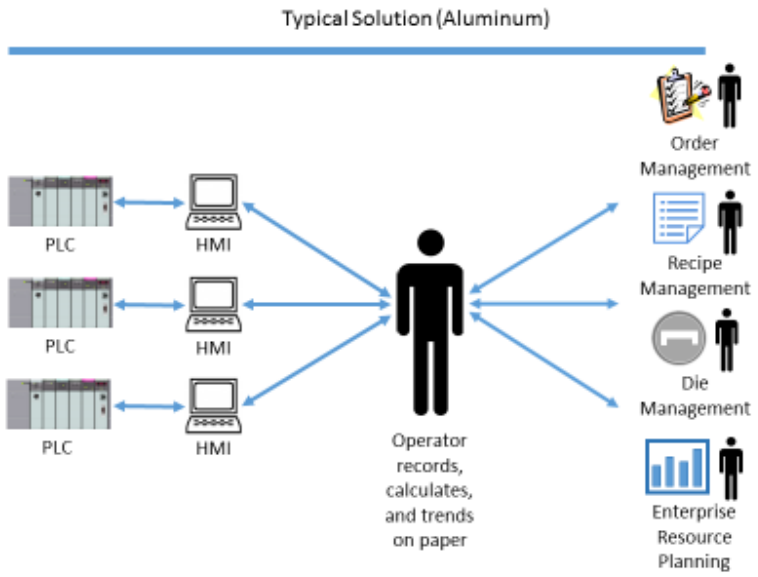
Parijat Aluminum Extrusion SCADA

The goal for extrusion operations is to produce the highest quality product at the lowest possible cost. Securing this efficiently requires a change in paradigm from operators pushing buttons and manually collecting data – to presses running in complete automatic, performance and production data being collected and transferred to the business, ERP system, while the equipment operators function as technicians concentrating on improving quality and productivity. The business, ERP system may be an existing 3rd party system like SAP, Oracle Financials, M2M, InFor, MS Dynamics, epics etc. or it may be the integrated business systems option of the Parijat system.



A Typical aluminum extrusion system solution consists of various software silos or islands from different vendors software products with multiple copies of data, also requiring a lot of manual data entry activities that are prone to human errors.

PCI solution combines all of these activities into a single software application with a single copy of data. This eliminates any data integrity complications & vulnerability to human data entry errors.

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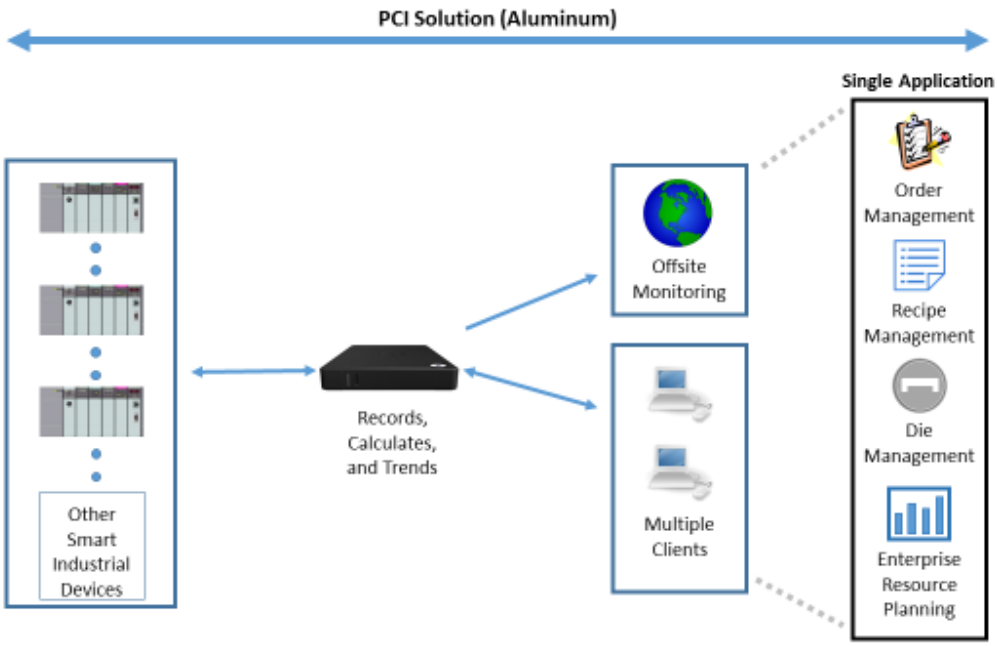


Automation

To get to this level, the press system – beginning with the billet / log heating and cutting system; billet loading system; press cycle, auto Die change; lead out table / hot saw / puller; profile handling transfer / stretching system; Cold / finish saw infeed, cutting, queuing, and offloading systems must be balanced and PLC's capable of communicating between themselves, running in automatic closed loop control mode and the PLC's making process adjustments based on equipment settings, positions and computer algorithms all with minimal operator intervention. Examples of this type of automation are:

