

# Considerations for Long Term Reliability of Dynamic Equipment Installations

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**ITW** Performance Polymers  
Heavy Industries Group

# Presentation Agenda

Introduction to ITW Performance Polymers

Methods for Mounting Dynamic Equipment

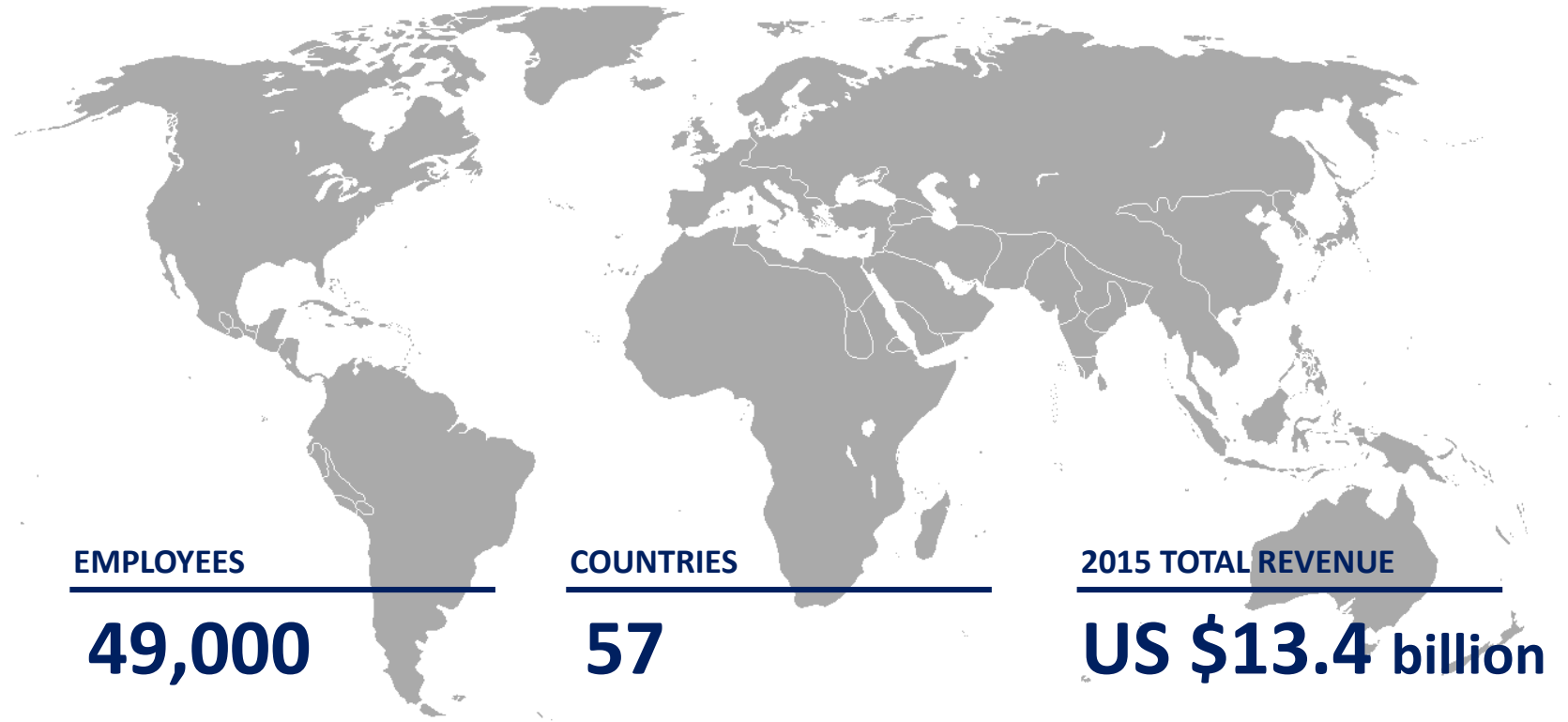
Comparison of Transfer Mediums

Advantages of Epoxy over Cement Transfer Mediums

Crusher Case Histories

# ITW Performance Polymers

Illinois Tool Works (ITW) is an American Fortune 200 company that produces engineered fasteners and components, equipment and consumable systems, and specialty products. It was founded in 1912.



(2014)

# ITW Performance Polymers

## ITW's Industry – Leading Business



Automotive  
OEM



Test &  
Measurement  
and Electronics



Food  
Equipments



Polymers  
& Fluids



Welding



Construction  
Products



Specialty  
Products

Key Brands :



Key Brands :

Avery Weigh-Tronix



Key Brands :



Key Brands :



Key Brands :



Key Brands :



Key Brands :



Since 1963, millions of horsepower of dynamic equipment have been installed on **Chockfast** mounting solutions.



