



*From lab to production,  
providing a window into the process*



# Pressure Sensor Care & Maintenance

Presented by: David Azevedo / Global Support Manager

# Dynisco pressure transducer





# Transducer definition

## **Question:**

What is the definition of a transducer?

## **Answer:**

A transducer is a device that converts one type of energy to another.

The conversion can be to/from electrical, electro-mechanical, electromagnetic, photonic, photovoltaic, or any other form of energy.

## **Example:**

A Guitar amplifier, which takes vibrations from the strings of the guitar, and converts to an sound frequency we can hear through the speaker via electromagnetic conversion.

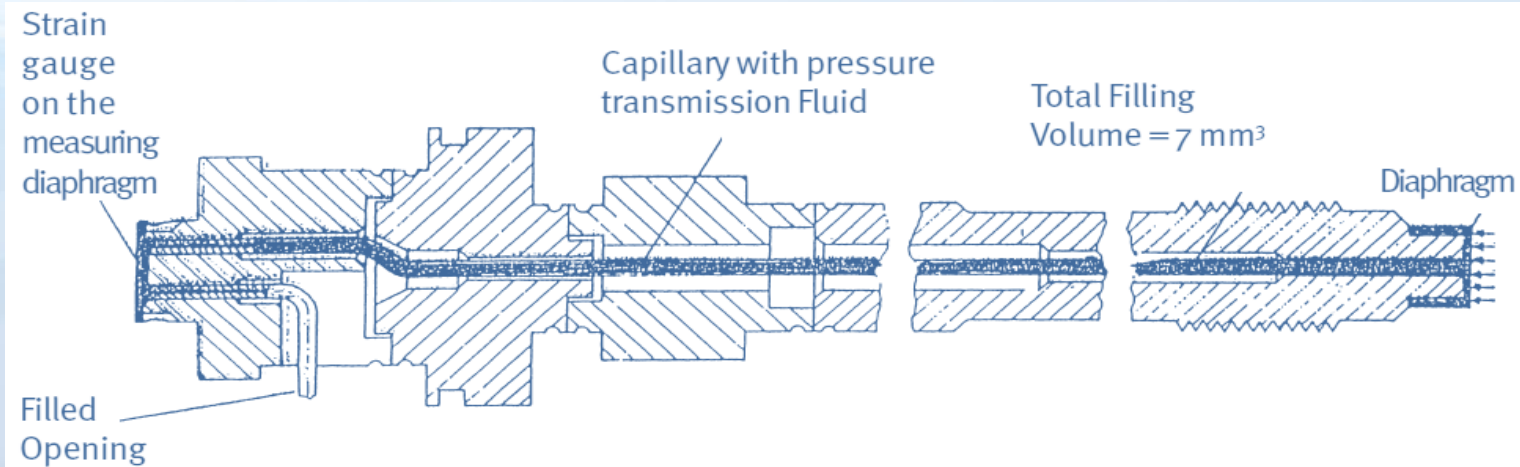
# Transducer technology

## Question:

How does a pressure transducer work?

## Answer:

By incorporating the foil strain gauge, a filled capillary and diaphragms to obtain a controlled pressure change which is converted electronically to signal output, that is scaled to a specific pressure range.



# Signal outputs

## Available signal outputs for Dynisco sensors:

- Millivolt (one thousandth of a volt) symbol = mV
- Volt (the measure of electric potential) symbol = V
- Milliamps (one thousandth of an ampere) symbol= mA

## Available ranges for the various signal outputs:

- Millivolt= 2mV/V, 3mV/V, 3.33mV/V (other ranges available upon request)
- Volt= 0-5V, 1-6V, 0-10V, 1-11V (other ranges available upon request)
- Milliamps= 4-20mA, 4-20mA with HART (pressure ranges can be assigned)

# Benefits of pressure transducers

- In Plastic Extrusion, pressure variation at the die entrance, could be caused be either an actual variation in rate from the extruder, or variation in temperature affecting viscosity.
- Pressure fluctuations are typically controlled with gear pumps
- Gear pumps can be manufactured to have pressure transducer ports
- Transducers will help the operator make changes to process variables based on pressure readings captured via signal output to instrumentation.
- Instrumentation can be programmed to stop the Extruder if a pressure condition exists that will compromise the equipment.
- Pressure signals to instrumentation enable control of screen changers that filter out particle contaminates in the melt.
- Instruments will monitor and log pressure variations at the die head, providing the operator with data to improve process

# Benefits of pressure transducers cont..

**When Melt Temperature is stable, pressure variations are often caused by:**

- Variations in Feed Stock
- Inconsistent screw speed
- Barrel Temperature change
- Poor screw design
- Operating conditions

**Dynisco pressure transducers and Instruments enable detection of these conditions**





# Pressure Measurement Benefits

- Increased productivity
- Quality products
- Reduced waste
- Reduced costs
- Less Down Time
- Increased Profits
- **Happier customers**
- **Longer life**
- **Safety**
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- **Safety**

# Transducer Tip

- Dynisco's innovative cap diaphragm
- Machined 45 degree sealing surface
- Industry standard  $\frac{1}{2}$ -20 threads
- One-piece stem construction (most models)



# Standard Threads

- The threads are the industry standard of 1/2-20 UNF
- Improper dimensions will cause thread galling and material leakage
- Insure proper hole dimensions with Gauge Plug included in the Dynisco Cleaning Tool Kit, part number 200100

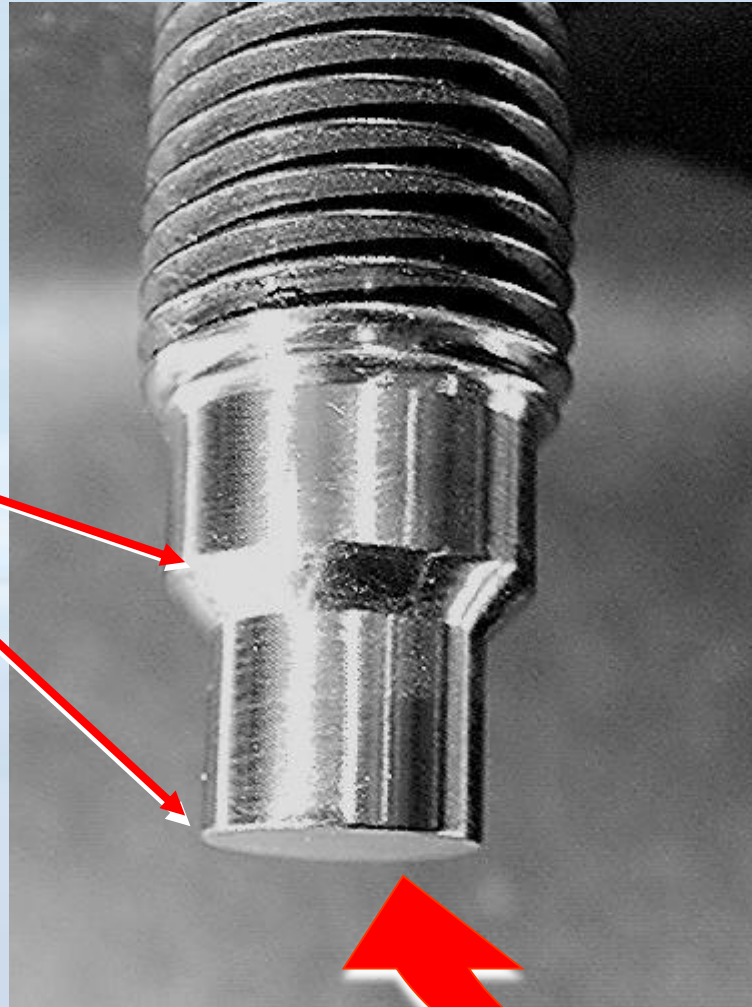
# Transducer tip





This is the way a transducer tip should look when it's new.

