

INSIDER

NEW EMPLOYEES - CASTOOL:

Lee Akey
General Labour - Cleaning

Adam Boonstra
CAM Programming

Duanne Cinnamon
General Labour - Manufacturing

Dan Rigby
CAD Design

Ploy Robbins
Marketing

NEW EMPLOYEES - CASTOOL 180:

Mr. Somnuk Kamsat (Tee)
Die Oven Assembler

Mr. Niwate Kaewlaowyong (Tom)
Electrical Engineering

ARTICLE ALERT:

Watch for Castool's article
**(Extrusion Productivity,
Part 1 – Billet Geometry)**
in the April 2018 issue of

**LIGHT METAL
AGE**



New Sales Director for Asia

Ken Chien will be directing die cast and extrusion sales in Asia, and retain his position of product director. Ken started working at Castool in 2013.

Ken studied material science and engineering at University of Toronto (U of T), majoring in steel production and applications. His masters degree focused on ceramics, and doctorate on coatings for lithium ion batteries. He also spent 2 years working with Professor Yoshida at University of Tokyo and another 5 years with Professor Tom Coyle at Massachusetts Institute of Technology (M.I.T.).

Ken was born in Taiwan and speaks fluent English and Mandarin.

Pricing

2018 continues to be a challenging year of increasing costs. As a result, we introduced price increase to most of our products on March 1. We will continue to monitor costs and adjust pricing as needed.

SCHMELZMETALL

SCHMOLZ + BICKENBACH
International



BÖHLER UDDEHOLM

The cost of global alloys, electrodes, manufacturing consumables and energy have been climbing significantly over the past year, with no end in sight. Our tool steels are designed alloy rich, giving our customers the strength, control and optimum properties for application use. Our aim is to work on offsetting some of these unavoidable costs in our purchasing patterns and lean manufacturing without compromising the material quality or service level.

**CASTOOL & CASTOOL 180
ARE FULLY CERTIFIED**
by Intertek Systems Certification:



MATERIALS

Castool uses the best materials for each application served, in terms of safety, longevity and cost. We also manage the method of heat treatment, nitration and post nitration coatings very carefully.

The list following has most of the materials used by Castool. Each material has a temperature range, thermal conductivity and wear properties.

| | Thermal Conductivity (W/mk) | Wear Property (HRc) | Temp Range (C) |
|-----------------|-----------------------------|---------------------|----------------|
| Tuff-Temper | 30 | 40 | 250 - 605 |
| Dievar | 30 | 38 | 250 - 595 |
| H-13 | 24 | 38 | 250 - 585 |
| Con-Duct | 42 | 35 | 25 - 550 |
| Stainless Steel | 18 | 30 | 25 - 450 |
| A45 | 240 | 19 | 25 - 300 |
| A52 | 230 | 21 | 25 - 300 |
| A25 | 150 | 29 | 25 - 300 |

EXTRUSION

| | |
|--------------|--|
| H-13: | Dummy blocks, stems, liners, clean-out blocks, support tooling, shear blades |
| Con-Duct: | Container mantles, sub-liners |
| Tuff-Temper: | High pressure dummy blocks, spacers |

Tuff-Temper offers superior value

Tuff-Temper steel contains 4% molybdenum and H-13 has 1.3%. The higher molybdenum contents increase the Tuff-Temper hot yield strength (at 800°F/425°C) by about 10%. Due to higher hot yield, Tuff-Temper has higher hot wear property than H-13. Tuff-Temper also has higher working temperature range than H-13 and Dievar. Tuff-Temper is the best alternative dummy block steel for high pressure and precision tubing extrusion situations.