**Chockfast** GROUTING SYSTEMS

for machinery and foundation repair

**Chockfast RED and Vibratherm**

maintain critical machinery

**Chockfast** FULLY ENGINEERED EPOXY GROUT SYSTEMS

for machinery installations and foundation repair

High-performance, pourable resin chocking and grouting compounds

**Chockfast**

for machinery installation and foundation repair

CHOCKFAST ORANGE/CHOCKFAST BLUE ... CHOCKFAST RED

**the complete, pourable grouting system**

**CHOCKFAST**

by the people who put technology in grouting

By analyzing your grouting problems, our engineers are able to determine your precise grouting needs. Stress, temperature, vibration, and other variables are carefully evaluated for your specific installation before recommending the grade or grades of CHOCKFAST for high performance and reliability.

With four pourable grades, each with engineered performance capabilities, the CHOCKFAST grouting system offers ease of application, rapid cure, superior strength, and long term reliability under the widest range of operating conditions. All grades of CHOCKFAST are impervious to oil and most chemicals, highly shock resistant, and non-shrinking.

For the past 14 years, CHOCKFAST has been proving itself under the toughest conditions in marine and land-based industries. Available from our worldwide network of servicing distributors, CHOCKFAST will work for you.

**PHILADELPHIA RESINS CORPORATION**  
25 Chestnut Drive, Monroeville, PA, USA  
Tel: 215-855-8450 Telex: 84-6362 Cable: PHILRES WMLL