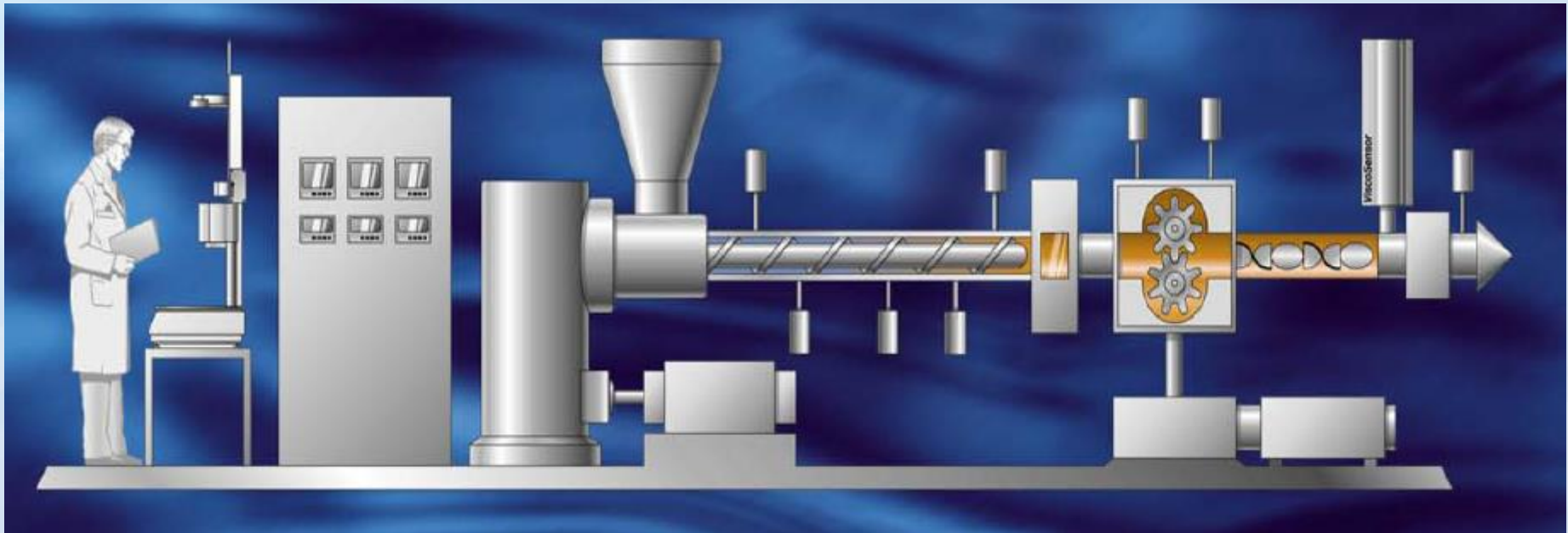
Clean sharp edges



Flat diaphragm

# Transducer Location

- Before screen changer
- Before melt pump
- After melt pump
- In the dies



# Location Benefits

- Prevents pressure build up
- Insures adequate melt feed to pump
- Insures adequate pump pressure to die
- Insures adequate pressure for product
- -----INSURES SAFETY-----

# Location

- Too close to the feed zone can cause damage from unplasticized pellets
- Mounting too shallow in the hole can cause material degradation and freeze-off
- Mounting too deep can cause tip damage and measurement errors
- Repeated hole cleaning can cause “too deep” holes, and possible tip damage. ( use spacers )

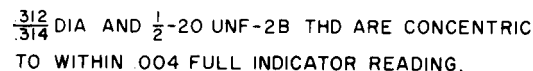


# Dry Location

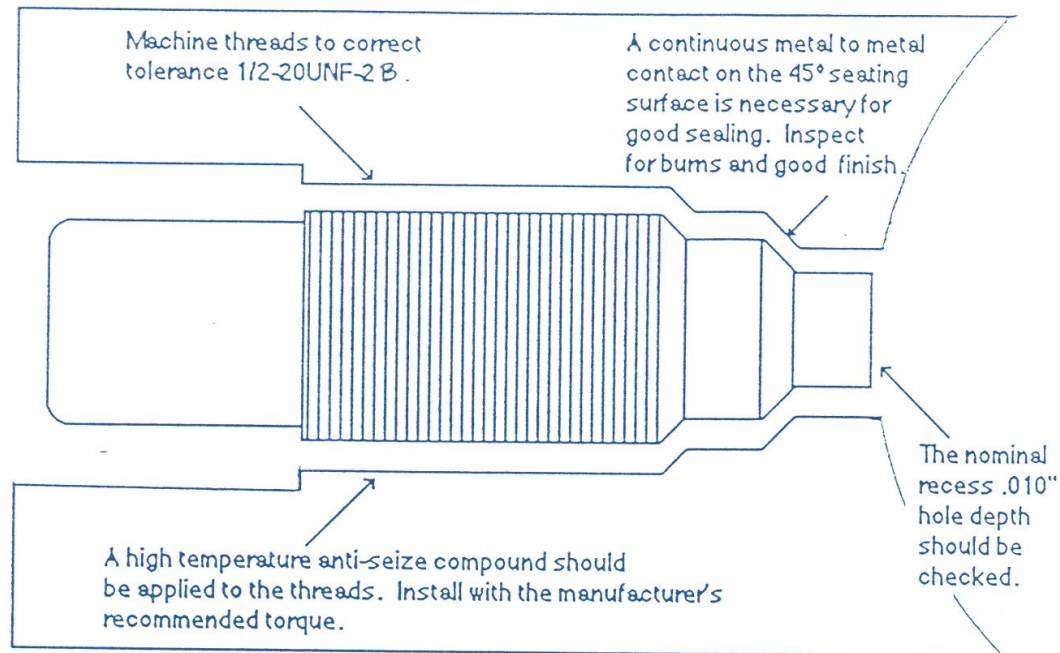
- Standard transducers are NOT water tight!!!!
- Dynisco circuitry can handle extrusion plant environments, but will not operate when wet
- Specify water tight transducers when wet operation is unavoidable