DIE CASTING

| | |
|--------------|---|
| H-13: | Shot sleeves, plunger rings |
| Dievar: | Plunger heads, plunger rings |
| Con-Duct: | ABP plungers, AMP plunger heads, AMP plunger bodies, shot sleeves mantles |
| Tuff-Temper: | High temperature shot sleeves, inserts |

A45
AMP plunger bodies
- A45 is a Beryllium free copper alloy with very high thermal conductivity

A52
ARP plungers, AMP-R plunger heads, plunger rings
- A52 is a medium Beryllium copper alloy with high thermal conductivity and strength

A25
AMP-A plunger heads, plunger rings
- A25 is a high Beryllium copper alloy with 6 times better thermal conductivity than H-13 and very high strength

Stainless steel: Plunger holders

Con-Duct offers superior value

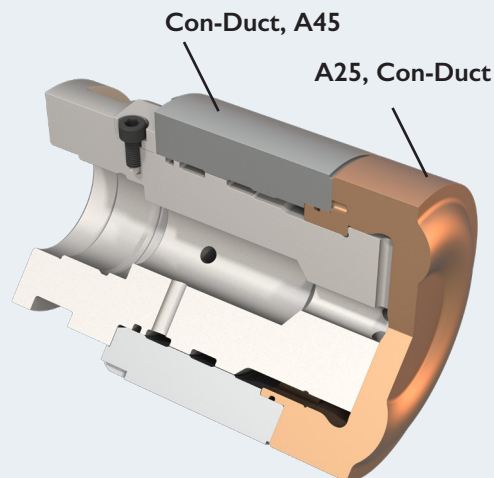
Con-Duct steel has about 4 times higher impact toughness than H-13 and also 80% better thermal conductivity than H-13. Such a high impact toughness give Con-Duct the broadest temperature range from 25 - 55°C. No thermal shock concerns. Con-Duct is the best steel material for plunger tip application.



DIE CAST UPDATES

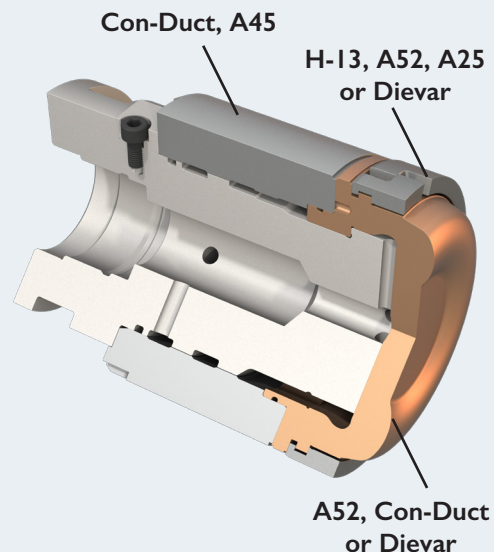
AMP-A Plunger Tip

Many die casters are challenged using plunger rings because of 'gating' in the sleeve or poor process control. The AMP-A offers a solution for these die casters.



AMP-R Plunger Tip

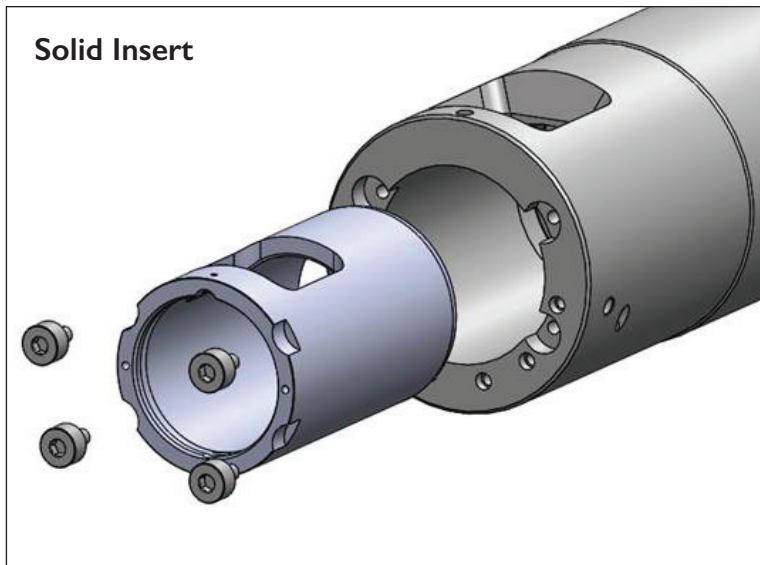
Many die casters using the ring have very short cycle time requirements or restricted water flow. In these cases, we can use a A52 plunger head with a Con-Duct body.



