

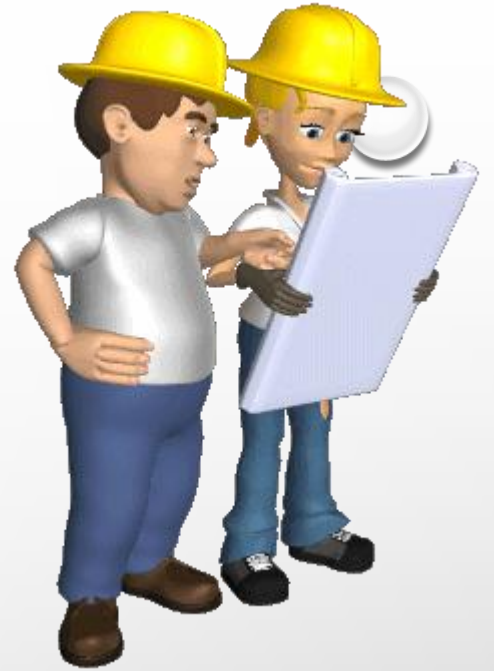
# PUMP MAINTENANCE

FOR WATER & WASTEWATER PERSONNEL



# STARTING POINT

- NEW PUMPS
  - PERFORMANCE PARAMETERS
  - TEST & DOCUMENT
  - RE-TEST ANNUALLY
  - DOCUMENT ANNUAL TESTING



# STARTING POINT

- NEW PUMPS
- PERFORMANCE PARAMETERS
  - AMP DRAW
  - FLOW RATE
  - PRESSURE



# STARTING POINT

- **OLD** PUMPS
- PERFORMANCE PARAMETERS
  - AMP DRAW
  - FLOW RATE
  - PRESSURE



# STARTING POINT

- **OLD** PUMPS
- PERFORMANCE PARAMETERS
  - USE HISTORY (IF DOCUMENTED)
  - O&M



# MAKE IT LAST...

- **EQUIPMENT IS A MECHANICAL EMPLOYEE,  
GIVE IT A LONG AND HEALTHY CAREER.**
- **INSPECTION**
- **BASIC CARE**
- **TUNING**



# INSPECTION

- OPERATOR'S ROUNDS ARE THE MOST FREQUENT PREVENTIVE MAINTENANCE ACTIVITY



# INSPECTION

- USE YOUR SENSES
  - LOOK IT OVER
  - LISTEN FOR TROUBLE
  - TOUCH THE PARTS
    - HEAT
    - VIBRATION
- ANYTHING CHANGED?





# INSPECTION

- WE CALL IT “RUSTY” FOR SHORT



# INSPECTION

- LOOK IT OVER
  - PAINT IN GOOD CONDITION?
    - FLAKING OFF
    - CHANGE OF COLOR DUE TO HEAT
- ANYTHING CHANGED?



# INSPECTION

- LISTEN FOR TROUBLE
  - LOUDER THAN USUAL
  - WHINING OR SINGING
  - THUMPING OR KNOCKING
- ANYTHING CHANGED?



# INSPECTION

- TOUCH THE PARTS
  - ANYTHING LOOSE?
  - HEAT
  - VIBRATION
- ANYTHING CHANGED?



# BASIC CARE

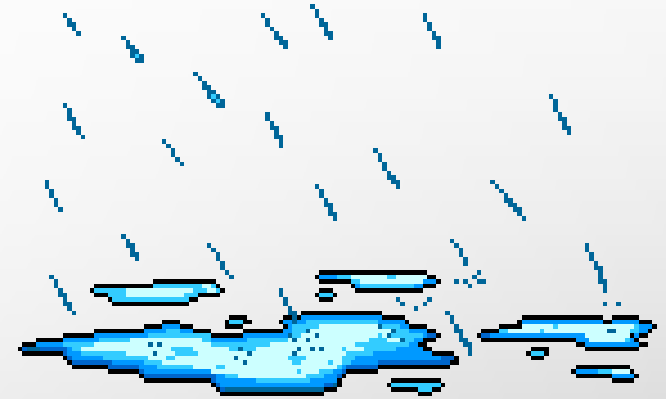
- LOOK FOR LEAKS
- BEARINGS ARE YOUR FRIENDS
- VEXING VIBRATIONS
- PERFORMANCE PARAMETERS
- EXTRA-EXTRA-READ ALL ABOUT IT!