**Chockfast** FULLY ENGINEERED EPOXY GROUT SYSTEMS

for machinery installations and rapid foundation repairs

**Chockfast RED and Vibratherm**

maintain critical machinery

**Chockfast** GROUTING SYSTEMS

for machinery installation and foundation repair

high performance grouting and chocking systems

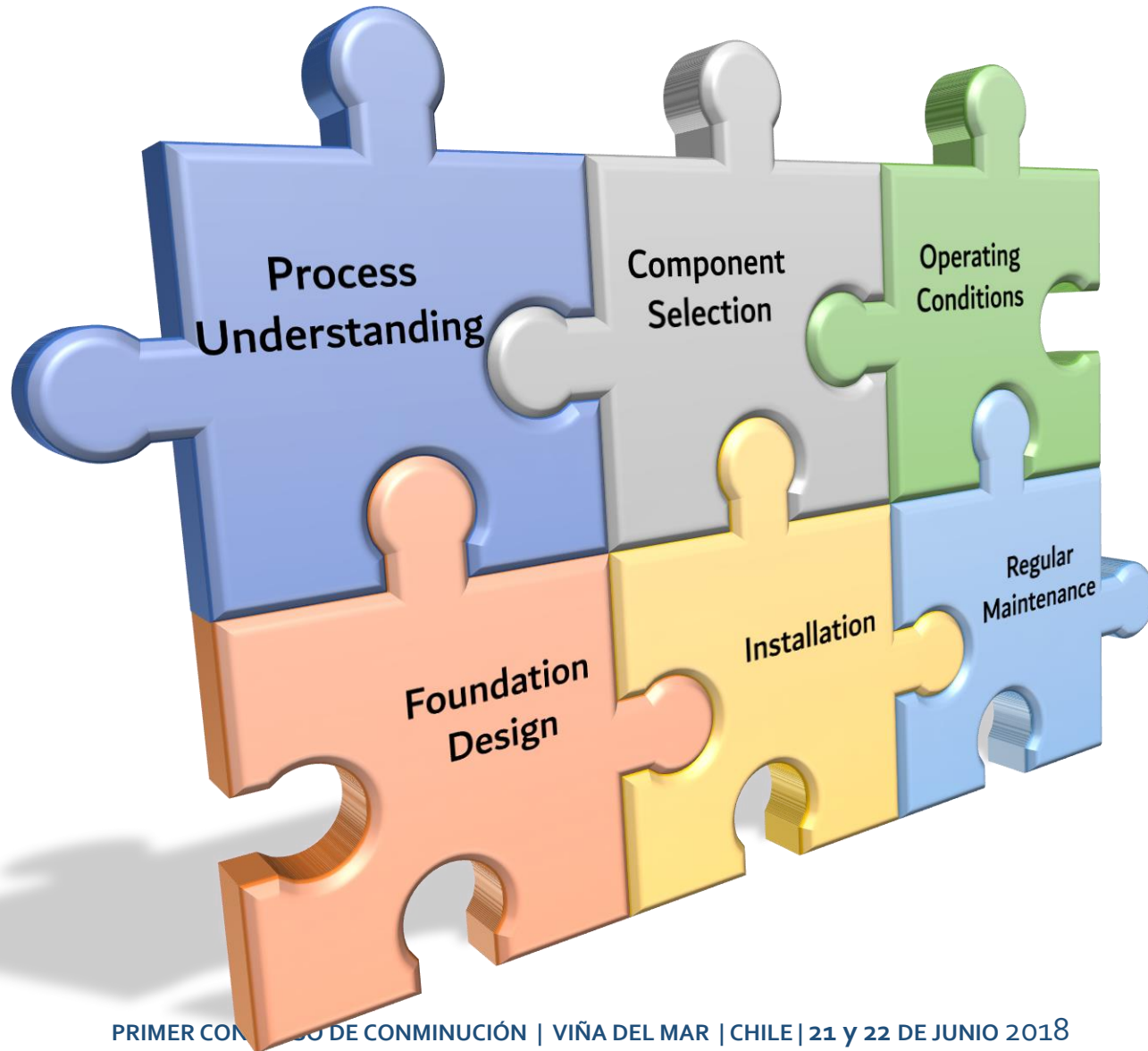
**Philadelphia Resins**

# Chockfast<sup>®</sup> has been used in a variety of critical applications to ensure long term equipment reliability.

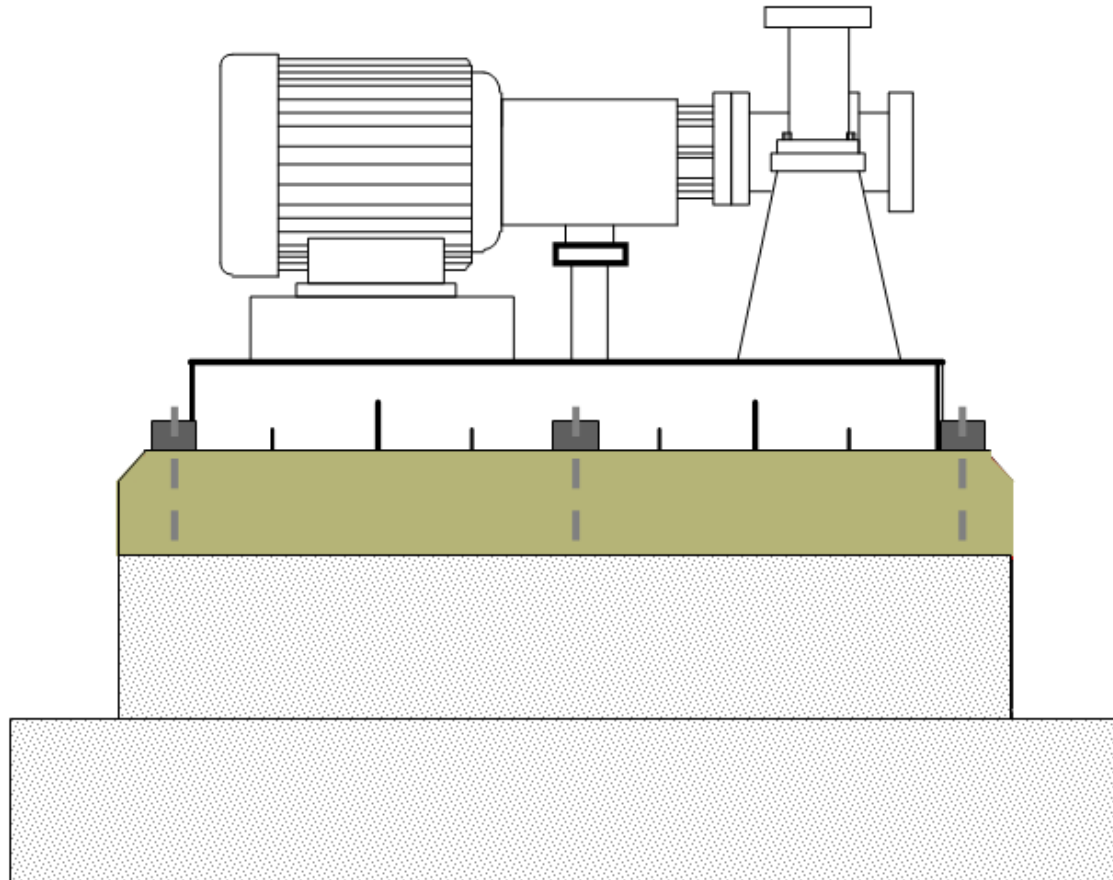
- Crushers
- Conveyors
- Pumps
- Steam and Gas Turbines
- Compressors
- Engines
- Pulverizers
- Ball Mills
- Generators
- Blowers
- Electric Motors
- Crane & Gantry Rails
- Separators
- Fluid Drives
- Gear Drives
- Rolling Mills
- Clarifiers
- Rail Car Unloaders