1. Automatic billet call settings based on press ram speed, billet length and dead cycle time
2. Die Copy actual weight per unit length calculation based on puller positioning and billet size.
3. Automatic adjustment of billet length to maximize recovery, and minimize press time
4. Billet length calculations based on last recorded weigh per unit length of die copy.
5. Smoother & faster press cycle & smaller dead cycle time – even less than the press vendor spec.
6. Safety interlocks –
   - Puller safety light curtains
   - Hot saw protection
   - Press safety alarms / stops – ram obstruction, billet misalignment, butt fall detection, short tool stack,
7. Auto generated shift reports & statistics – quantity of billets run, gross weight extruded, number of die changes, contact time
8. Automatic burp pressure settings to minimize blisters, burp cycle
9. Hot saw positioning in conjunction with billet length calculation to maximize recovery

10. Automatic position / release of extrudate via recipe verses operator, or time controlled
11. Ram speed adjustments based on exit temperature (InfraRed Pyrometer) and billet temperature
12. Finish saw automation, unattended operation after the stretcher trim is cut off so the saw operator can assist in racking metal

Tracking & Traceability

Parijat system uses advanced video analytics, Big data & Iiot (Industrial Internet of Things) to track & trace the materials used from entry of logs/billets to the finished products at plant exits.

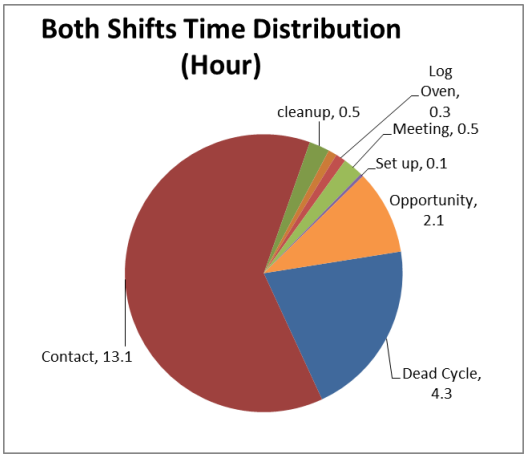
Communications – data collection

Up till now data collection and analysis was quite arduous – many times data is not thoroughly collected or analyzed to determine what is preventing current system from running optimally – getting to root cause is the key. Even the oldest presses have the potential to run in full automatic or as a bare minimum semi-automatic. Parijat SCADA data collection system will provide with real time press performance and identify roadblocks to excellence. Parijat integrated single system will provide the cost savings models by modifying or correcting the issues which are keeping the press from being very profitable.

Once the press system is functioning at full potential, optimum recipes (press parameters) can be generated beginning with the highest volume shapes. These recipes get automatically pushed directly in to the PLC's, once again reducing operator keystrokes and potential for human error. Infinite quantity & extensive recipe management system helps with the process optimization also. Parijat PLC programs & the PC software harness the full power of both sides coupled with the domain knowledge of Aluminum extrusion. This is done by focusing on total end to end Systems Integration:

1. Develop drivers and software to cohesively integrate existing press PLC's with existing business systems (ERP, MRP) or also perform those functions if an ERP system does not pre-exist as an integrated system.
2. An extensive die management system to provide the tools to effectively analyze the performance of the presses down to the profile level, including automatic Die change over, if physical mechanisms exist.
3. Presales quoting system – provide a quoting model which provide the production estimates and the optimum number of holes in a die. In a multi press operation this can be provided by multiple cost / profitability estimates based on different presses.
4. Scheduling – provide easily manipulated Press Schedule – using existing ERP, MRP system. Including optimizing billet length, hot saw position, multi drags, multi push based on actual weight per unit length of the profile.
5. Collect - Labor, Burden, number of billets, length of billets, alloy, alloy lot number, actual weight per unit length of extrusion and run success based on PLC data communications without the need for the operator to input this data manually.

6. Collection of “real downtime” or lost time – The following diagram shows time distribution of a typical extrusion 21 hour work day.
7. Use of smart industrial buses like Ethernet, Controlnet, Devicenet, Profinet etc.to significantly reduce wiring.



Contact time is the time the press is under pressure (the paid for time). Dead Cycle Time is based on the average actual press dead cycle times the number of billets run. Cleanup, log oven issues, meetings, and die setup are typical maintenance and production downtimes. After all are collected and summarized over 10% of the available production time is unaccounted for. Once the contact time is analyzed verses the ideal recipe, the norm is that there is approximately 10% inefficiencies in the extrusion time. Parijat goal is to help recover this time, reduce operational costs and open additional capacity by helping resolve these issues.