## Mounting holes are important !!!

- ### Recommended mounting hole dimensions for PT460E, PT462E & TPT463E



# Mounting depth

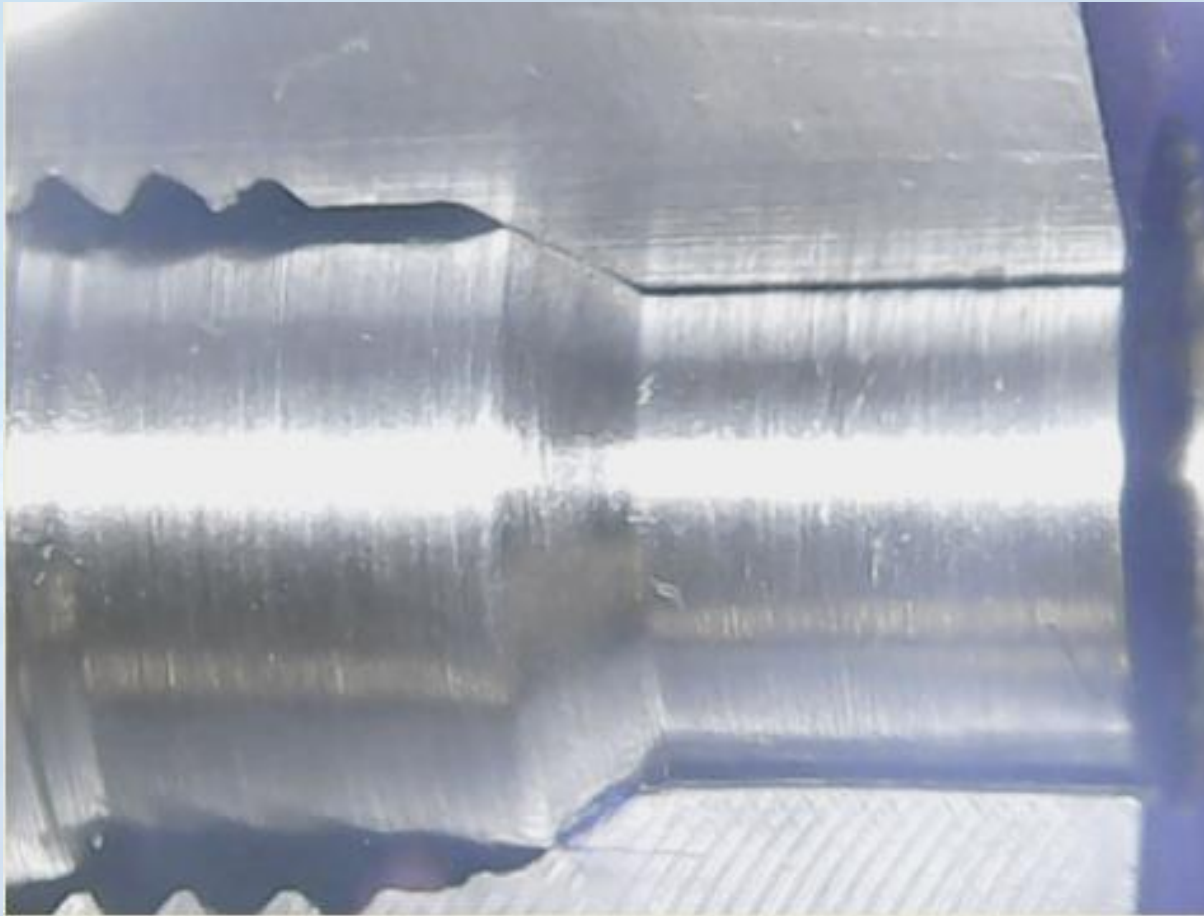


# Mounting Depth

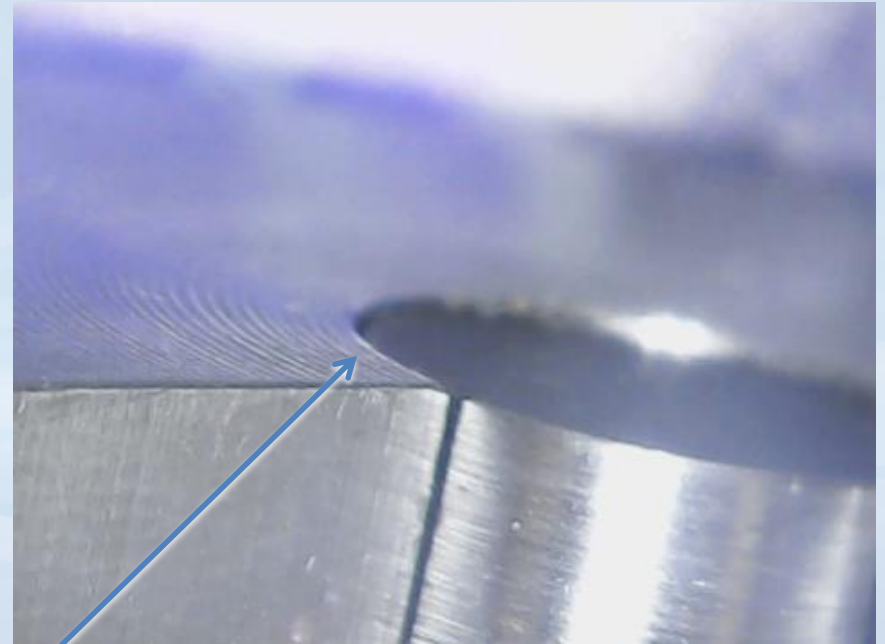
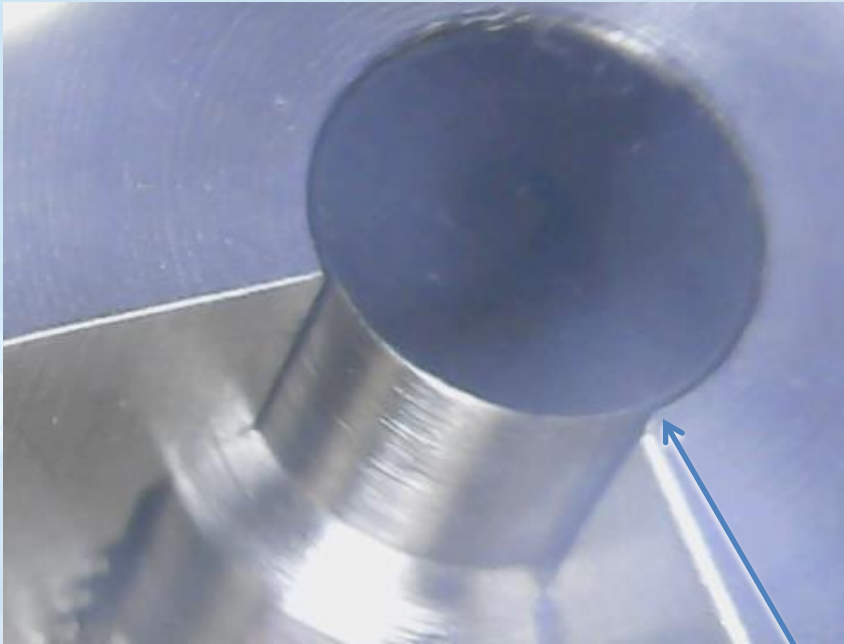
- **How deep should transducer be?**
  - Typically recessed around 0.010"
    - This depth will prevent any unnecessary diaphragm wear and help prolong the life of the pressure transducer
    - Kit # to make holes...PN 200925
  - If hole is already too deep, use stackable 45 degree 0.025" copper spacers (PN 633511) Aluminum also available



# Mounting depth



# Mounting Depth



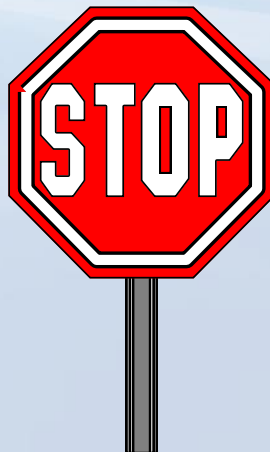
***Recessed .010 inch***

# Mounting conditions

- Always use a high temperature anti-seize compound when mounting transducers
- Always use proper mounting torque
  - 100-200 inch-pounds (8-16 ft lbs) may vary on transducer type
  - 500 inch-pounds MAXIMUM (250 for push rod)
  - **RULE OF THUMB...finger tight plus 1/4 turn**