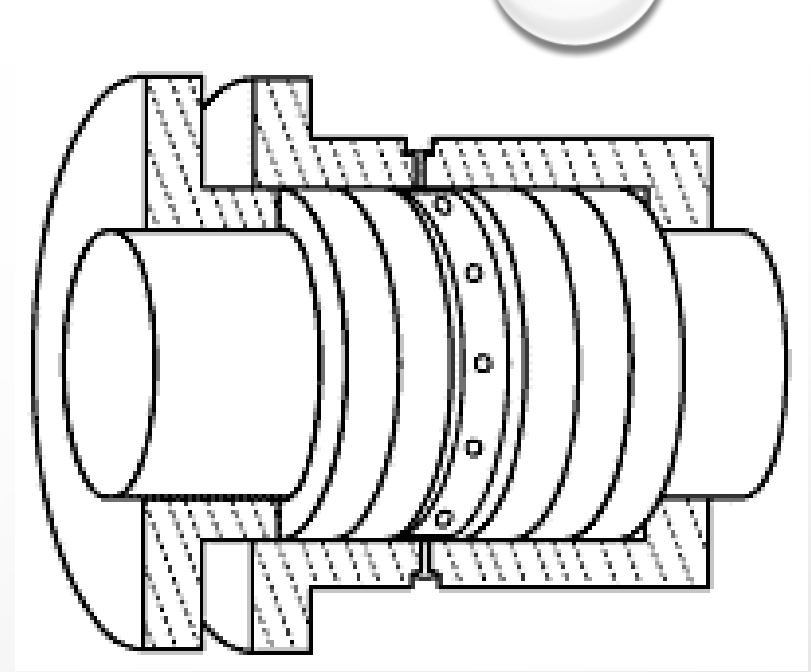


# BASIC CARE

- LOOK FOR LEAKS
  - PUMPS WITH MECHANICAL SEALS SHOULD NOT LEAK
  - PUMPS WITH PACKING MUST DRIP
  - NEVER FROM THE CASING
- RUSTY IS NEVER A GOOD NICKNAME FOR A PUMP

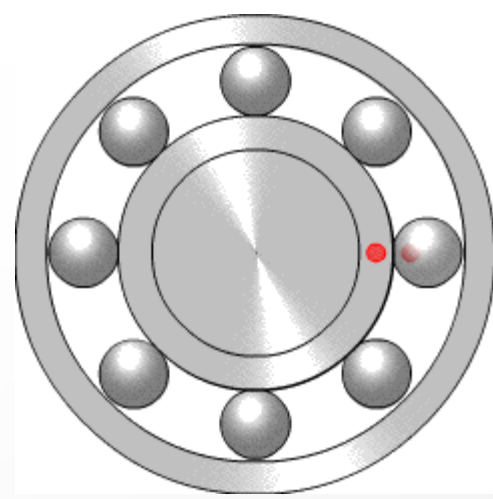


# BASIC CARE



- HOW MANY RINGS OF PACKING?