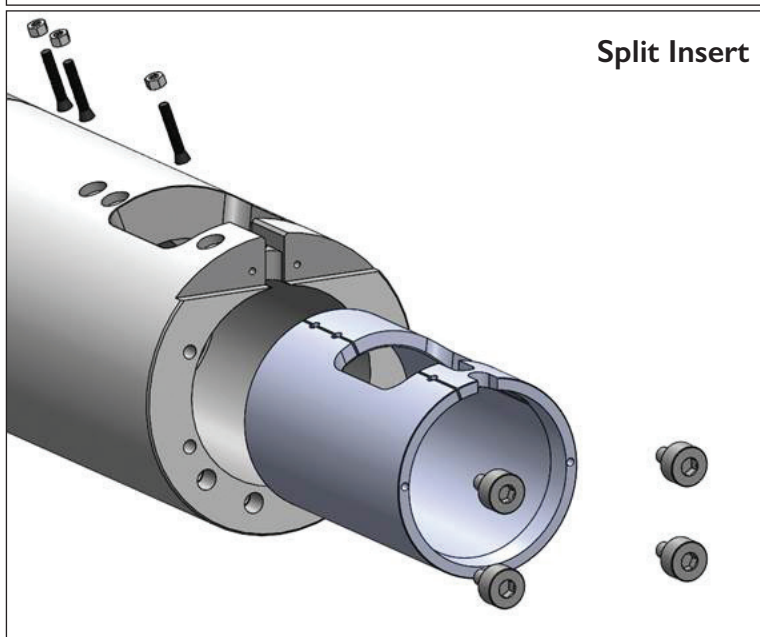
Shot Sleeve Inserts

Inserts are becoming popular with many high production die casters. With advanced manufacturing techniques, there are no fit problems as in the past. Two types of inserts are offered as below.

Solid Insert



Split Insert



3P Coating

Most of the inserts today have 3P to extend life. 3P is an additional process done after nitriding. It adds 1/10th of a thou thick oxide coating on top of nitride layer. The additional oxide layer increases corrosion and erosion resistance to molten Aluminum.



SUCCESS Stories:

GM USA

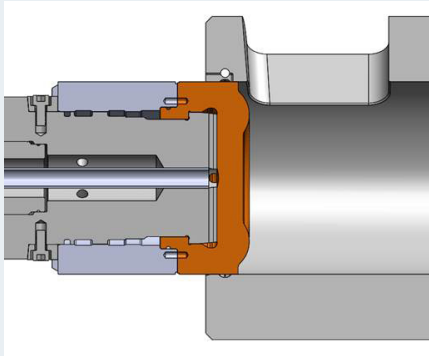
- 383 alloy
- 5.5" diameter

Competitor: Semco

- Their product was a BeCu plunger
- Life was 2200 castings

Castool used an AMP-A, A25 head and Con-Duct body

A25 head life: 12,000 castings



GM is equipping more machines with Castool's tooling system.

Shiloh USA

- magnesium
- 5.5" diameter

Competitor: Brondolin

- Their product was an ARP plunger
- Plunger life was 6000 castings
- Plunger Ring life was 2000 castings

Castool used an AMP-R,

Con-Duct head and A45 body

Con-Duct head life: 25,000 castings

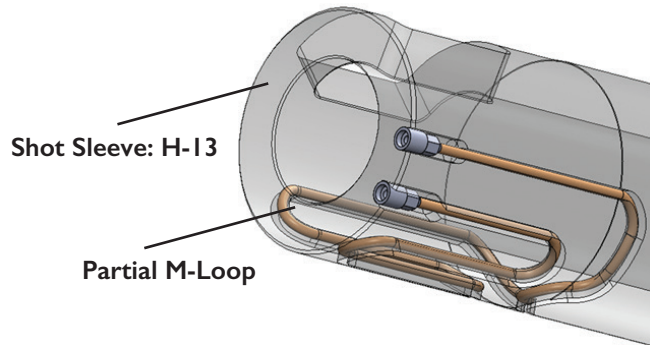
Plunger Ring life: 10,000 castings

Shiloh is also using Castool's Plunger Rod Lube System and CLS-200 lubricant. CLS-200 is Castool's new low-cost vegetable ester based lubricant. It is blue in colour, has a high flash point, no graphite, low smoke and is biodegradable.

