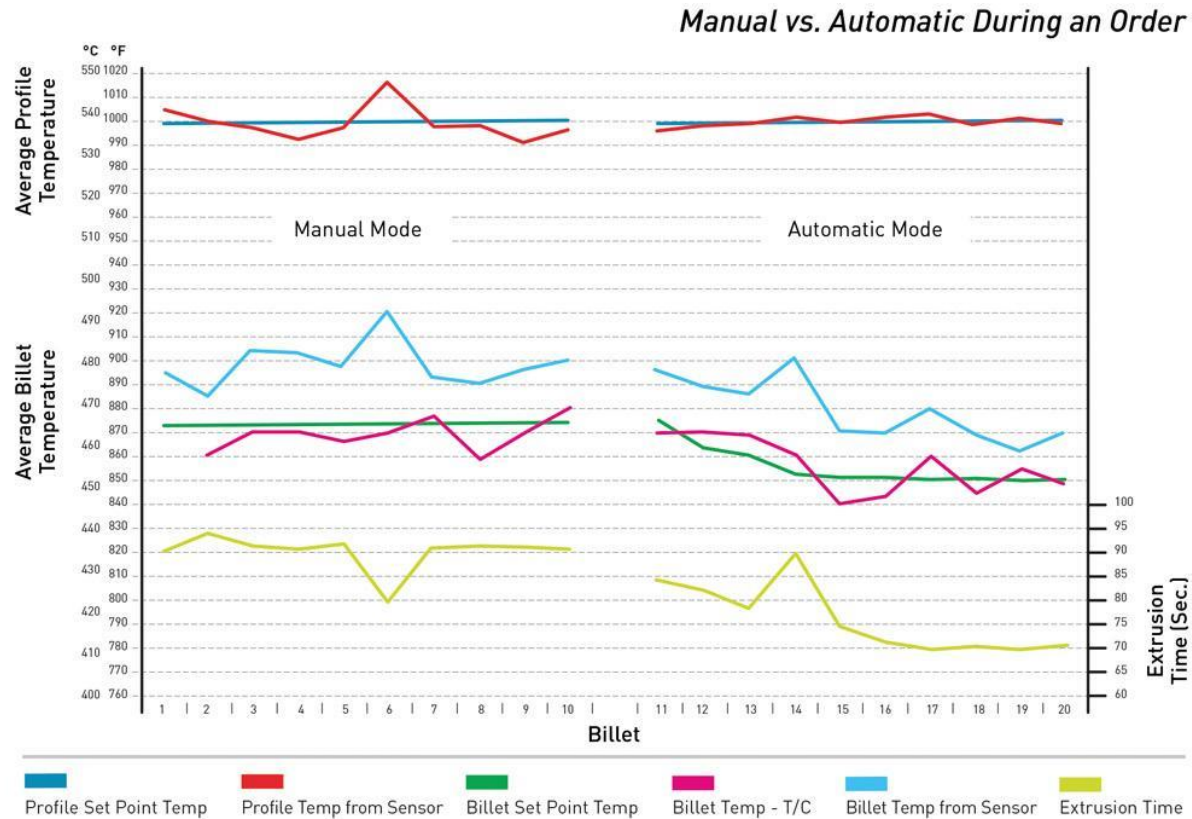
Date	Time	Extr Bill Nr	Profile Temp (°F)	Avg Ram Speed	Extr Time (s)	Break TTime (s)	Avg Extr Press	Peek Press (psi)	Billet Temp (°F)	Dead Time (s)	Down Time (s)	Offset Step Speed (%)	Offset Dyn Speed (%)	Offset Bill Temp (°F)	Offset Speed Tot (%)
02/09/2017	12:04:07	1216	563	10.6	30	4.4	187	251	400	27	25	5	1	-20	6
02/09/2017	12:05:31	1217	564	10.4	111	4.4	187	251	400	27	26	5	0	-20	5
04/21/2017	15:49:26	18865	563	10.6	51	5	188	250	400	27	25	5	2	-20	7
04/21/2017	15:50:26	18866	563	10.5	110	5	187	250	400	27	26	5	0	-20	5