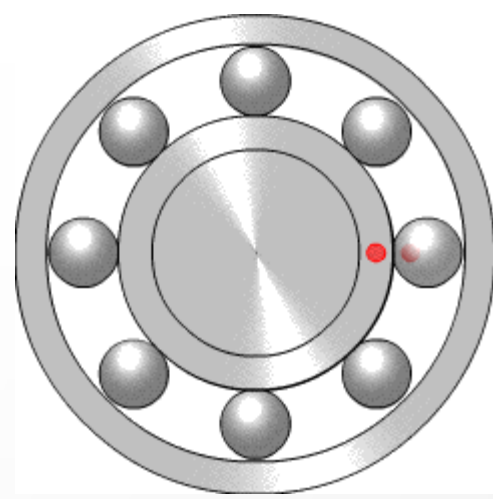
# **BASIC CARE**



- **BEARINGS ARE YOUR FRIENDS**
- **O&M RECOMMENDATIONS**
- **WARRANTY**

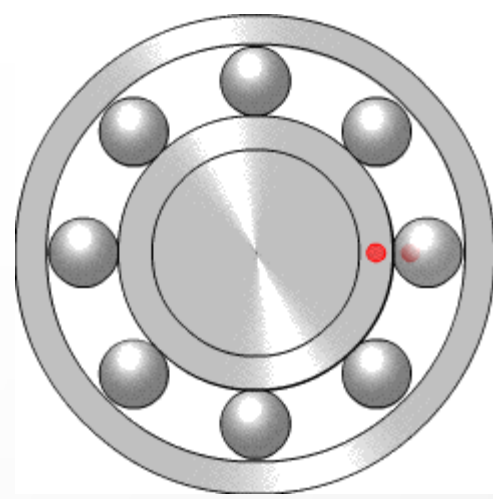


# **BASIC CARE**



- **BEARINGS ARE YOUR FRIENDS**
- **QUANTITY**
- **MIXING**
- **CLEAN & DRY**

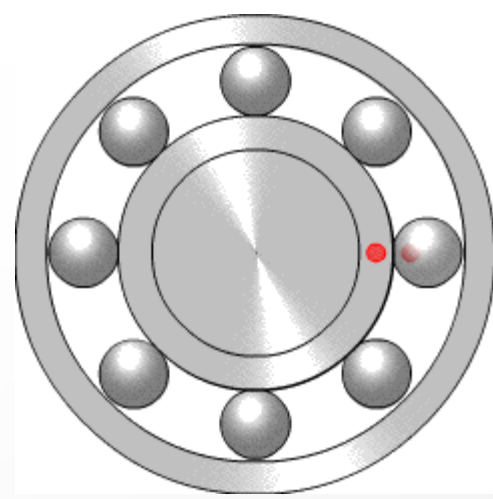
# BASIC CARE



- **BEARINGS ARE YOUR FRIENDS**

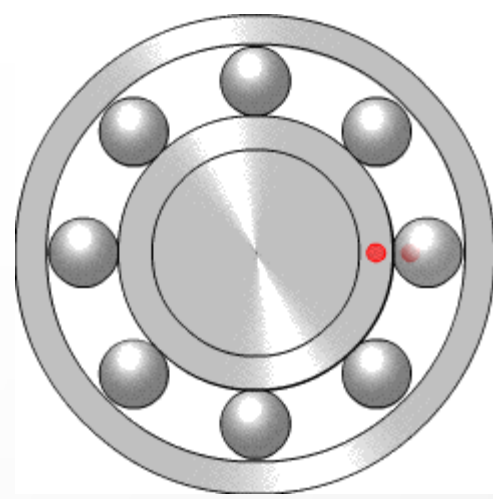
- TURN IT OFF
  - IF POSSIBLE
  - IF NOT POSSIBLE

