

# Hydraulic Systems & Plastic Injection Molding

The webinar will begin in less than 10 minutes.



# Hydraulic Systems & Plastic Injection Molding

The webinar will begin in less than 5 minutes.



# Webinar starting soon; until then...



## TEST YOUR KNOWLEDGE

All energy put into a hydraulic system must come out as:



Work or Heat

Noise or Heat

Friction or Wear



# Webinar starting soon; until then...

TEST YOUR KNOWLEDGE



When pipe diameter is narrowed to decrease flow, pressure:



Doesn't Change

Decreases

Increases



# Webinar starting soon; until then...

TEST YOUR KNOWLEDGE



Oil is:



Pushed into a Pump

Drawn into a Pump

Pulled into a Pump



# Webinar starting soon; until then...

TEST YOUR KNOWLEDGE



What percent of all plastic produced is recycled:



25%

9%

6%



# Hydraulic Systems & Plastic Injection Molding



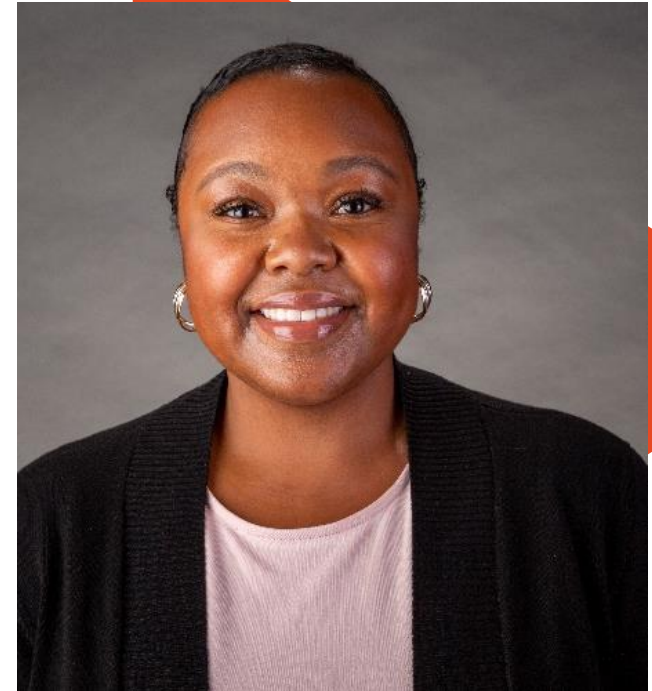
# Amber Fessler - NLGI CLGS; STLE CLS & OMA-I

- CITGO Senior Technical Services Representative
- Materials Engineer
- 12 Years of Experience in Lubricants
- STLE Certified
  - Certified Lubrication Specialist
  - Oil Monitoring Analyst I
- NLGI Certified
  - Certified Lubricating Grease Specialist



# Erica McDonald

- CITGO Lubricants Sr. Product Specialist
- B.S. Integrative Biology with Minor in Chemistry
- 12 Years in the Lubricants Industry, including extensive experience at the CITGO Cicero Lab
- LubeAlert Oil Condition Monitoring Program Support



# Luke Buchanan - STLE CLS

- Senior Account Manager – NC/SC/VA/MD
- 12 Years Experience in the field of Lubricants, both Regional and National Accounts, specializing in the Industrial world.
- STLE CLS certified
- Former Marketer Sales Representative



# Agenda

Hydraulic  
Systems &  
Plastic Injection  
Molding

Know Your  
Setting

Plastics Primer

Hidden Obstacles

Oil Analysis

The PIM Process

Opportunities

Salesmanship  
Tips & Tricks

# Mystik JT-9 LeakShield AW Hydraulic Fluids

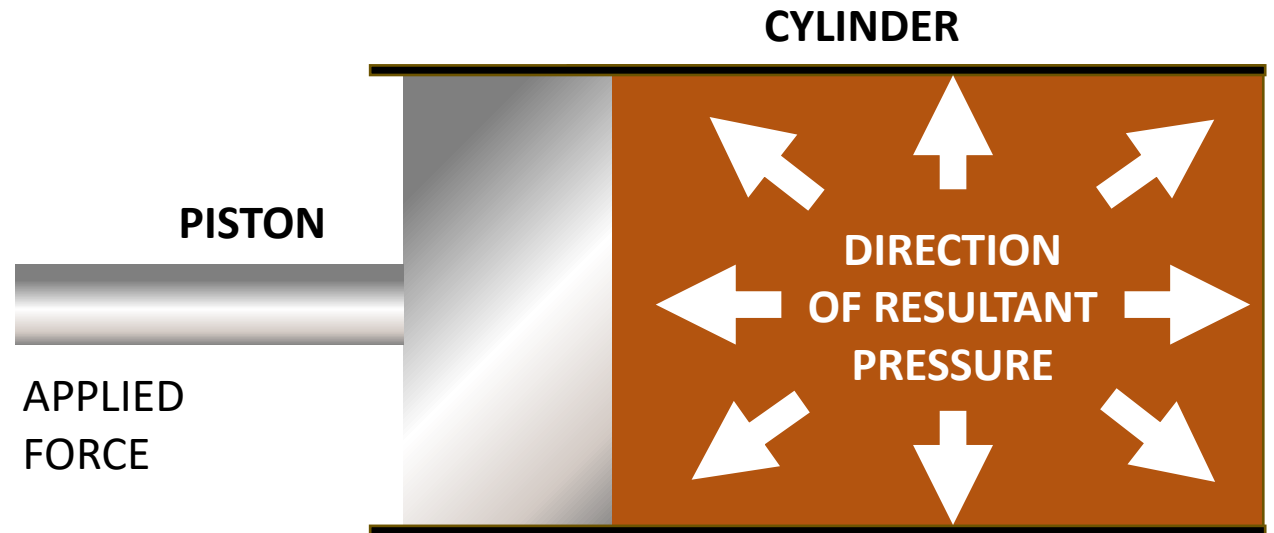
- Excellent wear protection
- Thermal and oxidative stability
- Excellent rust and corrosion protection
- Demulsibility
- ISO 32, 46, 68, and 100
- **HVI-32 and HVI 68**
- High viscosity index
- Wide temperature range
- High dielectric strength – 35 kV