10/29/2018 11:25 AM

1

Isothermal Extrusion with Integrated Order Management

Manual vs Automatic



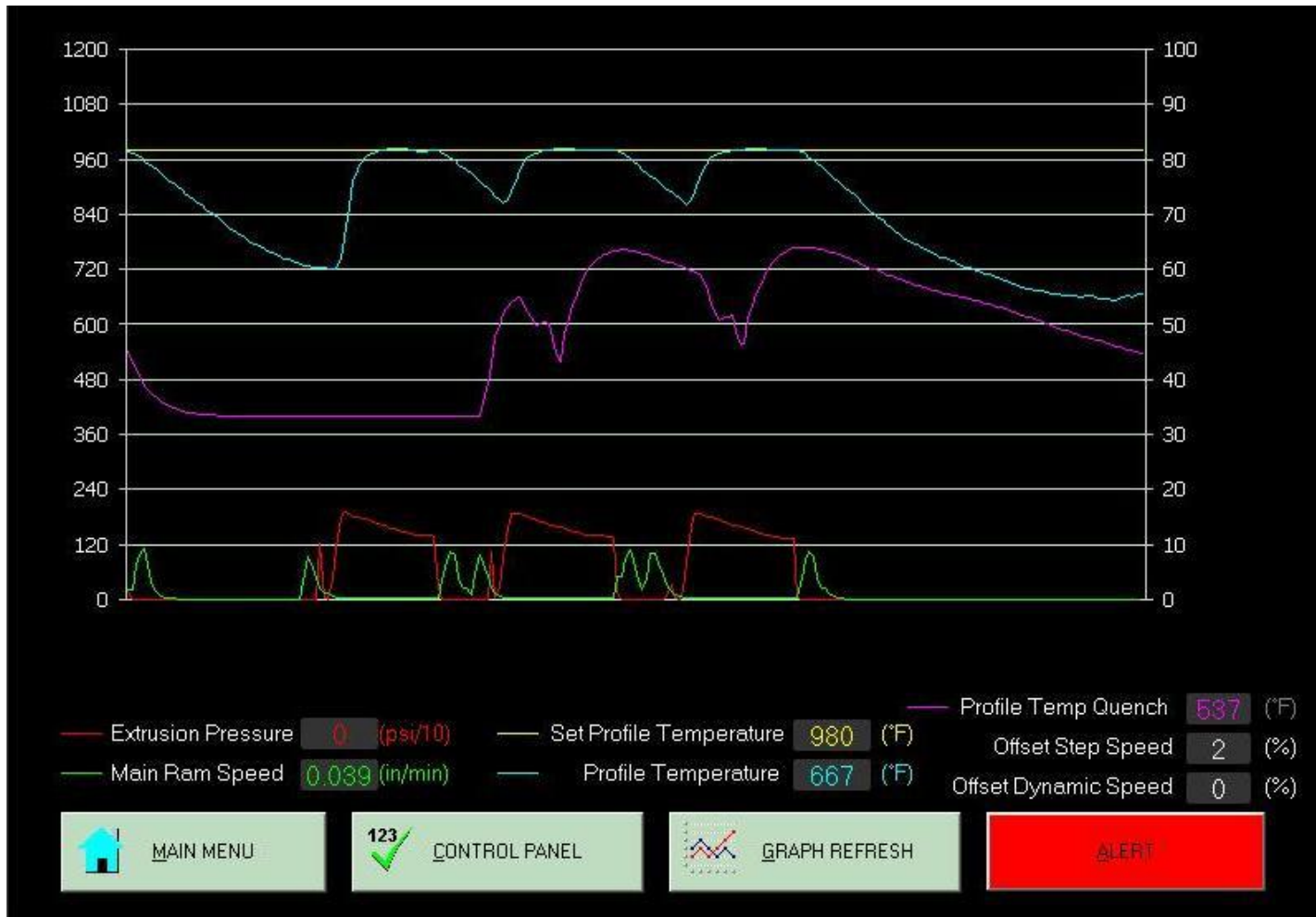
17% Reduction in Extrusion Time with no sacrifice in quality

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

Process Trend



Data collection & Reports

** CURRENT EXTRUSION REPORT **

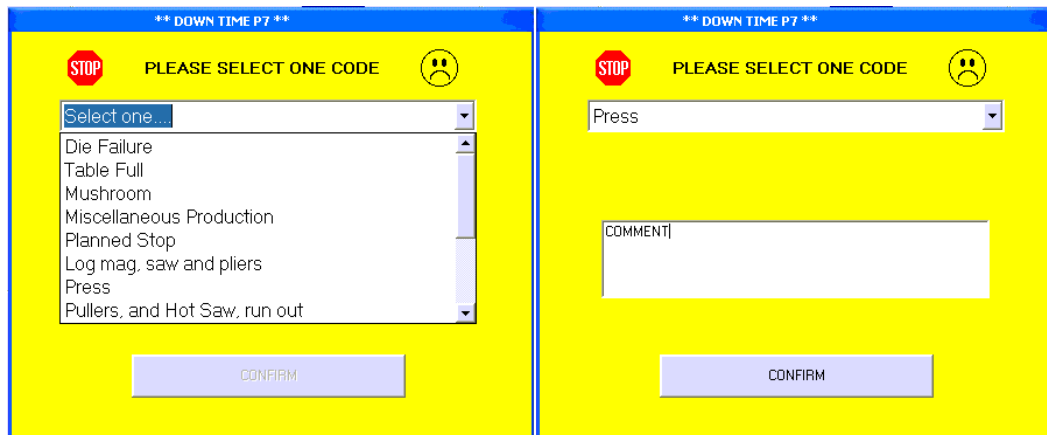
Date	Shift	Time	Order Number	Die Code	Extruded Billet N°	Set Profile Temp (°F)	Average Profile Temp (°F)	Ram Speed Target (in/min)	Ave Ram Speed Target (in/min)	Extr Time (sec)
▶ 06/16/2009	1	09:51:49 AM	ORDER21	027157-100	1	1020	953	12	12	102
06/16/2009	1	09:54:22 AM	ORDER21	027157-100	2	1020	978	12	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