# BASIC CARE



- **BEARINGS ARE YOUR FRIENDS**
- IF NOT POSSIBLE
  - SLOW STUFF
  - FAST STUFF

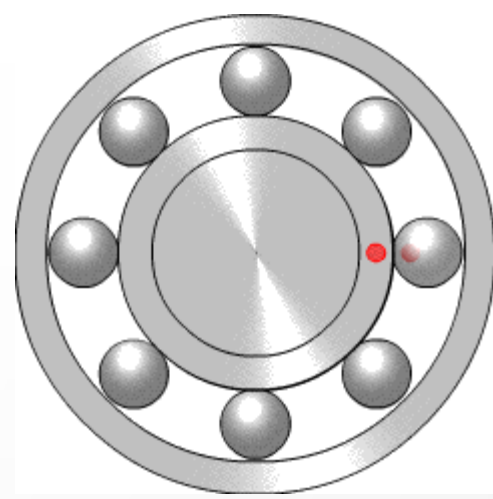
# BASIC CARE



- **BEARINGS ARE YOUR FRIENDS**

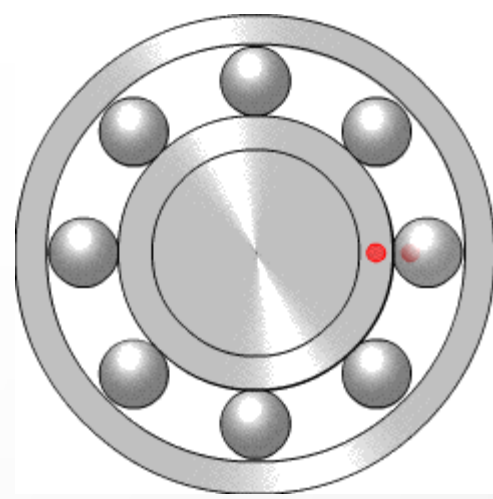
- IF YOU TAKE IT APART, GET A  
NEW ONE

# BASIC CARE



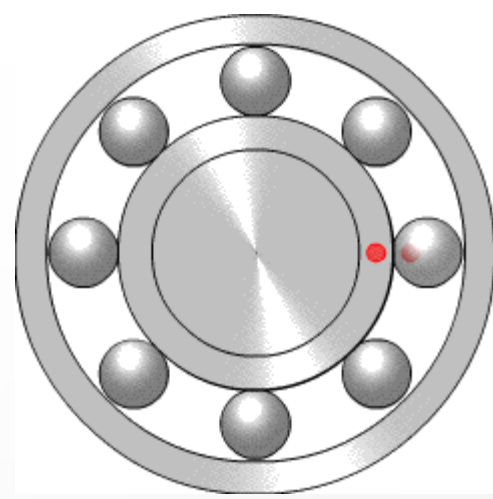
- **BEARINGS ARE YOUR FRIENDS**
- IF YOU TAKE IT APART,
  - DON'T DROP IT, A DROPPED BEARING IS SCRAP

# BASIC CARE



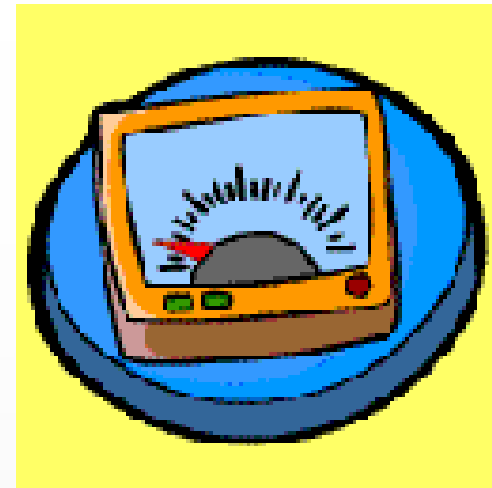
- **BEARINGS ARE YOUR FRIENDS**
- IF YOU TAKE IT APART, WATCH OUT FOR THE PARTS CLEANER

# BASIC CARE



- **BEARINGS ARE YOUR FRIENDS**
- **DON'T RE-USE**

# BASIC CARE

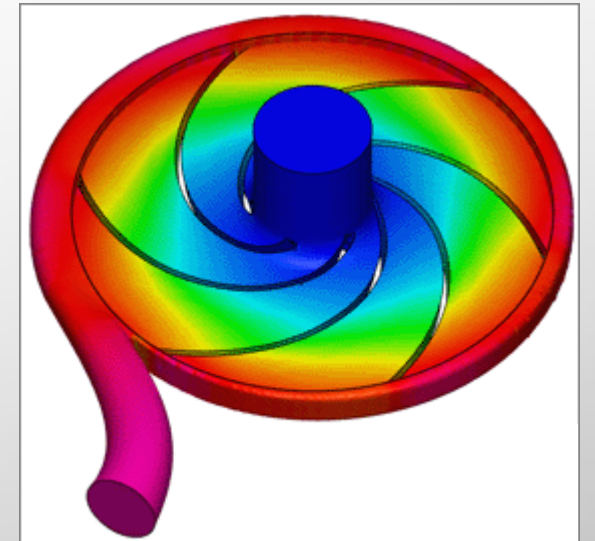


- VEXING VIBRATIONS
  - HIGH SPEED EQUIPMENT WILL HAVE A VIBRATION SPECIFICATION
    - O&M
    - FOUNDATION
    - IMPELLERS