# Long-Term Equipment Reliability



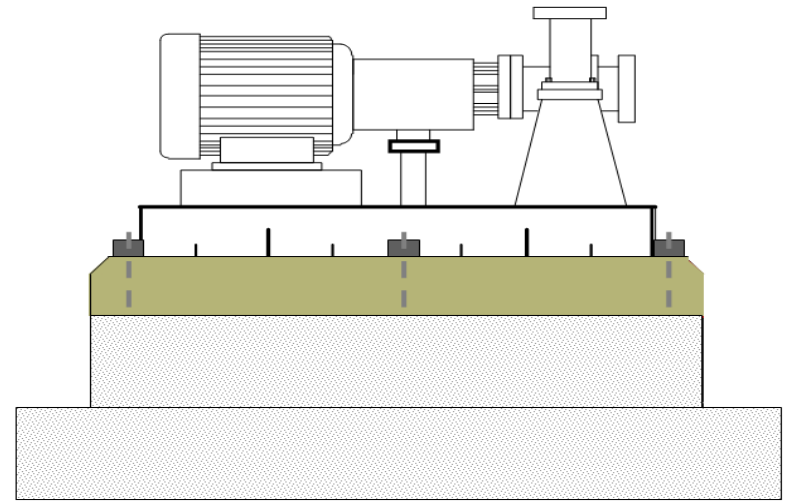
# The Equipment System





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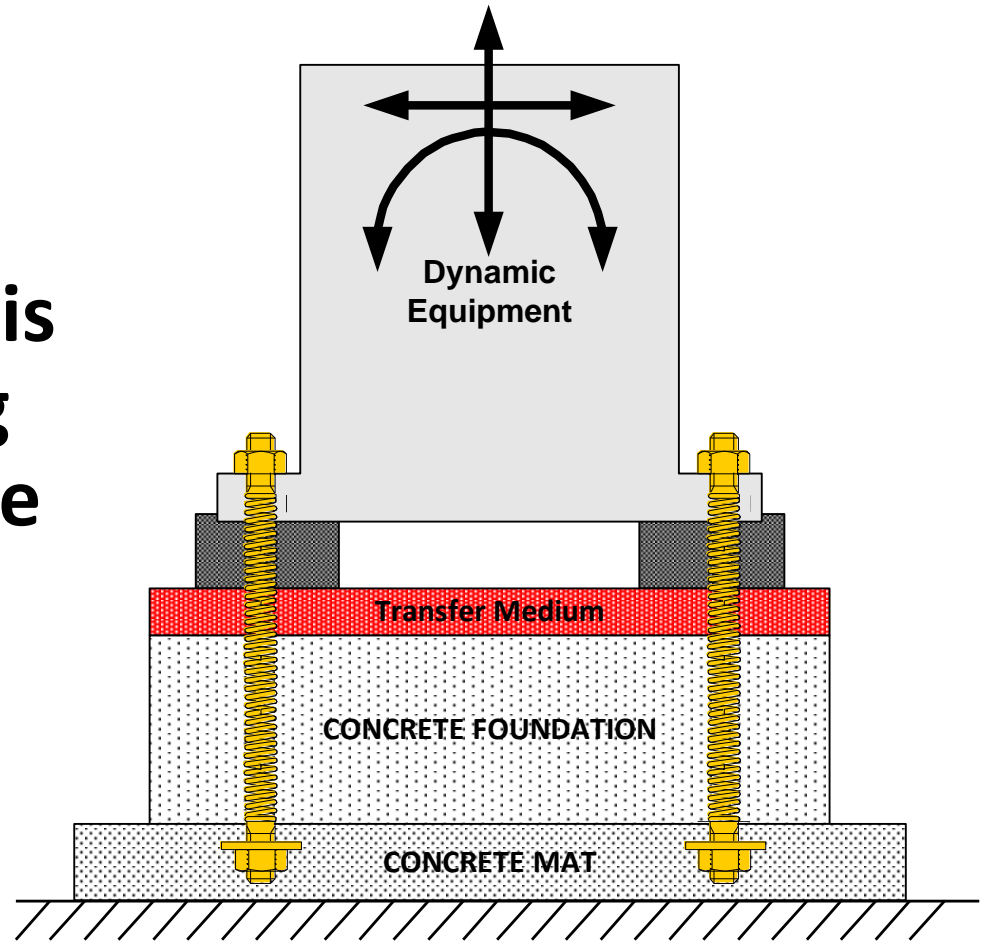
Dynamic Equipment  
Baseplate  
Transfer Medium  
Jack Bolts/ Anchor Bolts  
Foundation  
Sub-surface