#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.

Down Time



Automatically the **Down Time** popup tracks the reason and the comment for reporting function.

Other functions

S.A.I. AUTOMATION - BRESCIA (ITALY) - EGN EXTRUSION CONTROL - DIE OVEN

DIE OVEN

Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9
ABX319/1	MT25/1	KNR103/1	0	0	0	0	0	0
SOAK TIME 04:12:44	SOAK TIME 02:33:27	SOAK TIME 00:59:55	SOAK TIME 0	SOAK TIME 0	SOAK TIME 0	SOAK TIME 0	SOAK TIME 0	SOAK TIME 0
DIE INFO	DIE INFO	DIE INFO	DIE INFO	DIE INFO	DIE INFO	DIE INFO	DIE INFO	DIE INFO

INSERT HOME TAKE OUT

INSERT
Select Die (PgUp - PgDown to scroll the list)
ABX319/1
Select Oven
C 1 C 2 C 3 C 4 C 5 C 6 C 7 C 8 C 9

TAKE OUT
Select Oven
C 1 C 2 C 3 C 4 C 5 C 6 C 7 C 8 C 9

Die Oven.

Record of all preheating process data.

DOWNTIME

Description	Code
Cancelled Run	CR
Log Conveyor (in	D01
Log Oven	D02
Log Shear	D03
Scarp Elevator	D04
Loader Arms	D05
Die Slide (Incl	D06
Container	D07
Limit Switch	D08

EXIT

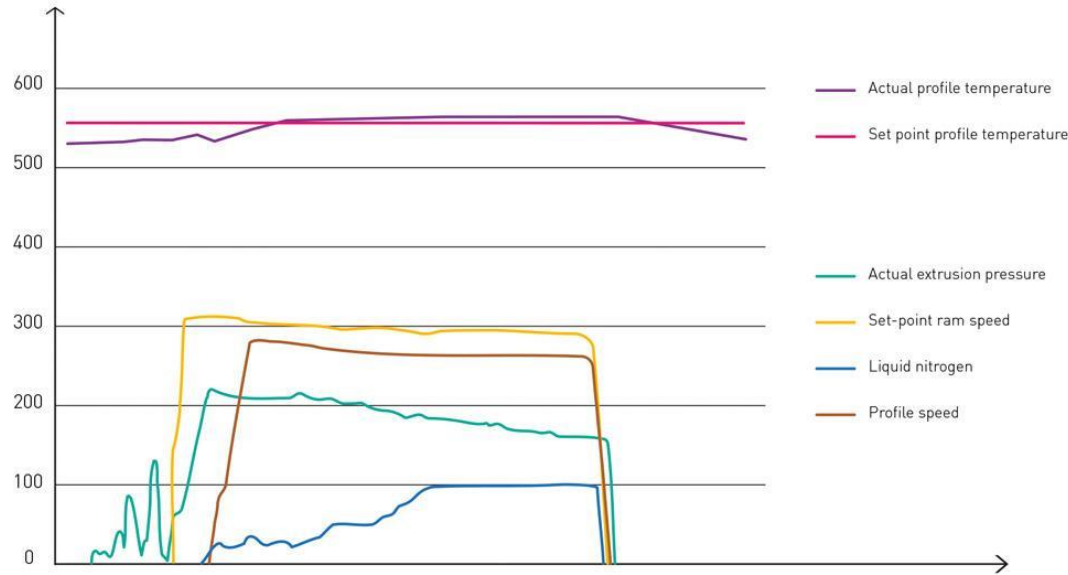
CHANGE DIE REASON

- Ran OK
- Pick up
- Wall Thickness Variation
- Ovality
- Convexity
- Squareness
- Speed Cracks
- Bearing Changes
- Tooling Clearance
- Peg Broken
- Foreign Body in Billet
- Flatness
- Blisters

CONFIRM

Down Time
and Die
Change
Tracking.

Liquid Nitrogen Die Cooling



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

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

IES Configuration