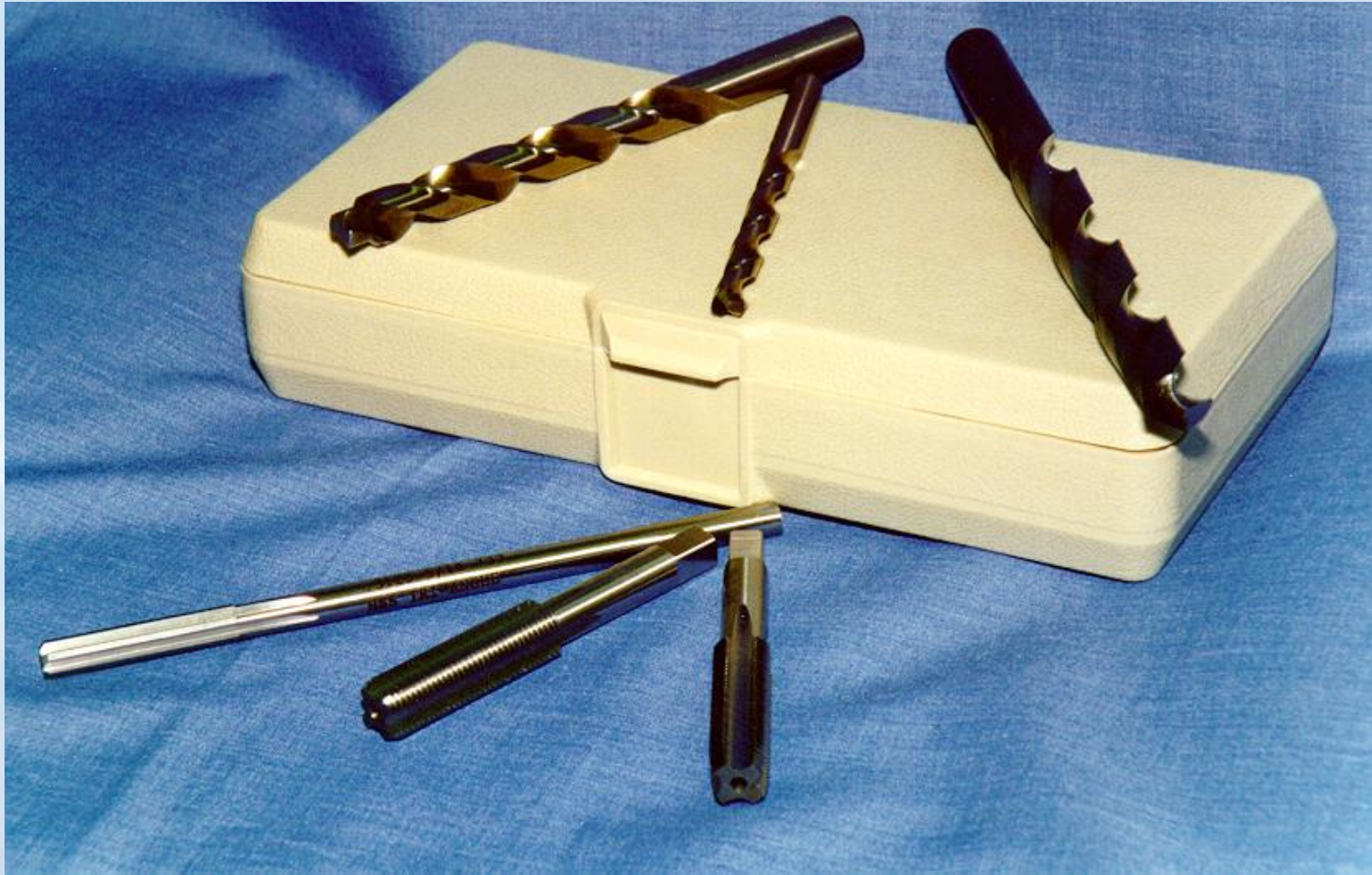
# Transducer Mounting Techniques

- To machine a new hole use Dynisco's Machining Tool Kit, # **200925**
- Use proper mounting torque upon installation
  - Proper Torque - See Product Manual
  - Less causes **leaking**
  - More causes **seizing and damage** to the transducer





# Dynisco ½ 20 UNF machine tool kit (200925)



# Removal of the pressure transducer

- **Always remove the transducer while the equipment is HOT**
- Remove any polymer residue from the tip by using a cotton rag.
- Do not use the wire wheel on the bench grinder!
- Always remember to clean the hole before re-installing the transducer
- Use the Dynisco Cleaning Kit # **200100**

# Dynisco ½ 20 UNF cleaning tool kit (200100)



# Cleaning tool kit contents

- Bottoming tap - cleans threads
- Guide Sleeve/Cleaning Drill - cleans hole
- Bluing – checks hole cleanliness and size
- Gauge Plug - insures proper fit
- Instructions

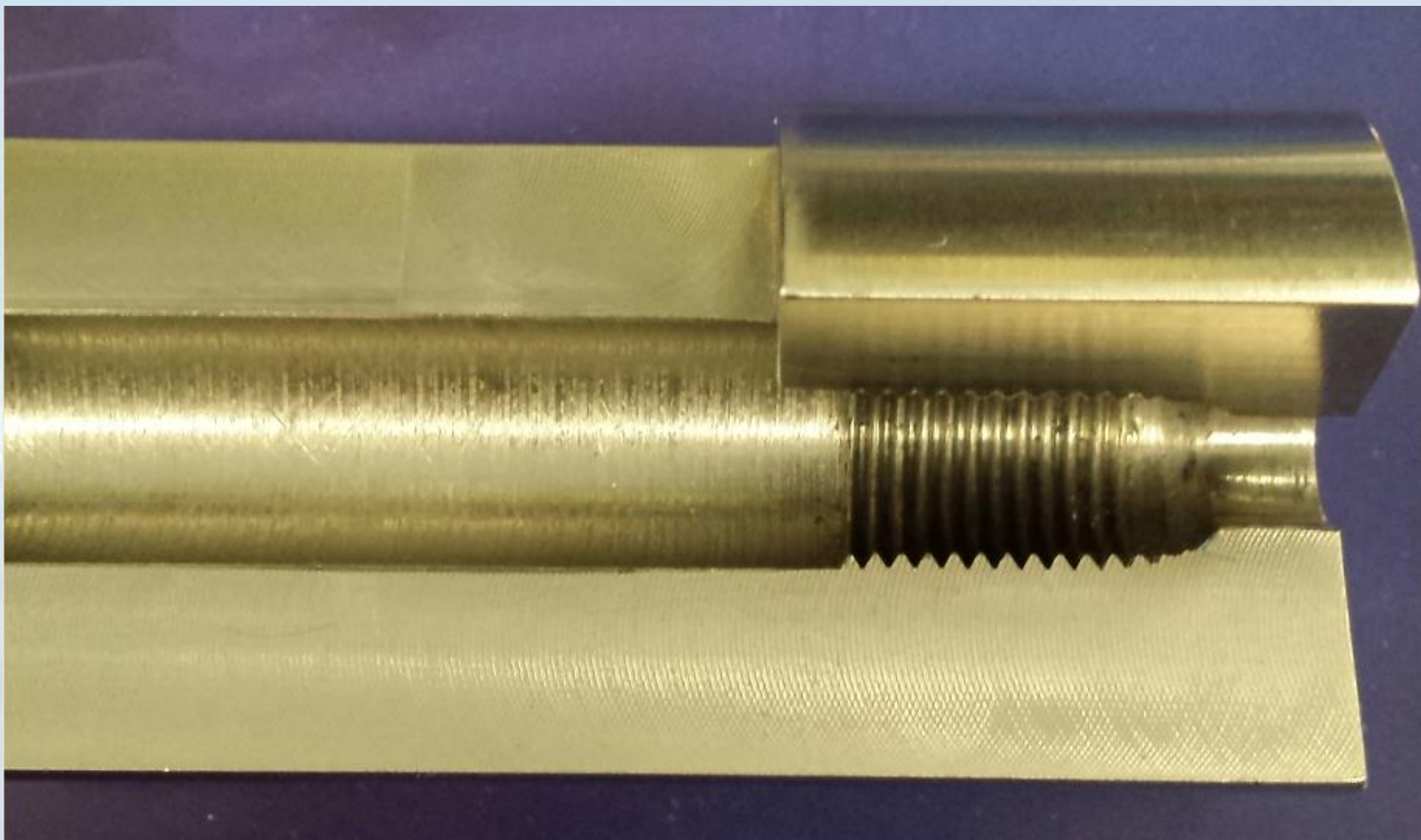


# Cleaning the mounting hole

- **ALWAYS** remove the transducer before cleaning the barrel with abrasives, cleaning compounds or a wire brush
- Remove the transducer with the barrel **HOT** and wipe the transducer tip clean
- Remember to go back and **clean the hole with the cleaning drill/guide sleeve**