**An Equipment System is more than individual components placed together.**

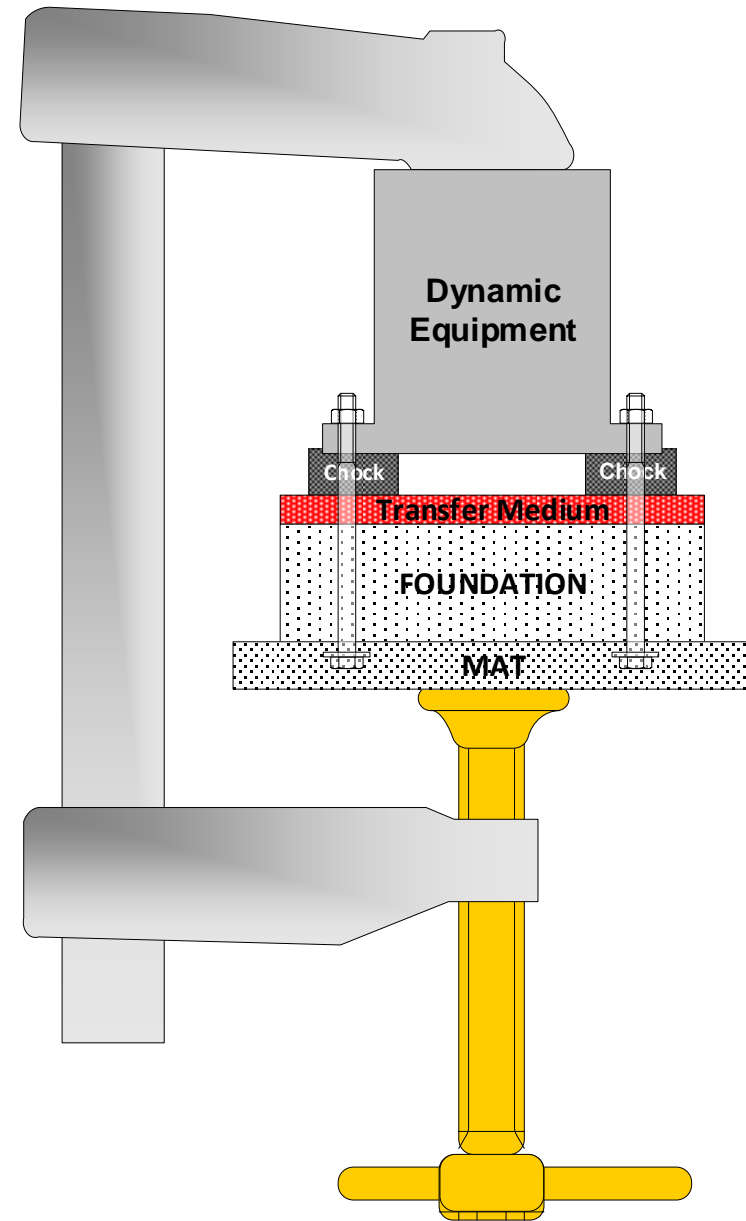
# The Equipment System

**An Equipment System is a series of interacting components that move and vibrate together.**



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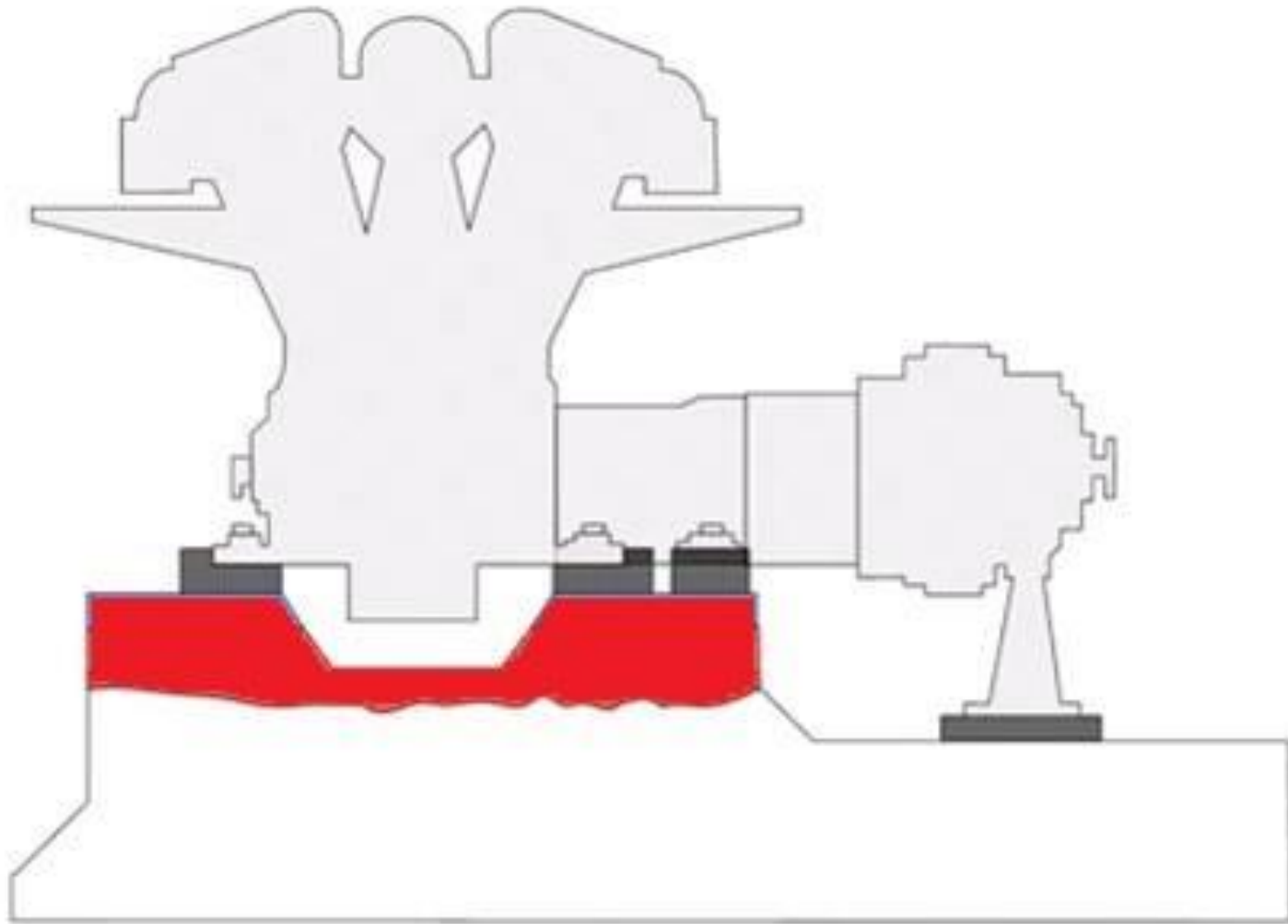