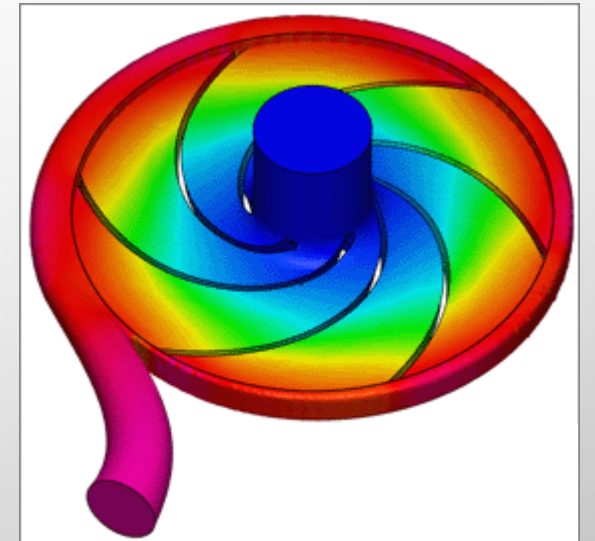
# BASIC CARE

- PERFORMANCE PARAMETERS - CENTRIFUGAL
  - NAMEPLATE DATA
    - - GPM @ FT OF HEAD
    - HP
    - RPM
    - SERVICE FACTOR & INSULATION



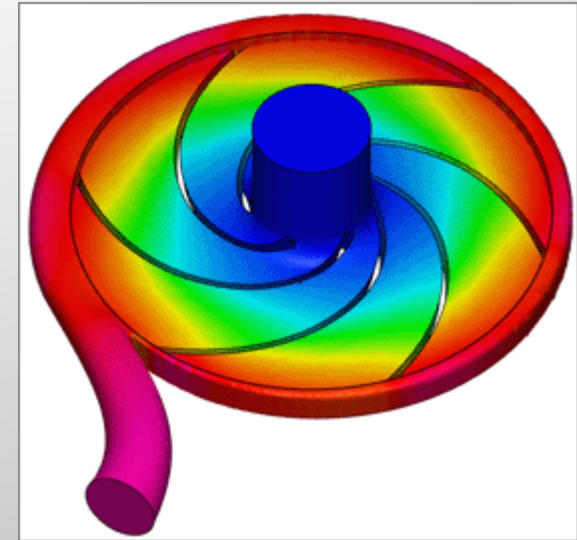
# BASIC CARE

- PERFORMANCE PARAMETERS - CENTRIFUGAL
  - PUMP CURVE –
    - ACCEPTABLE OPERATING RANGE
    - NET POSITIVE SUCTION HEAD - NPSH
    - NET POSITIVE DISCHARGE HEAD - NPDH
  - PRESSURE GAUGES – ACTUAL NPSH & NPDH CONDITIONS
  - FLOW METER – GPM