DIE CAST UPDATES

M-Loop

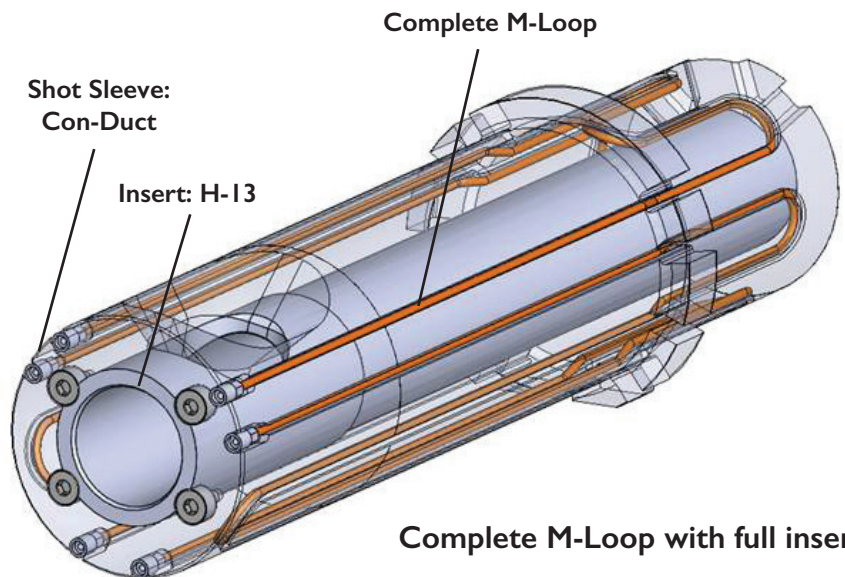
Many die casters want the benefits of thermal regulation without the risk and expense of a gun-drilled shot sleeve. M-Loop offers a safe alternative to the conventional thermally regulated shot sleeve.



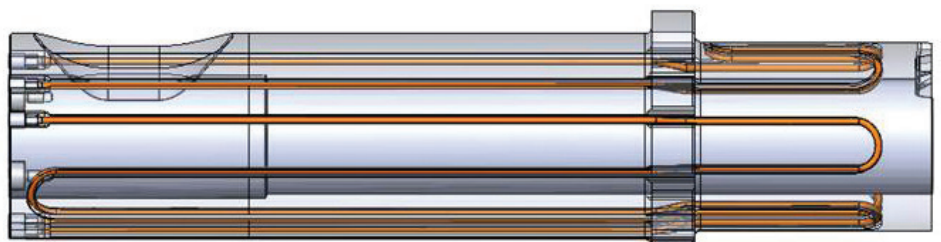
Partial M-Loop under the pour spout

The Con-Duct shot sleeve mantle offers 80% better thermal conductivity than H-13. It is reusable and is relatively low-cost.

The full insert in H-13 is much less expensive than an H-13 shot sleeve, and offers similar useful life, and is easily replaceable.

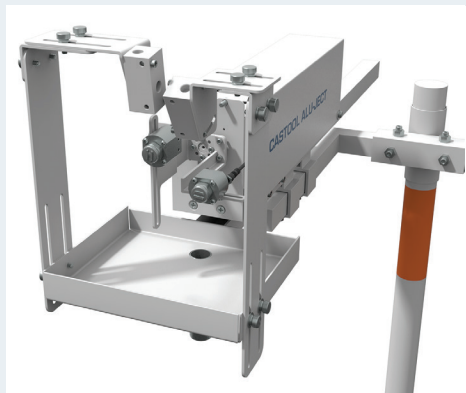


Complete M-Loop with full insert





Liquid Lube Unit for Billets Upgrades



- Dual pulse width modulation spray nozzles
- Dual siphon valve cleaning circuit
- Ultra sonic distance sensor for maintaining constant distance between the nozzle and the billet face
- Dedicated stirrer
- Simplified circuit
- Stainless Steel catcher for containing any overspray
- PLC Control with colour touch screen
- Level sensors and level indicators
- 40L Stainless steel tank with strainer for lube
- 7.5L Stainless Steel tank for water