# What is the role of the transfer medium in dynamic equipment foundations?

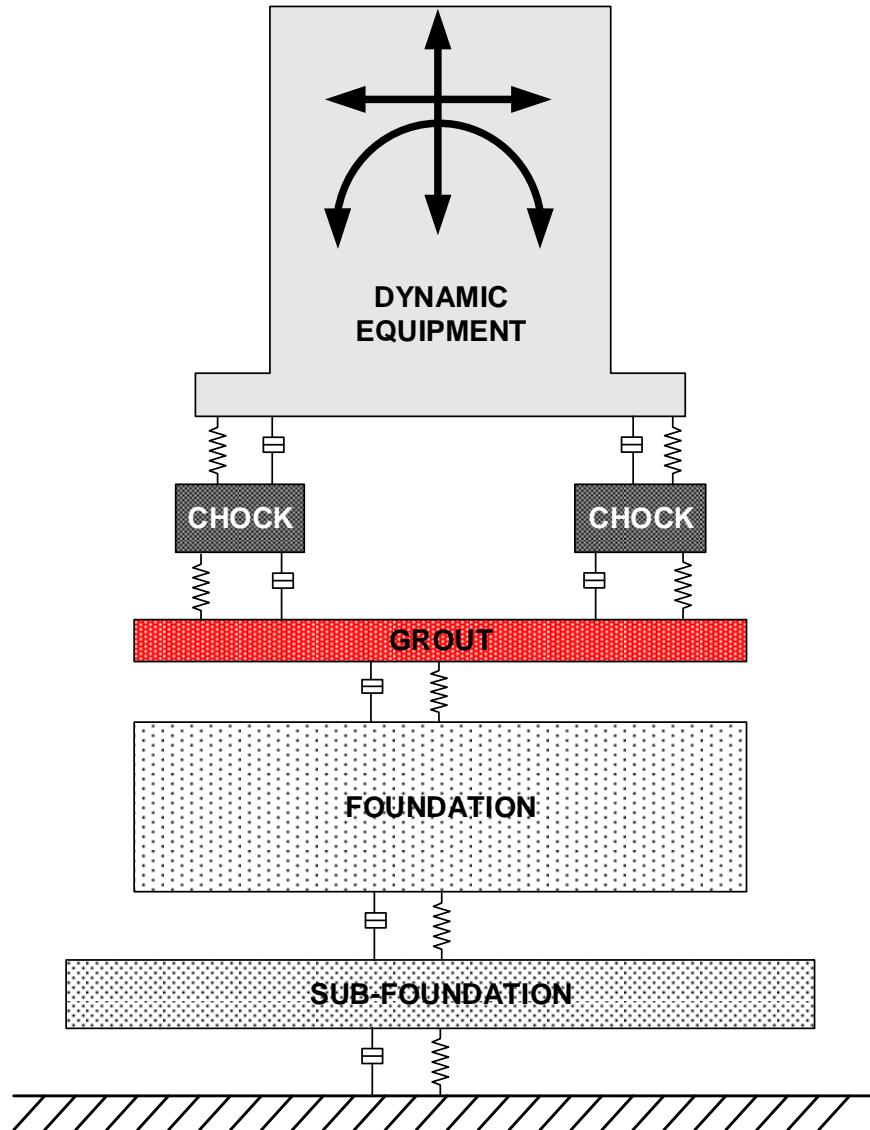
1. Maintain position of equipment
2. Transfer loads and vibrations
3. Protection of foundation
  - Chemical
  - Freeze/Thaw
  - Impact