# Clean mounting hole



# Mounting hole review

- Dynisco cleaning tool kit (p/n 200100) will make the job easy
- Remove the transducers when cleaning the barrel
- Remove them when they're HOT
- Remove any plastic buildup in the hole

# Mounting Hole Problems

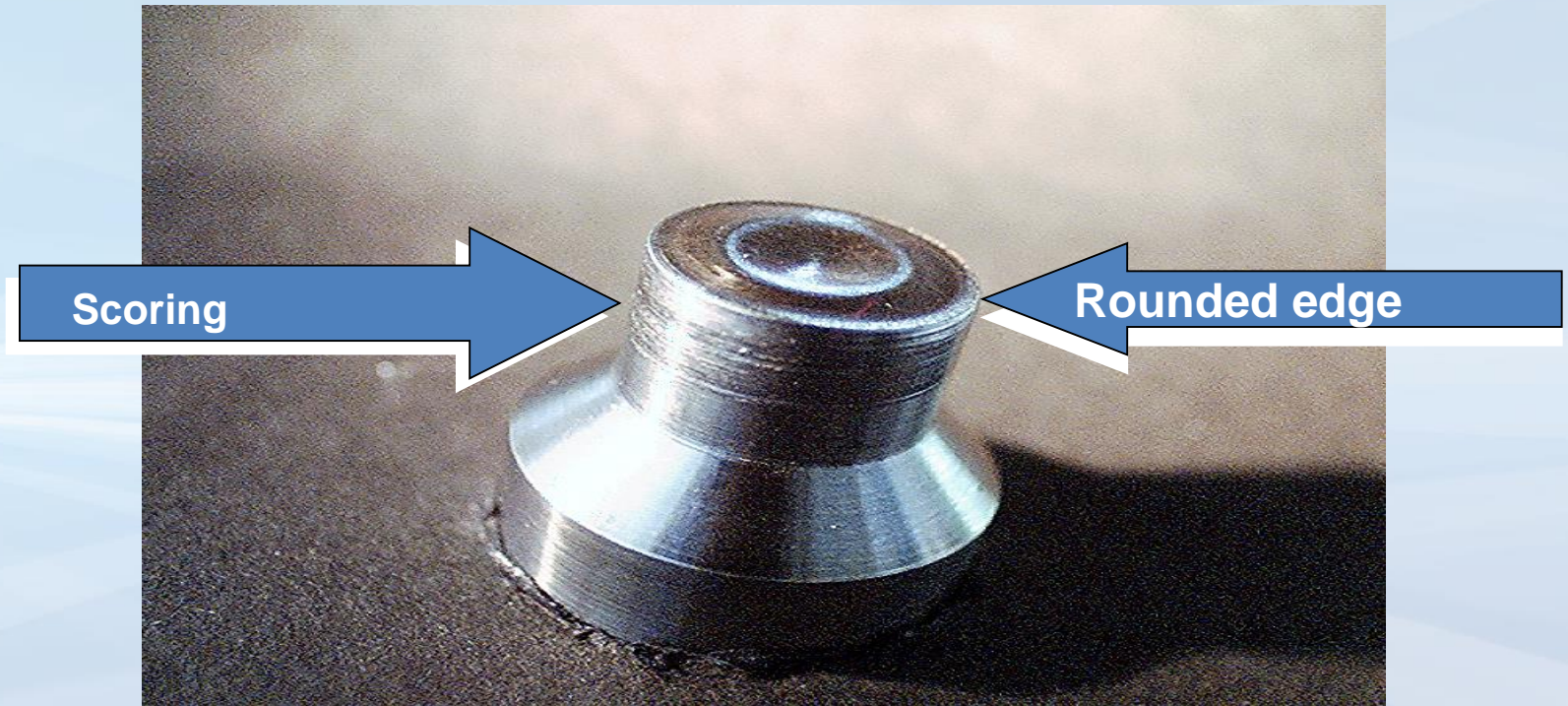
- **Problem**

- Damaged tip
- No response
- Galled threads

- **Reason**

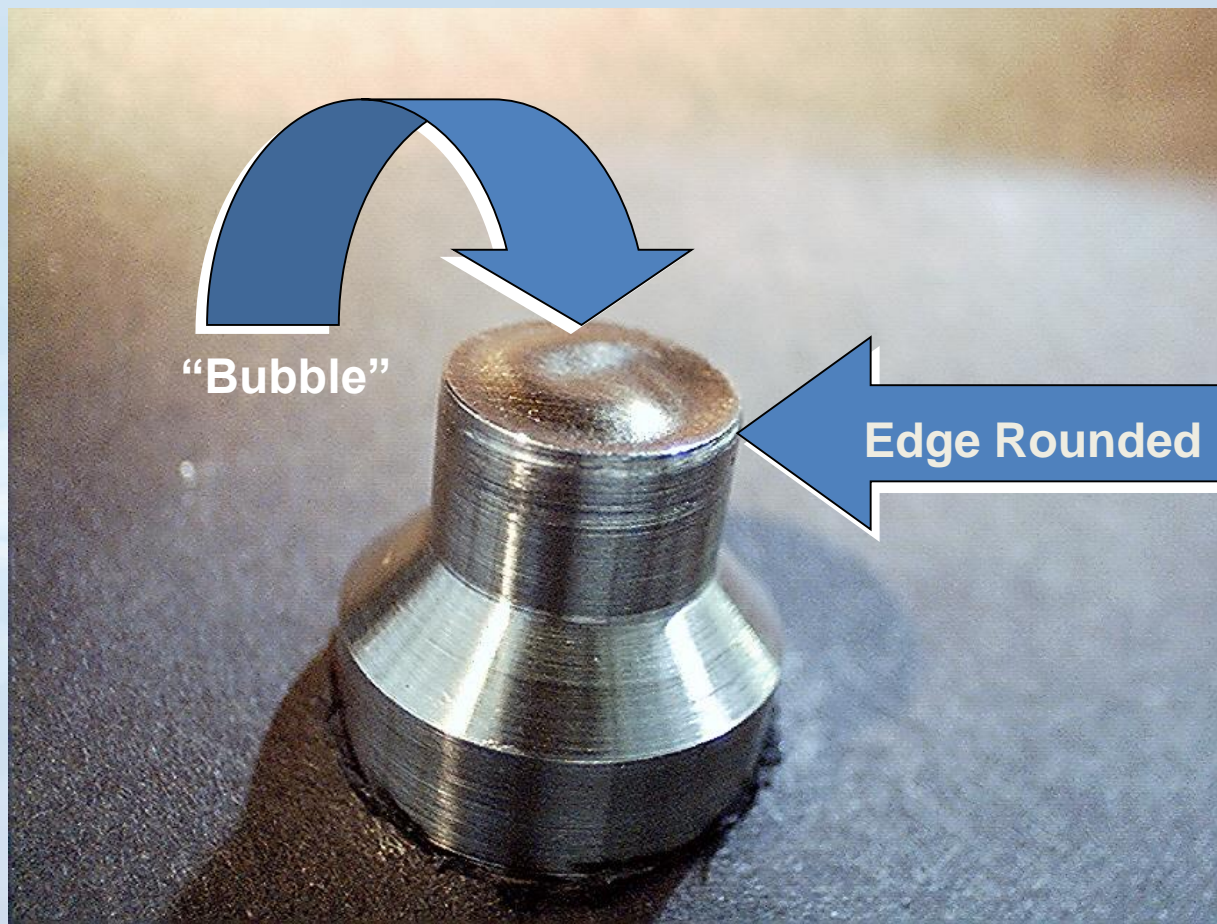
- Improper hole
- Over-pressured
- No anti-seize used