# Basic Hydraulics

## Pascal's Law

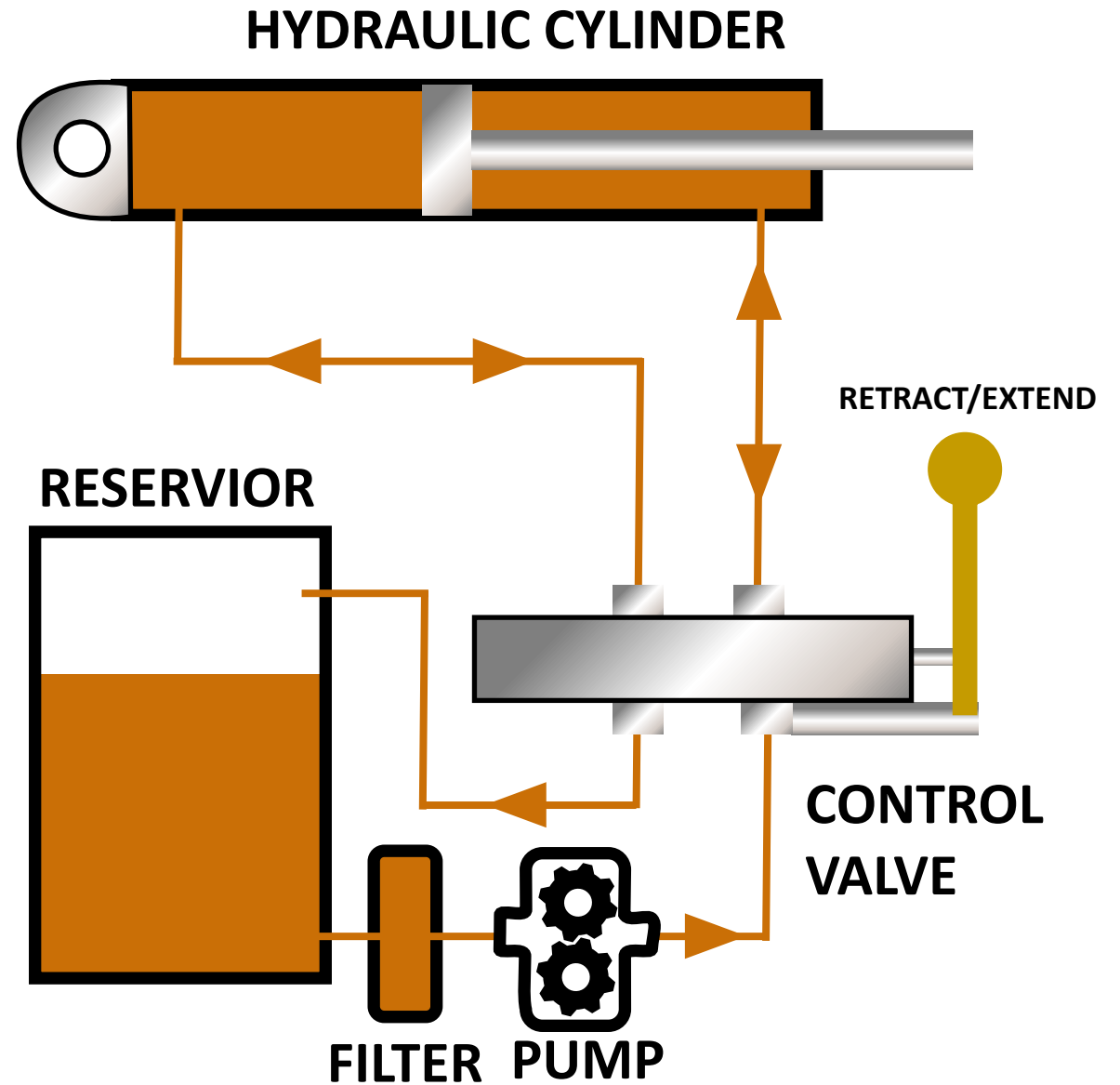


$$\Delta P = \rho g(\Delta h)$$

# Hydraulic Circuit

## Components

- Fluid Reservoir
- Filter
- Pump
- Directional Control Valve
- Hydraulic Cylinder