# Types of Transfer Mediums



# Types of Transfer Mediums



# Role of Specific Transfer Mediums

Concrete	Large Masses, General civil/construction installations
Cementious Grout	Static or low dynamic loaded equipment needing alignment
Epoxy Grout	Dynamic equipment requiring high loading resistance, high chemical resistance and precise alignment
Epoxy Chocks	Dynamic equipment requiring higher loading resistance and extremely precise alignment

# Characteristics of Transfer Mediums

	Concrete	Cementious Grout	Epoxy Grout	Epoxy Chocks
Composed of...	Cement, water, aggregate	Cement-aggregate blend and water	Resin, hardener and bags of aggregate	Resin and hardener
Consistency	Water-dependent	Water-dependent	Lumpy Oatmeal	Thick, heavy oil
Flowability	Water-dependent	Water-dependent	Fair to Poor	Fair to Good
Working Time	2 to 3 hours	1 to 1.5 hours	1 to 4 hours	15 to 40 minutes
Cure	28 days	7-21 days	24 to 48 hours	18-36 hours
Cost	\$	\$\$	\$\$\$	\$\$\$\$



# Properties of Transfer Mediums

	Concrete	Cementitious Grout	Epoxy Grout	Epoxy Chocks
Compressive Strength	20-35 MPa	25-60 MPa	80-125 MPa	130-170 MPa
Tensile Strength	2.5 MPa	2.8-4.2 MPa	11-20 MPa	34-46 MPa
Shrinkage	Water-dependent	Water-dependent	0.004%	0.02%
Vibration Dampening	Very Little	Little	High	Very High
Bond Strength	Very Low	Low	High	Very High
Typical Installation Life	5-10 years	10-15 years	>30 years	>30 years

# Why Epoxy is Preferred for Dynamic Equipment

1. Holding precise alignment
2. Increased load transference and vibration dissipation
3. Superior foundation protection



# Advantages of Epoxy over Cement

## Why precise alignment is important

1. Decreased shaft deflection
2. Increased operating efficiency
3. Decreased operating costs



**Chockfast** epoxy grouts and chocks hold precise alignment throughout the life of the equipment.

# Advantages of Epoxy over Cement

## Hazards of Vibrations to Dynamic Equipment

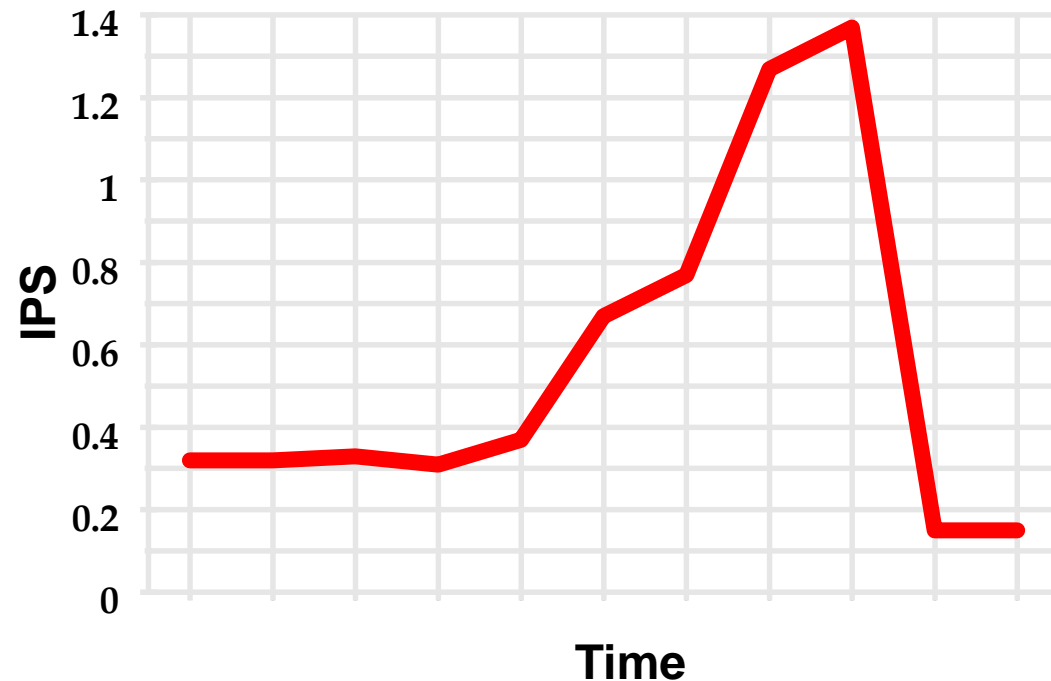
1. Higher maintenance costs
2. Higher operating costs
3. More often and less predictable failures



**Chockfast** epoxy grouts and chocks absorb, dampen and dissipate vibrations.

# Vibrations Case Study

- 4 Process Water Pumps
- No Grout on Iron Base
- Maintenance Costs
  - \$8,000 per pump/annually
- Re-Installed New Concrete Pads & Epoxy Grout
- Avg Vibrations 1.4 IPS to less than 0.15 IPS
- \$40,000 Cost Paid in 13 months