# Mounting Hole to Small





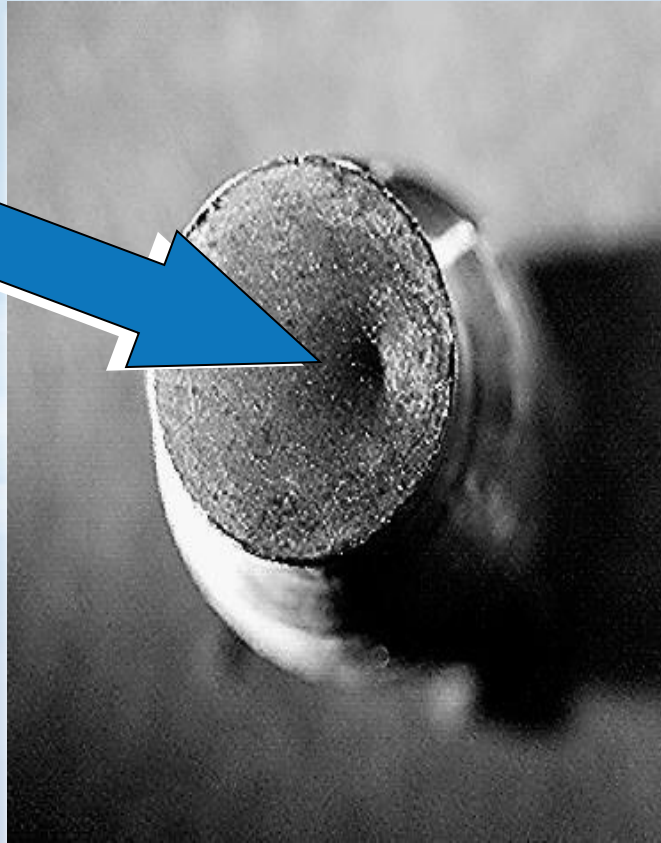
# Mounting Hole to Small





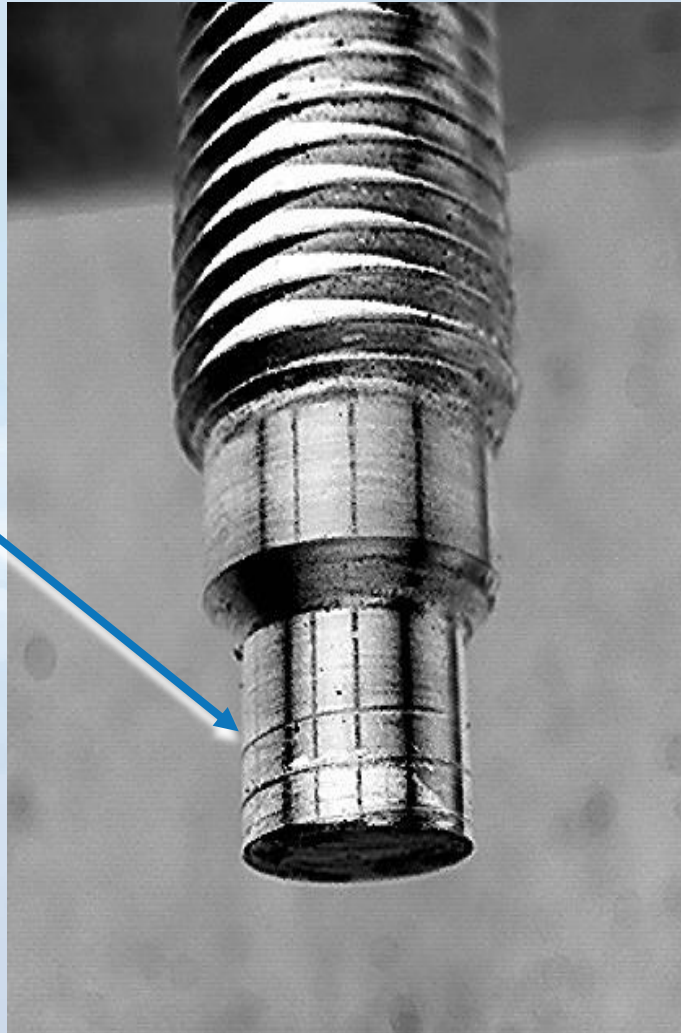
# Diaphragm damage

**Dented diaphragm**

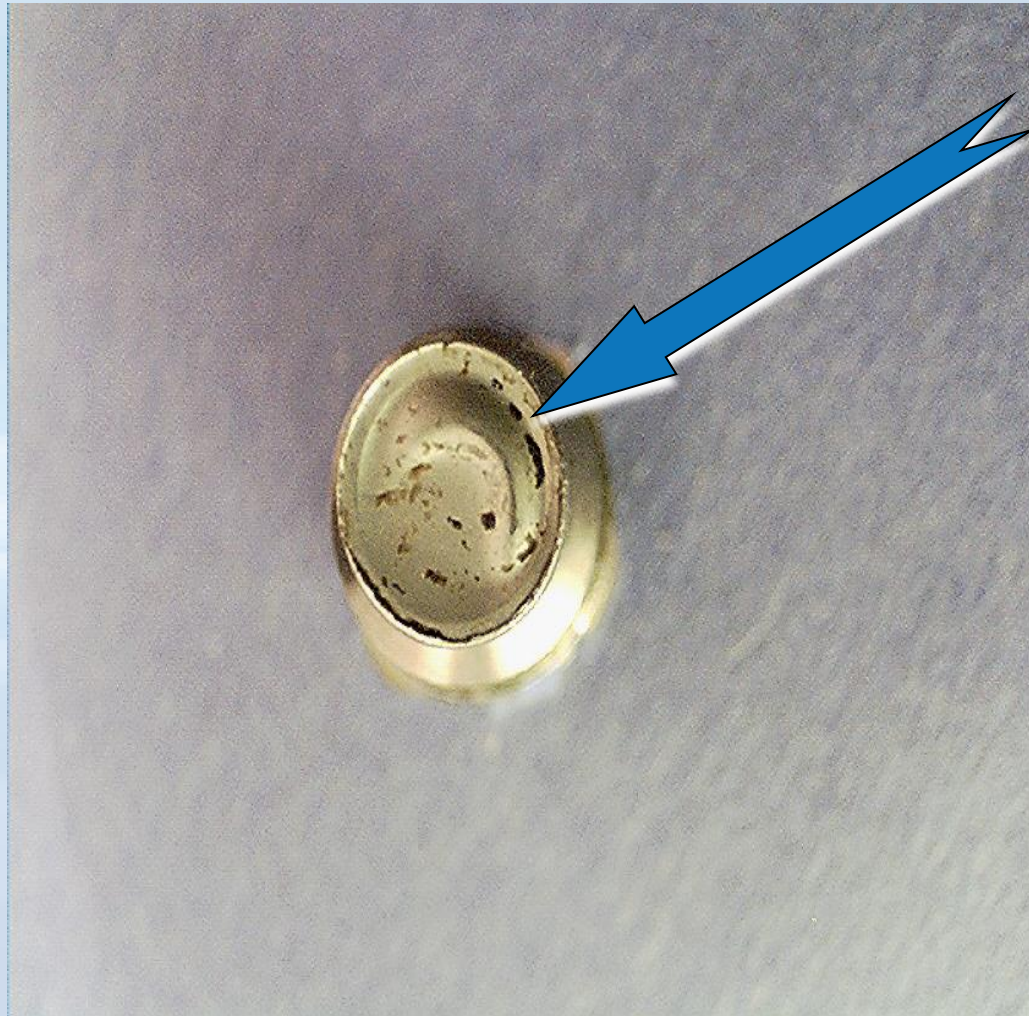


# Tip damage

**Scored tip**



# Diaphragm damage

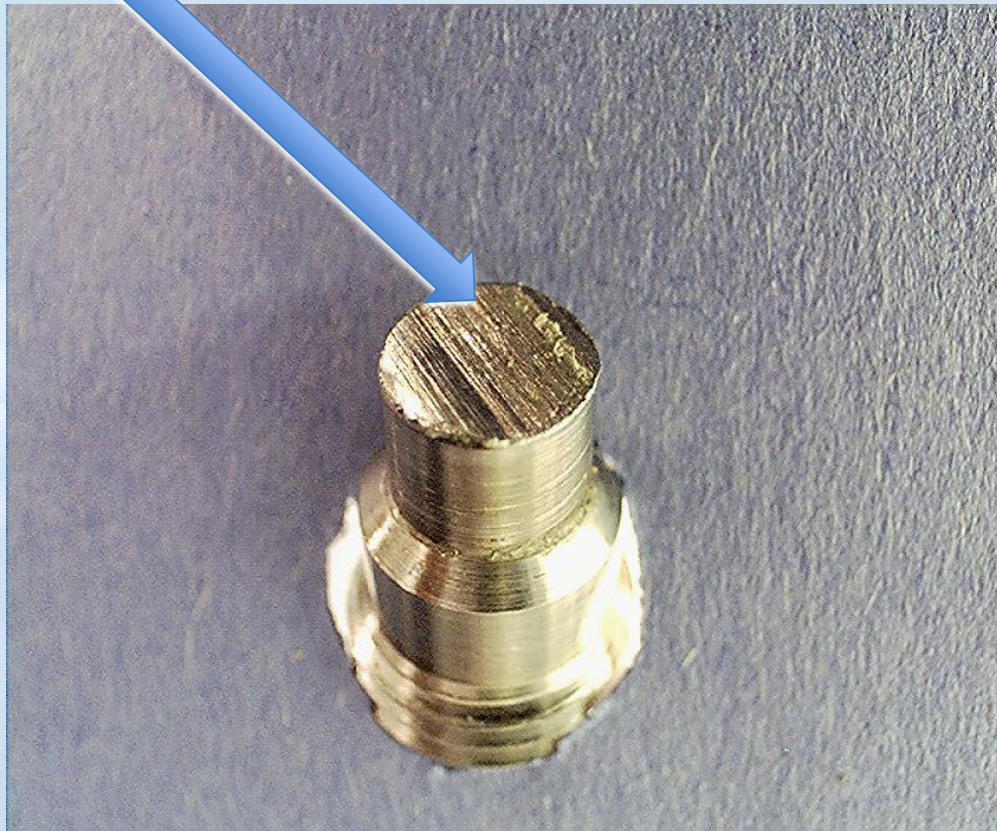


**Diaphragm Wave**



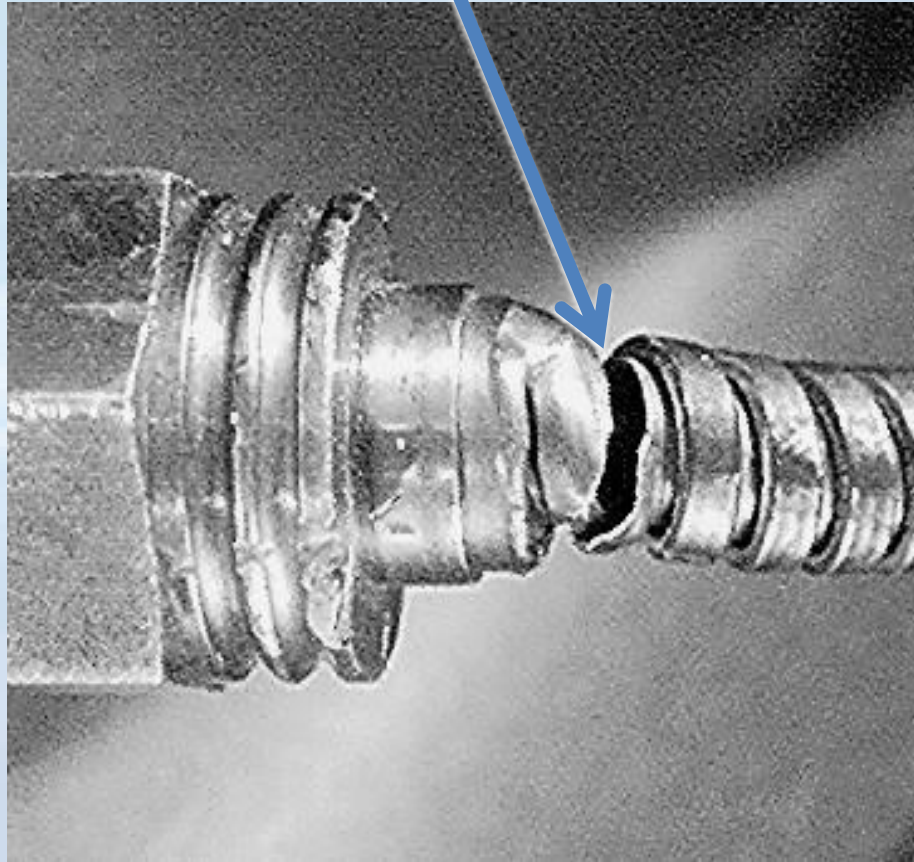
# Diaphragm damage

## Diaphragm Scored from very abrasive material



# Transducer damage

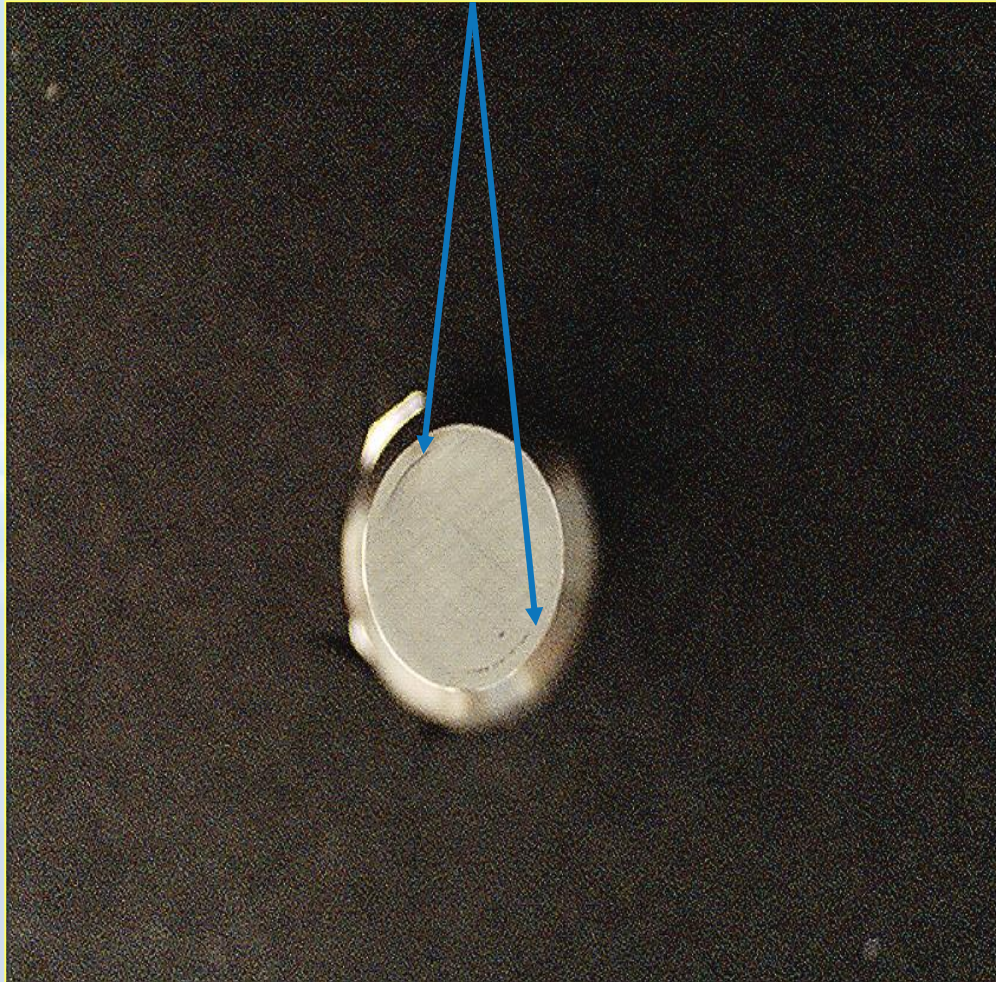
Broken armored flex





# Diaphragm damage

## CRACKED DIAPHRAGM



# Selecting Pressure

- Transducers operate best at midrange.
- Transducers can withstand 1.5 times overpressure without damage.
- Overpressure can occur when cold material slows the flow.

# Selecting Pressure

- Verify that your transducer will be operating within their rated range
- Pay special attention to the pressure range when extruding different materials
- Like people, over-pressured transducers cannot perform their job properly

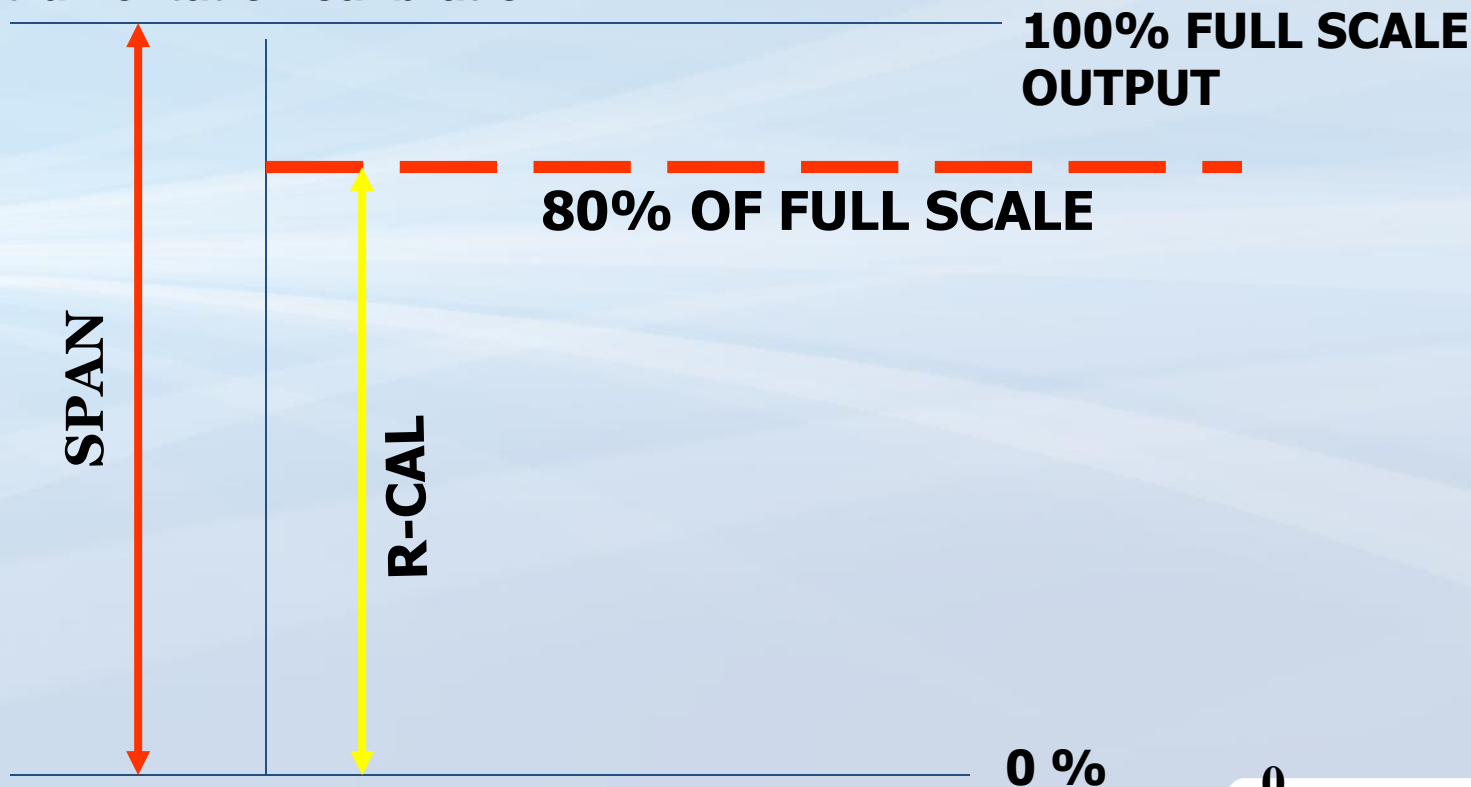
# Calibrating your transducer.

- When? -----When it's up to operating temperature and at zero pressure.