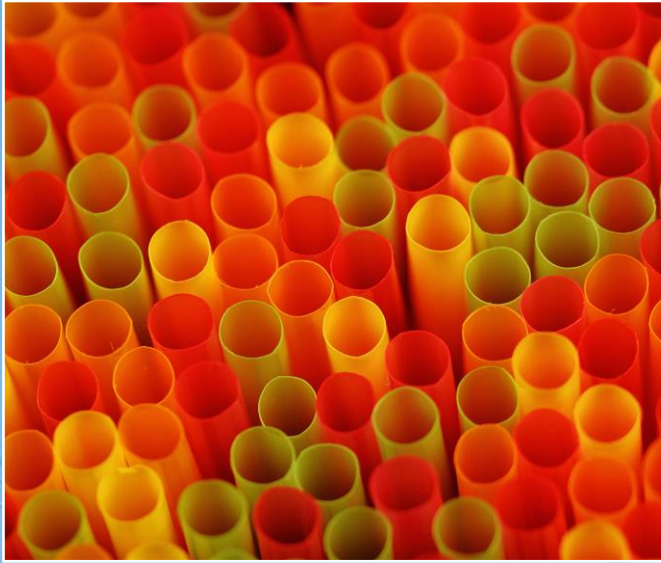


# Hydraulic Fluids are **EVERYWHERE**



- ▶ **Know your setting** and your customer's expectations before making a fluid diagnosis.
- ▶ Is it a dirty, unchecked, leaking system? Is it a clean, precise and well-managed location?
- ▶ The **Plastic Injection Molding** industry leans more towards the clean and organized side (versus heavy industrial mills).
- ▶ Advise on reliability & uptime.