# Advantages of Epoxy over Cement

## Damage to Concrete Foundation

1. High vibrations from dynamic equipment
2. Exposure to acids, salts, & precipitation
3. More often and less predictable failures



**Chockfast** epoxy grouts and chocks protect foundations and prevent damage.

# Advantages of Epoxy over Cement



# Case Histories

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# Crusher Case History #1

- Gold Mine in remote Ontario, Canada
- 1,200 hp crusher
- 550 to 1765 standard ton per hour (stph) capacity
- Reinstalled on epoxy grout after failure of previous transfer medium



**Chockfast** was selected and installed for an emergency foundation repair, while the other 3 crushers nearby were still in operation.

# Crusher Case History #2

- Copper mine in Tayahua, Mexico
- Reinstallation of cone and jaw crushers mounted with epoxy grout during maintenance turnaround
- 15,500 Ton/day process capacity
- Two layers of grouting:
  - Chockfast Red (10")
  - Chockfast Orange (1")



# Crusher Case History #3

- Copper mine in Buenavista del Cobre, Mexico
- New installation of 14 crushers mounted with Chockfast Orange
- 250,000 Ton/day process capacity
- 3th largest copper mine in the world
  - 512,000 ton/yr



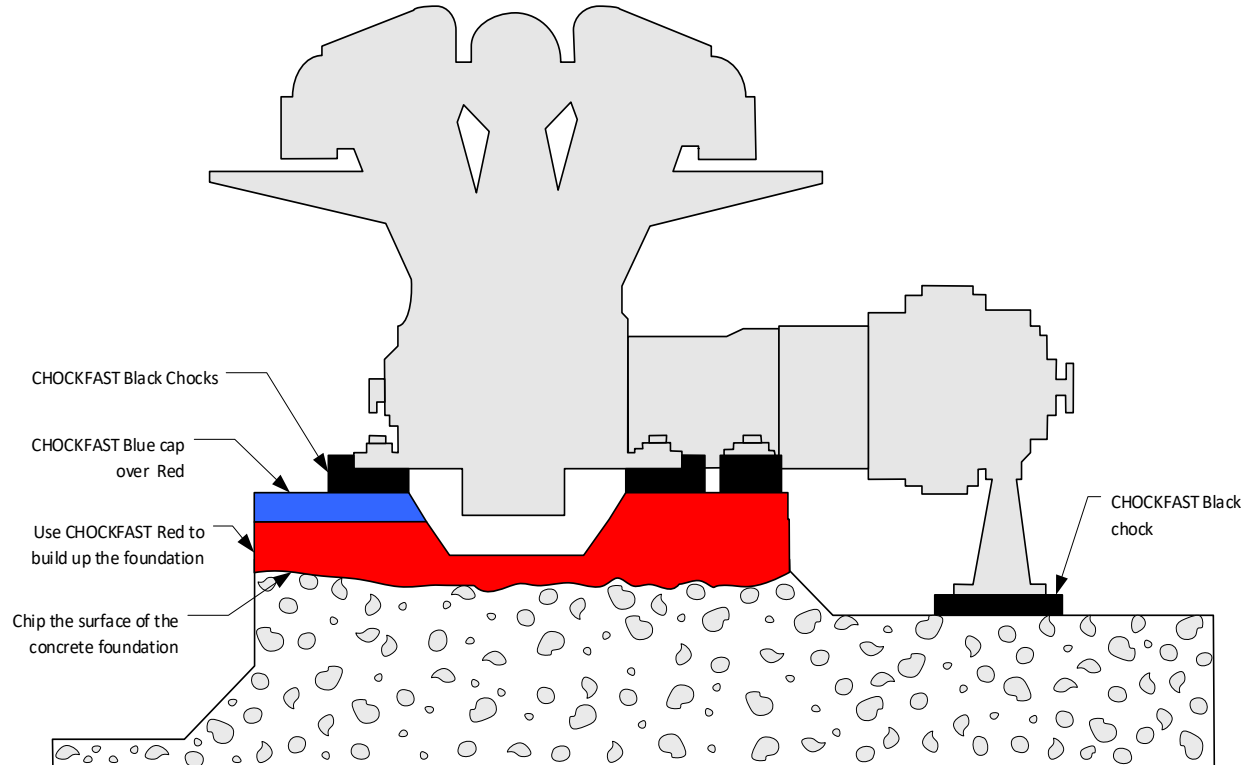
# Conclusion

Selection of the proper transfer medium to match the needs of the application is key to the long-term reliability of the equipment and the installation.

By properly matching dynamic equipment with epoxy transfer mediums and technical expertise, the results are:

- **Increased equipment reliability**
- **Increased equipment up-time**
- **Decreased maintenance costs**
- **Decreased overall operating costs**
  - **Increased profitability**

# Thank You



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