- How often?-----When your ISO9000 standards dictate, or if the zero appears to have shifted.
- It's easy! -----Dynisco transducers have a built in 80% R-Cal, and our indicators use this R-Cal to calibrate the span.



# Shunt Calibration “R-CAL”

All Dynisco Melt Pressure Transducers include a built-in 80% of full scale “R”-CAL. This is accomplished using an internal resistor to unbalance the bridge electrically, rather than strain induced by applied pressure. “R”-Cal provides a quick and accurate method of transducer-to-instrumentation calibration.



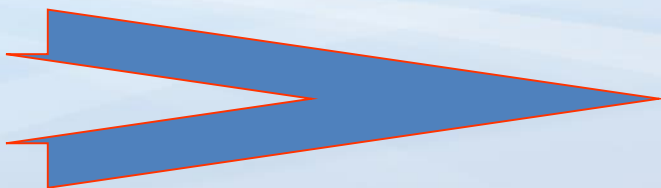


# How can Dynisco Help YOU?

- **Stabilize your process**
- **Operate more efficiently**
- **Increase profit**
- **Increase consistency and quality**
- **Help your profitability**

# Helpful Literature

Dynisco has published several documents , to aid our customers with application support, please inquire with your Dynisco Rep for further details.



## Melt Pressure Transducers for Extrusion

by Gordon Shaw, Regional Sales Manager,  
Dynisco Measurement & Control Group

*These 8 tips for installing and caring for your extruder melt pressure transducers will help you get the most out of your transducers and minimize problems in their use.*

Extruders use melt pressure transducers to improve output and melt quality, enhance production safety and safeguard machinery. It is important to maintain the optimum processing pressure during production to ensure that product quality specifications such as part dimension and surface finish are met with minimal material waste.

Transducers placed at the entrance to the die, in conjunction with a pressure control device, help maintain stable output, thereby reducing scrap and material waste. Pressure measurements at the screen pack and melt pump are also important. A pressure gage mounted downstream of the screen pack will



Transducer damage caused by mis-machined hole.

# Conclusion

- **Dynisco** manufactures for the extrusion industry the most rugged and reliable transducers
- **Dynisco** is an **ISO9001** company
- Proper care and handling will provide you with many years of service
- **Dynisco** has a Repair Program to fix your damaged transducers

# QUESTIONS???

# Contact Dynisco

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# THANK YOU FOR YOUR TIME TODAY