EXTRUSION UPDATES

Visual Optimization System

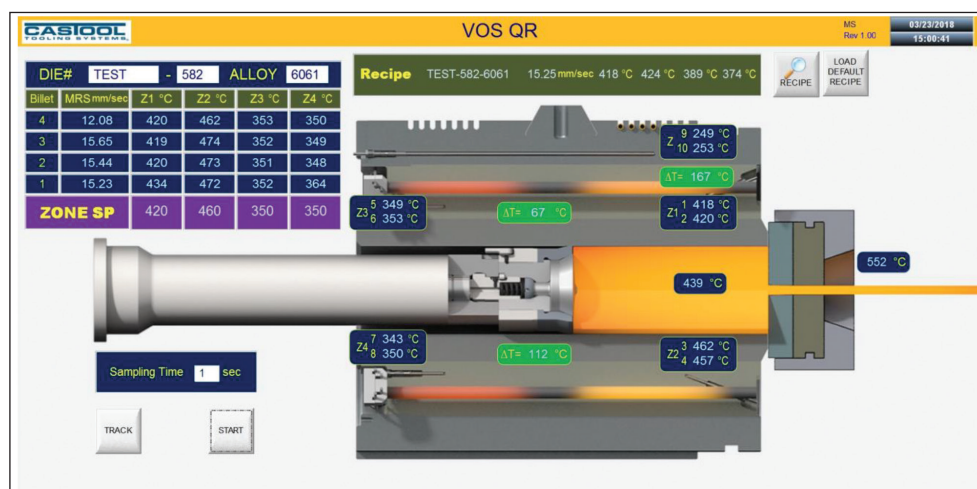
The purpose of the Visual Optimization System (VOS) is to increase production by maximizing ram speed and by using proven recipes.

The recipe based VOS is designed to be run at the press. The core strength is the colour coded real time comparison to recipe targets.

The system puts the press operator in charge by providing tools for extrusion cycle tuning. The system can connect to various PLC using Scada server: Press, QR Container, Puller, Die Ovens, Pyrometers, Billet Furnace, Quench, etc.

Features:

- Recipe management: add, update, delete recipes
- Create recipes specific to profile, copy, alloy and press
- Track real time production status
- Generate reports
- Track data
- Multiple language support
- 19" industrial PLC with pedestal
- 1 week on-site support and training



Standard Pressure/High Pressure: Dummy Block and Container

BILLET: 210mm (8.268") Diameter

| | 2200T PRESS | 2500T PRESS | 2750T PRESS | |
|---------------------------|---------------------|----------------------|----------------------|----------------------|
| Dummy Block Face Pressure | 622 MPa (90.2 ksi) | 706 MPa (102.4 ksi) | 777 MPa (112.7 ksi) | 650 MPa (95 ksi) * |
| 2-Piece Liner Stress | 933 MPa (135.3 ksi) | 1059 MPa (153.6 ksi) | 1166 MPa (169.1 ksi) | 950 MPa (138 ksi) ** |
| 3-Piece Liner Stress | 809 MPa (117.3 ksi) | 918 MPa (133.1 ksi) | 1010 MPa (146.5 ksi) | |



Safe
Caution
High Pressure

* Transition to high pressure design (MN, Smaller Bayonet)
** Transition to high pressure design (3-Piece)



EXTRUSION UPDATES

3-piece Container

We can calculate the max specific pressure during extrusion by using press tonnage and the liner ID cross sectional area in mm^2 . It is done by converting the press tonnage into kilogram, kilogram to Newtons and then divide the Newtons by the cross section area of the liner ID (in mm^2). For example, the Aluko Vina tonnage at 2500T at 8" liner ID, the max pressure during the extrusion is 689 MPa (or 100 ksi). From this specific stress we can then calculate the stress in the container.