Parijat can help optimize the control systems and processes.

There are a number of other services Parijat offers, beyond trouble shooting, optimization and integration.

Training – Parijat team is fully capable of training client’s maintenance personnel on multiple PLC platforms – Rockwell, Siemens, GE, Schnieder, Mitsubishi, Honeywell, to name a few.

PLC Upgrades – if current press control system is running out dated PLC’s, Parijat can help upgrade it to the latest software and hardware available & harness their power to the fullest.

EMMT – Extrusion Maintenance Management Tool – this is an instant interactive, intuitive. Visual fault diagnosis & trouble shooting tool for the maintenance team to trouble shoot equipment, without the PLC technician having to pull out the lap top and analyze the ladder logic. Parijat provides plant team members a virtual road map for trouble shooting which will significantly reduce system downtime by minimizing the trouble shooting of the equipment – EMMT points in the right direction.

Various OEM equipment that may be supported:

Presses: UBE, SMS Meers, Mei-Ruey, Tecalex, Presezzi, Gia Clesim, Siddharth heavy ind, Guangzhou DT, Danieli, Kautec,

Shears: Belco, Granco Clark, Omav, Tecalex, Cometal, Kautec, Presezzi, SMS Meers, GIA Cleceim, Turla

Furnaces: Belco, Granco Clark, Omav, Tecalex, Furnace Engineering Pty Ltd, Cometal, Kautec, Presezzi, GIA Cleciem, Turla

Pullers: Granco Clark, REISCH Maschinenbau GmbH, Cometal, OMAV, Kautec, Presezzi, Belco, Turla
Straighteners: SMS Meers, Butech Bliss, Granco Clark,
Other Ancillaries: Tecalex, Omav

To begin the process, Parijat requires as much detailed information on press configurations as follows:

	Press Name or Designation
PLC make/model (if any)	
HMI make/model (if any)	
ERP Software (if any)	
MES Software (if any)	
Other peripheral software in use (if any)	
LOG OVEN	
Log diameter	
Maximum log length	
Minimum log length	
Maximum billet length (in the press)	
Production capacity (kg/hour)	
Type of fuel	
Log Shearing force	
Tapering zone?	
Nº of thermocouples (zones)	
Furnace length	
Heat recuperating unit length	
Maximum Billet temperature	
Temp. uniformity with furnace	
BILLET HANDLING SYSTEM	
Log Shear, log Saw or Cut Billet	
Transfer to press loader method	
Cutting Tolerance	
Cycle time from time oven furnace opens until billet ready to be loaded in press	
PRESS	
Tonnage	
Manufacturer	
Date of Manufacture	
Last Upgrade	
PLC and Model	
Number of High Pressure pumps and Manufacturer	
Working hydraulic press	
Maximum Billet Diameter (COLD)	
Maximum billet length to be extruded	

Maximum extrusion speed	
Dead cycle time (with Burb cycle)	
Dead cycle time (without Burb cycle)	
Container Heating – radial, longitudinal, multizone	
Front Loading, rear loading, moving stem?	
TOOLING SIZE	
Diameter	
Thickness	
Die Slide, Die Shuffle, gatelock	
BUTT SHEAR	
Blade type - manufacturer	
Knocker	
HOT SAW	
Manufacturer / Date	
Diameter of Saw Blade	
Minimum Position from Platten	
Maximum Position from Platten	
HANDLING SYSTEM	
Manufacturer / Date	
Maximum profile height	
Maximum profile width	
Width of run-out roller conveyor	
Length of lead out table	
Length of run-out roller conveyor	
Maximum profile length	
Minimum profile length (for stretcher)	
Pulling force adjustable	
Puller rails	
Inside width of puller jaws	
Maximum return speed	
Maximum removing speed	
Maximum extrusion speed	
Cooling table length	
Dimensions of belt T1	
Dimensions of beltT2	
Dimensions of belt S1	
Dimensions of belt S2	
Dimensions of belt S3	
Stretching force	

Width of saw feed conveyor	
Length of saw feed conveyor	
Batch width	
Roller diameter	
Maximum cutting length	
Minimum cutting length (with gauge)	
HANDLING SYSTEM MATERIAL	
Lead out Table Material	
Materials of belt T1	
Materials of beltT2	
Materials of belt S1	
Materials of belt S2	
Materials of belt S3	
FINISH SAW	
Total length	
Number of rollers	
Rollers diameter	
Rollers length	
Rollers useful width	
Profile speed	
Useful cut width	
Saw diameter	
Maximum cut height	
Blade power (rotation)	
Blade movement	
Blade lifting system power	
Suction power	
Profile blockage	
Outfeed belts - number	
Outfeed belts length	
Number of outfeed stations	
Roller Material	
Belt Material	

General Info about PCI products/projects: Click here
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