**Plastic Extrusion Molding**



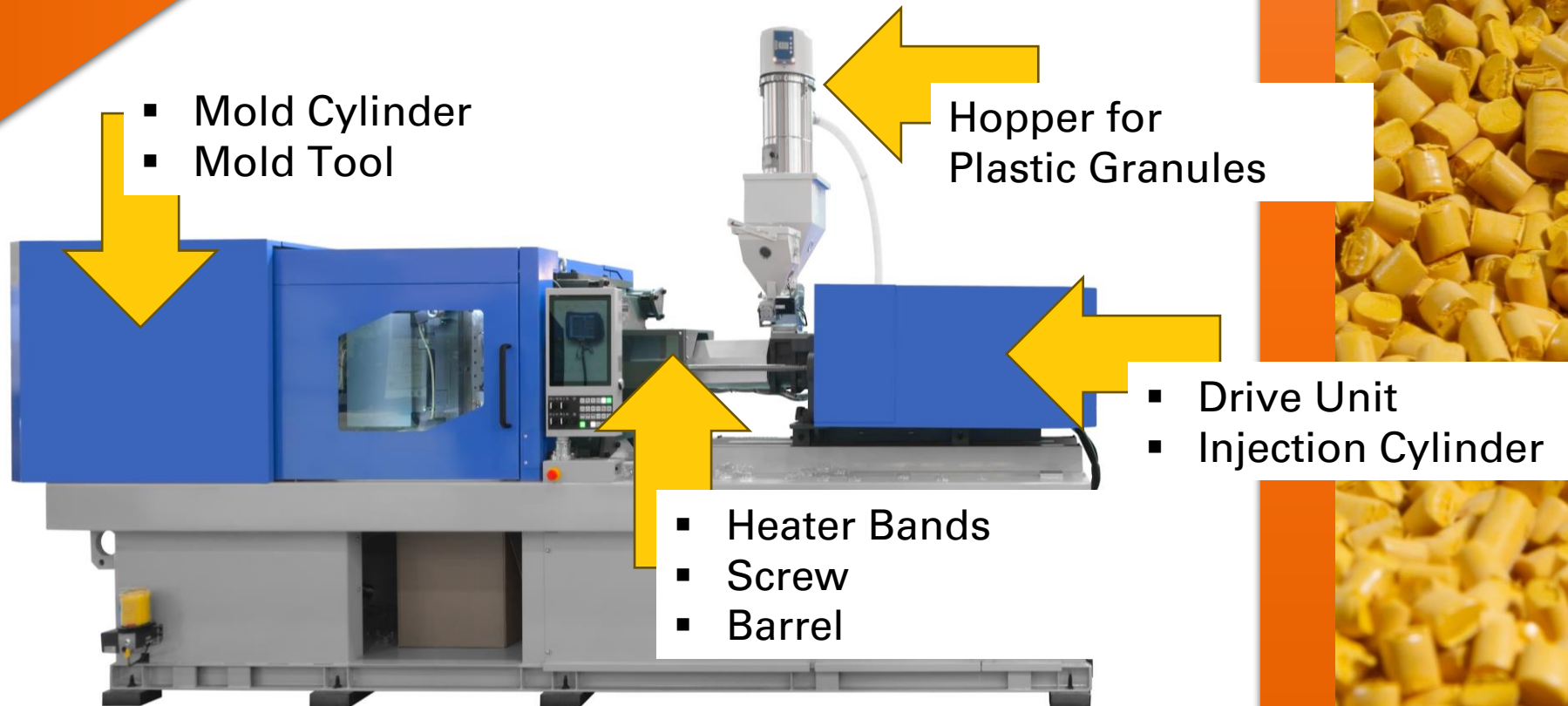
**Plastic Injection Molding**



**Plastic Blow Molding**

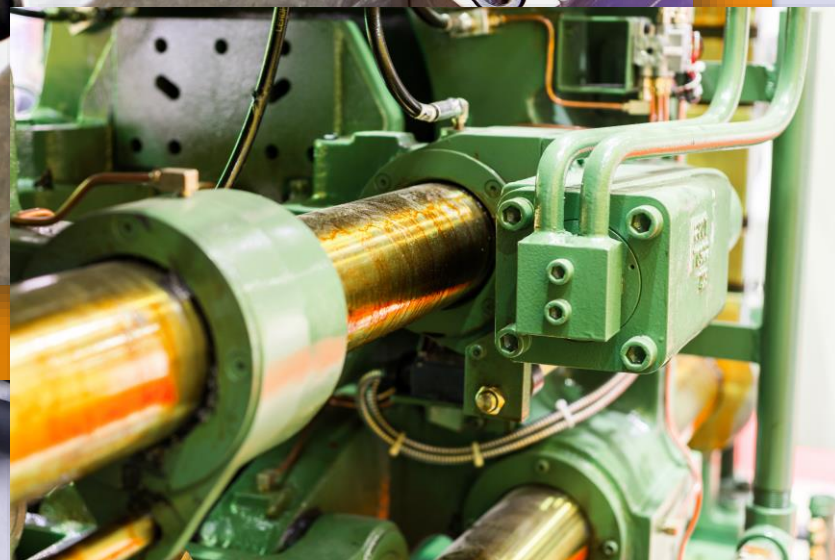
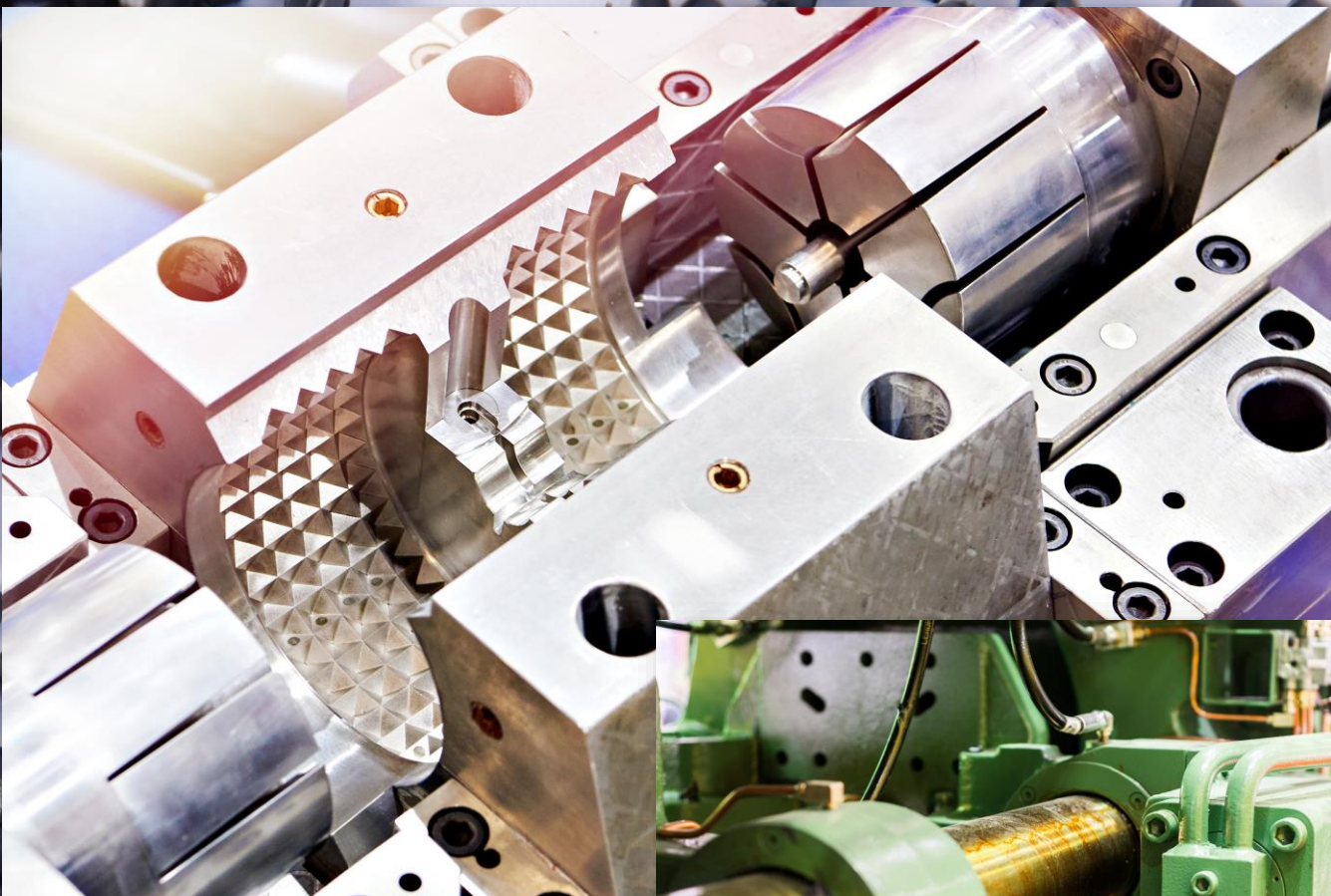
# **Stationary Hydraulic Equipment**