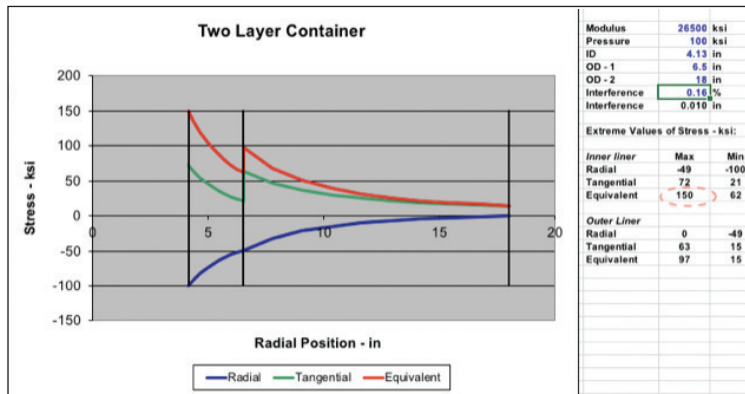


Figure 1: 100ksi 2pc

Figure 1 above shows the calculation of stress in the container during the extrusion pressure. The max pressure inside the 2pc Aluko container is 150ksi (or 1034 MPa).

When the stress is higher than 950 MPa it is a warning sign for short life due to creep. Where did this 950 MPa come from? The 1000 MPa is derived from the Handbook of Aerospace Structural Metal Handbook – Ferrous Alloys. In this handbook on page

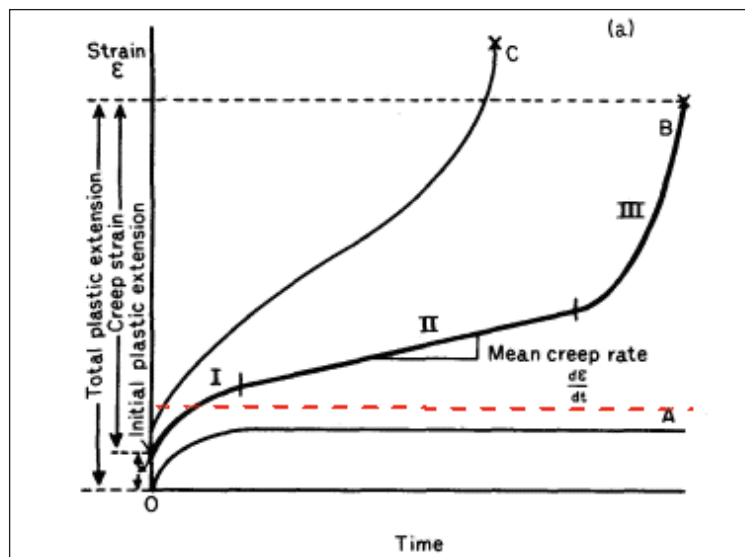
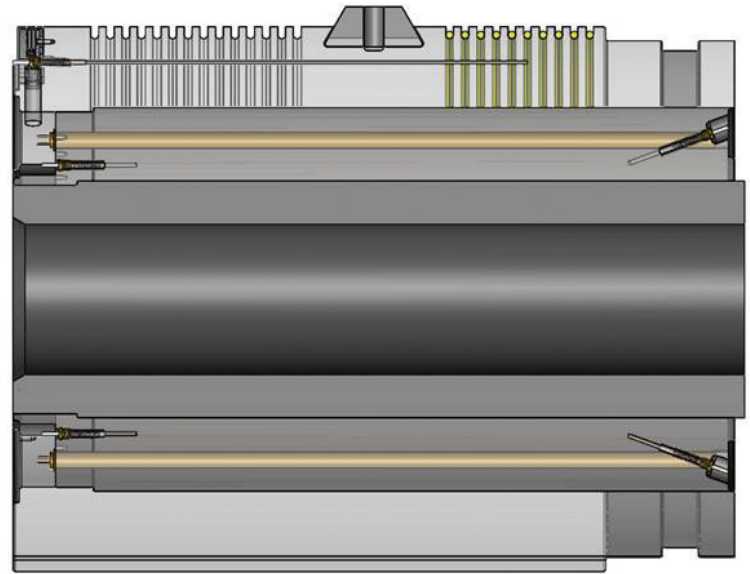


Figure 2: H-13 Creep Strength Graph



The 3-piece container is about 20% stronger than the 2-piece container. It is recommended to use the 3-piece container when the dummy block face pressure is 100,000 psi (690 MPa).