# Plastic Injection Molding



High  
Heat

High  
Pressure



Plastic pellets introduced into facility and stored in hoppers.

Plastic pellets moved from hopper to barrel via a screw auger

Plastic pellets are heated as they move through the barrel.

Once plastic becomes molten, the (heavy) mold closes.

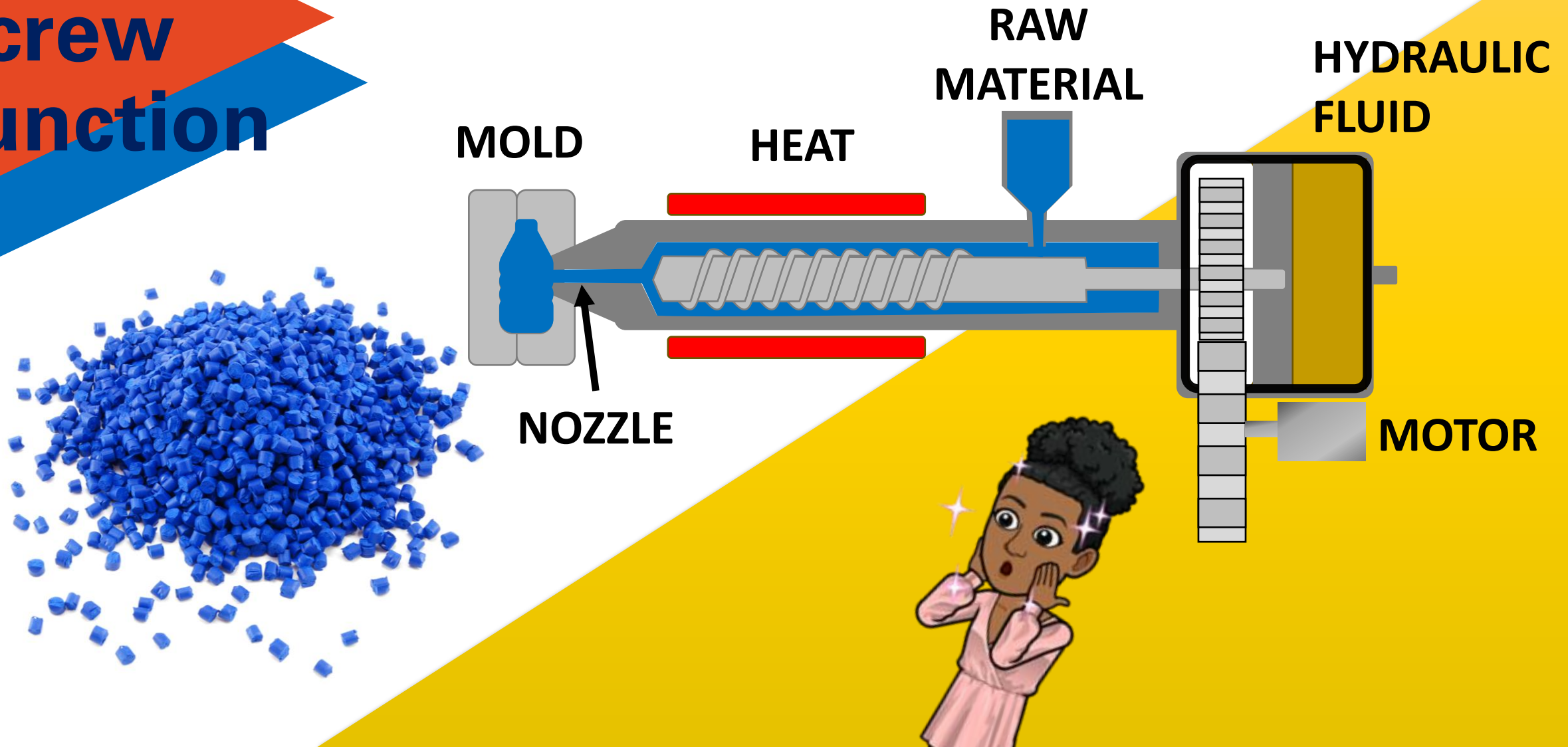
Auger plunges molten plastic with high pressure into mold cavity - after a few seconds plastic is cooled to a solid-state

The hardened material is removed from the mold. The mold opens and plastic widget is ejected

Repeat!

# Workflow

# Reciprocating Screw Function



# Viscosity Grades

Performance Features	Vis 32	Vis 46	Vis 68	Vis 100	HVI-32*	HVI-68*
Non-conductive Hydraulic Fluids Suitability (Dielectric Strength)						
Oxidation & Thermal Stability						
Anti-Wear Protection						
Wide Temperature Application						
Corrosion Protection						
Leak Control						
Green Color						

- HVI-32 and HVI-68 are guaranteed to have a dielectric strength of no less than 28kV when packaged and can be used as nonconductive hydraulic oils.
- Dielectric strength is extremely sensitive to humidity and contamination. Once containers are opened, the dielectric strength does not remain at its original value. Containers should be kept tightly sealed and stored in a dry environment.



# Oil Analysis



The goal is to make the customer as **RELIABLE** as possible

## OIL ANALYSIS IS THE WAY

- ✓ Current health of the oil
- ✓ Current health of the machine
- ✓ We can stop the dedicated staff & time to change out
- ✓ We maximize life of oil cost/investment
- ✓ **We get to see the trend of both oil life, machine health and maintenance practices!**

## An experienced maintenance manager would:

- Perform small checks versus a regular change out
- Take a sample vs. waiting for failure
- Understand the maximum value
- Diagnose the right hydraulic fluid

# HOT, HOT, HOT!

It Can Get Hot!

Arrhenius Rule Present

Your Physical Senses  
Can Help Here

Can We Use Trend  
Analysis To Eliminate  
Thermal Oxidation?

Thermal Oxidation Is A  
Reaction To  
Temperatures And Helps  
You Know What  
Catalysts May Come  
Along The Way



**LUBEALERT**  
FLUID CONDITION  
MONITORING SERVICE



## Compatibility of Common Elastomers and Plastics with CITGO Products

Elastomer/Plastic	Abbreviation	Trade Names	Mineral Oil	Synthetic Hydrocarbon	Synthetic Ester	Water/Glycol
		<b>Example Products</b>	HyDurance AW, HyDurance AW All Temp Mystik JT-9 LeakShield Clarion AW Hydraulic Fluids	HyDurance AW Synthetic Fluids	Clarion Green Bio	FR WG-40XD, Glycol FR-5046HP
Polyacrylate	ACM	HyTemp	Very Good			
Ethylene-Acrylic	AEM	Vamac	Good	Good		
Ethylene-Propylene-Diene Monomer	EPM, EPDM	Duttral, Nordel, Vistalon	Poor	Poor	Poor	Recommended
Fluoroelastomers	FKM, FPM	Viton, Fluorel	Very Good	Very Good	Very Good	Suitable
Nitrile (Acrylonitrile-Butadiene)	NBR, XNBR, HNBR	NBR, Purbunan, Buna-N, Chemigum, Hycar, Paracril, Nipol, Krynac, Europrene	Good	Good	Poor to Good	Suitable
Perfluoroelastomers	FFKM	Kalrez, Parafluor	Very Good	Very Good		
Polychloroprene	CR	Neoprene	Fair	Fair to Good	Poor	Suitable
Silicones	MQ, VMQ, PMQ, FMQ	VMQ	Poor to Good	Poor to Good	Poor to Fair	
Styrene-Butadiene	SBR	SBR, Buna-S	Poor	Poor to Good	Poor	Suitable
Polyester			Good	Good	Poor to Fair	
Polytetrafluoroethylene	PTFE	Teflon	Very Good	Very Good	Very Good	Suitable
Polyamide	PA	Nylon, Zytel	Poor to Good	Poor to Good	Poor	
Polycarbonate	PC		Good			
Natural Rubber	NR		Poor to Fair	Poor to Fair	Poor	Suitable
Polyethylene	PE (LDPE, HDPE)		Good	Good	Good	
Polypropylene	PP		Good to Poor			
Butyl Rubber	IIR		Very Poor to Poor	Very Poor to Poor	Poor to Fair	
Polyvinyl Chloride	PVC	PVC	Poor to Good	Poor to Good	Poor	
Chlorosulfonated Polyethylene	CSPE, CSM	Hypalon	Fair			
Polyether Ester	TPC-ET	Hytre	Good			
Polyurethane	PU		Good to Fair			
Polyoxymethylene, Polyacetal, acetal resin, polytrioxane, polyformaldehyde, and paraformaldehyde	POM	Delrin, Kepital, Celcon, Hostaform and Ultraform	Excellent - Good			
Fluorosilicone	FSI		Good			
Ethylene-Propylene Rubber	EPR		Poor	Poor		Good
Fluorovinyl Methyl Siloxane	FVMQ	Fluorosilicone	Good to Excellent			

Note: Always consult the elastomer supplier or Original Equipment Manufacturer (OEM) regarding the compatibility of a specific material with the lubricant to be used. If in doubt, have the elastomer/lubricant combination tested.