115, figure 3.4.1 (Figure 2: H-13 Creep Strength graph), it shows 600°C, 550°C and 500°C trend for H-13 under various stresses. The 430°C (the common extrusion temperature) is then extrapolated from this. The extrapolated result shows that in order to get 10,000hr (or 416 day) H-13 creep life, the stress needs to be less than 1000 MPa. However, the stress of Aluko 2Pc container is over 1000 MPa which will reduce the H-13 liner life. When the Aluko container is made of 3-pc, the stress inside the container is reduced to 130ksi (or 896 MPa - Figure 3).

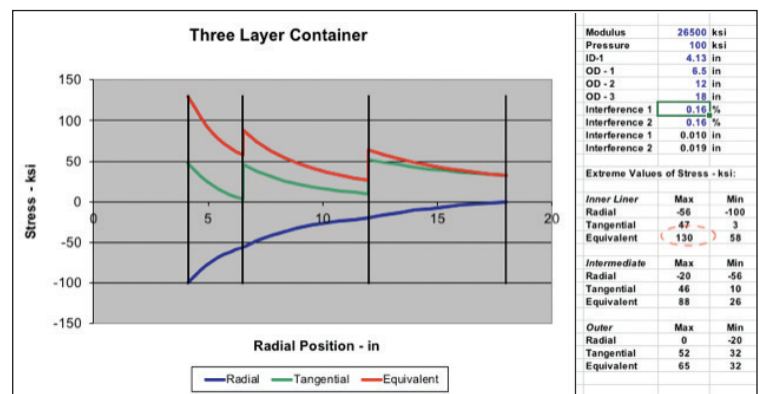


Figure 3: 100ksi 3pc

In this graph stress condition $C > B > A$. Stress C is the highest and A is the lowest. As long as the stress is below the red line (950 MPa), the creep is time independent. Then creep of H-13 is not a concern. The life of the H-13 is then limited by its wear property.



EXTRUSION UPDATES

PREVENTATIVE MAINTENANCE SCHEDULE

QR Containers

| FREQUENCY | TASK | ITEM |
|-----------------|---------|--|
| Annual | Replace | Thermocouples and plugs |
| | Check | Elements Bus bars Mica blocks Power connection |
| | Perform | CSA Inspection Thermocouple calibration Tighten power wiring termination points Run test using the diagnostic screens |
| Every 3 - 5 yrs | Replace | Complete heating system Elements Bus bars Thermocouples and plugs Mica blocks Power connection |
| | Perform | CSA Inspection Electro-Mechanical or Software upgrades if any |



Die Ovens

| FREQUENCY | TASK | ITEM |
|-----------------|---------|---|
| Annual | Check | Calibration Heating elements Thermocouples Lid Insulation board Gasket Tighten power wiring termination points |
| | Replace | Thermocouples Heating elements Lid Insulation board Oven gasket High Temperature power wiring |
| Every 3 - 5 yrs | Perform | Electro-Mechanical or Software upgrades if any |



THE INTERNATIONAL TEAM

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Sebastien Derooy
Ron Steinenger
Sam Durbin
Tom Troxclair

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Die Cast Sales Director
Product Director

Product Specialist Europe
Product Specialist Asia

Commercial Manager
Commercial Supervisor
Customer Service
Customer Service
Customer Service
Marketing Director

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Castool
Castool
JW Industries LLC
Sea Bass Outdoors
R-Bet Sales Inc
R-Bet Sales Inc
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INDIA

Sachin Kumar

AUSTRALIA/NEW ZEALAND

Doug Loader

Extrusion Machine Co New Zealand



2018



TRADE SHOWS

Our global presence is key to our success



**EXTRUSION
TABLE TOP EXHIBIT**
September 11 -13, 2018
Chicago, USA



**EXTRUSION
TRADE SHOW**
October 9 - 11, 2018
Dusseldorf, Germany



**DIE CAST TRADE SHOW
BOOTH # 514**
October 15 - 17, 2018
Indianapolis, USA



**DIE CAST
TRADE SHOW**
October 24 -26, 2018
Guadalajara, Mexico



**DIE CAST
TRADE SHOW**
November 8 - 10, 2018
Yokohama, Japan



**EXTRUSION & DIE CAST
TRADE SHOW**
November 21 - 24, 2017
Bangkok, Thailand



**DIE CAST
TRADE SHOW**
December 6 - 8 2018
New Delhi, India