# Seal Compatibility



ASTM  
D6158 HM

DIN 51524-2

Fives  
Cincinnati  
P-68, 69, 70

Parker  
Denison HF-0

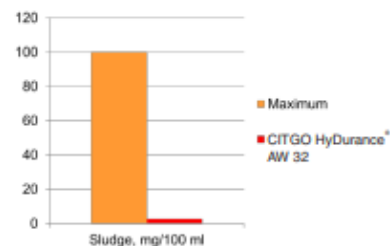
## APPLICATIONS



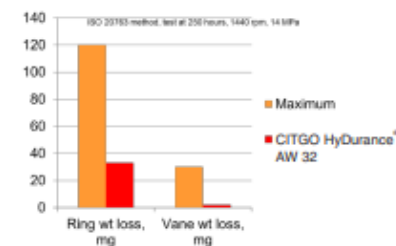
- Recommended for service in industrial and mobile hydraulic systems when used in accordance with equipment manufacturers' recommendations.
- Designed to provide enhanced service life to vane, piston, and gear pumps as well as other circuit components such as motors and servos.
- Recommended for use as a gear and bearing lubricant in industrial applications where rust- and oxidation-inhibited oils are required.
- Meet or exceed the following manufacturer specifications:
 

ASTM D6158 HM	General Motors LS-2
Fives Cincinnati P-68, 69, 70	JCMAS HK P041
Parker Denison HF-0	ISO 11158 HM
DIN 51524-2	SEB 181 222
Eaton Brochure 03-401-2010	US Steel 126, 127, 136
Bosch Rexroth RDE-90235	

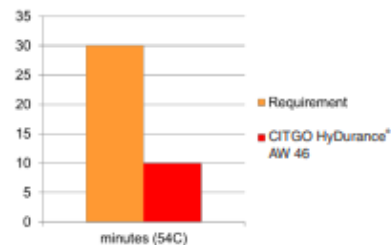
**Parker Denison HF-0 Thermal Stability**



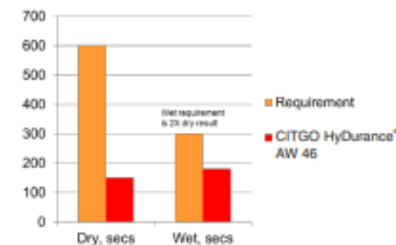
**V104C Vane Pump Wear Data**



**Parker Denison HF-0 Demulsibility**



**Parker Denison HF-0 Filterability**



# Applications & OEMs

Eaton  
Brochure  
03-401-2010

JCMAS HK  
P041

SEB 181 222

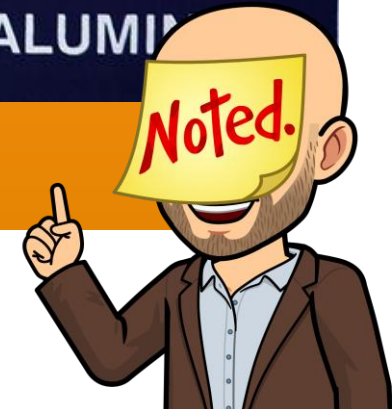
General  
Motors LS-2

Bosch  
Rexroth  
RDE-90235

US Steel  
126, 127, 136

SER NO   
MODEL  DATE   
CAP US GAL  LITERS   
MATERIAL  5052 ALUMI

ISO 11158  
HM





**What Should  
I Prepare  
For?**

Compressors

Electric  
Motors

Automated  
Grease  
Systems

Centralized  
Lubrication  
Systems

Gearboxes

Forklifts

Fleets

Vacuum  
Pumps

# Benefits and Features

## Reactive Maintenance



- Allow Assets to Run to Failure
- Very Costly

## Preventative Maintenance



- Preventing Problems Before They Occur

## Predictive Maintenance



- Predicting Problems to Increase Asset Reliability



# Additional Lubrication Options

## HyDurance AW Fluids

- ISO 22, 32, 46, 68, 100 and 150

## HyDurance AW All Temp Fluids

- High viscosity index
- Wide temperature range
- ISO 32, 46 and 68

## HyDurance AW All Synthetic Fluids

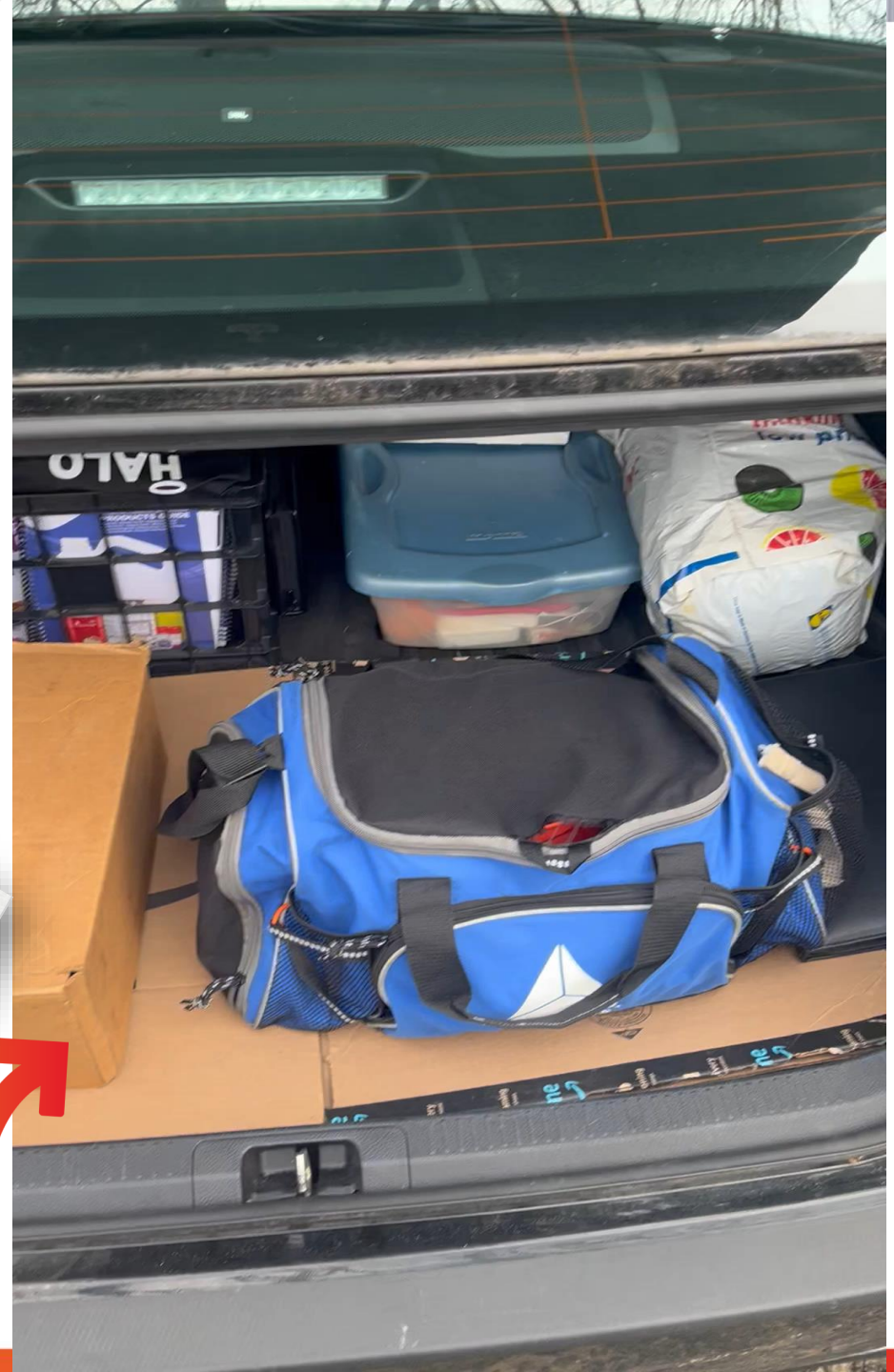
- Premium, ashless hydraulic fluid
- ISO 46 and 68

## Clarion Food Machinery AW Fluids

- ISO 32, 46 and 68



# TOOLS OF THE TRADE



Go Bag

# Create Your Solution

Leaks?

Running Hot?

Sampling?

Lubricators?

Pump Issues?

Storage Good?

Emergency Needs?

Follow up with what makes YOUR salesmanship unique and different.



# Questions?

Please post your  
questions using the  
Q&A function.



# Contact Us

Lubes Answer Line  
800-248-4684

8:00 AM - 12:00 PM  
1:00 PM - 5:00 PM CT  
Monday - Thursday

8:00 AM - 12:00 PM  
1:00 PM - 4:30 PM CT  
Friday

[lubeshelp@citgo.com](mailto:lubeshelp@citgo.com)



The background of the slide is a top-down view of a white desk. On the left, a portion of a silver laptop keyboard is visible. In the top center, there is a small potted succulent with green leaves. To the right of the succulent is a white ceramic cup of black coffee on a matching saucer. Below the coffee is a pair of tortoiseshell-rimmed glasses. At the bottom right is a black smartphone. A large orange rectangle is overlaid on the left side of the image, containing white text.

March 22, 2024

**CITGARD On Road**

April 19, 2024

**Specialty Greases**

May 24, 2024

**CITGARD/Mystik  
Off-Highway**

**Future Webinars**

**Mark Your  
Calendars**

# 2024 Spring Lubes School

**April 1 - 5, 2024**

**The Westin Houston, Memorial City**

**Registration details  
coming in early February**





Thank you &  
see you next time!