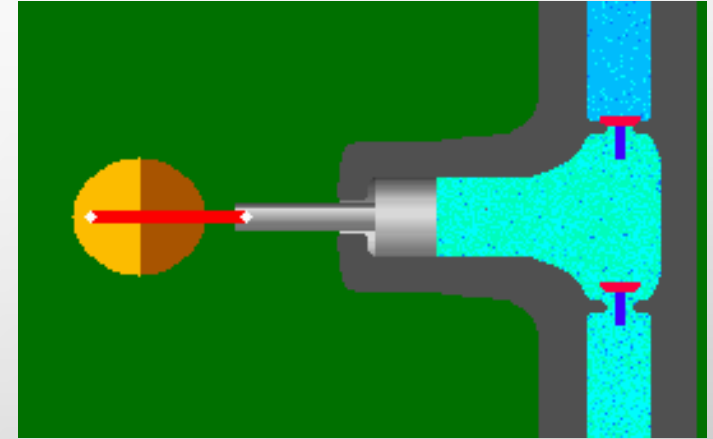
# BASIC CARE

- PERFORMANCE PARAMETERS - CENTRIFUGAL
  - REPLACEABLE WEAR COMPONENTS
    - PACKING
    - WEAR RINGS
    - IMPELLERS



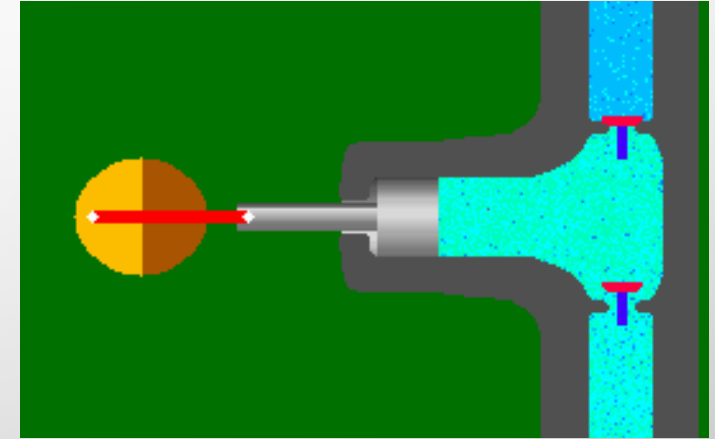
# BASIC CARE

- PERFORMANCE PARAMETERS — POSITIVE DISPLACEMENT
  - NAMEPLATE DATA —
    - HP,
    - GPM,
    - MAX PRESSURE



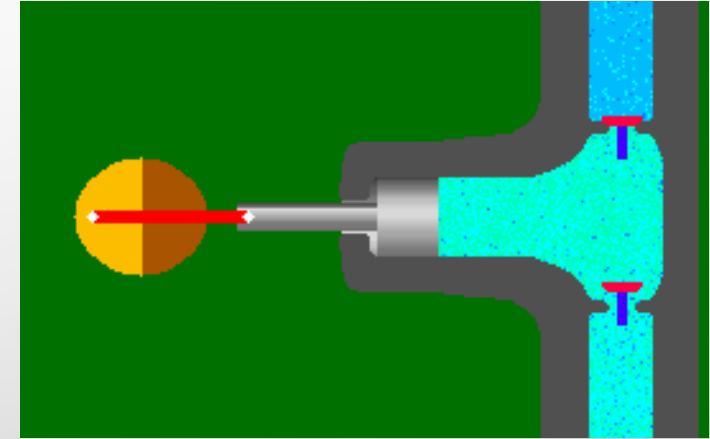
# BASIC CARE

- PERFORMANCE PARAMETERS – **POSITIVE DISPLACEMENT**
  - PUMP CURVE
  - PRESSURE GAUGES
  - FLOW METER



# BASIC CARE

- **PERFORMANCE PARAMETERS — POSITIVE DISPLACEMENT**
  - **SAFETY DEVICES**
    - **WATER HAMMER REDUCERS**
      - **SURGE TANKS**
      - **PIPING DESIGN**
    - **RUPTURE DISKS**
    - **BYPASS SYSTEMS**



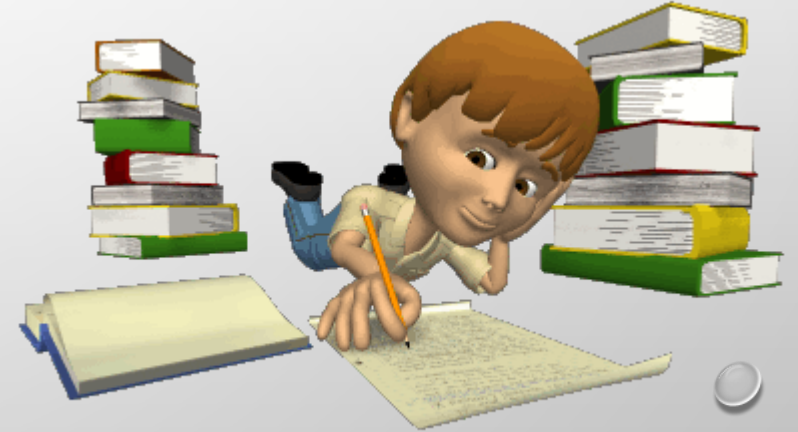
# BASIC CARE

- PERFORMANCE PARAMETERS
  - TEST PERFORMANCE ANNUALLY
  - DOCUMENT ANNUAL TESTING



# BASIC CARE

- EXTRA-EXTRA-READ-ALL-ABOUT-IT!
  - O&M MANUAL(S)
  - PLANT SPECIFICATIONS
  - WORK ORDER HISTORY





# TUNING



- **PUMP OUTPUT – CENTRIFUGAL**
  - SPEED - VARIABLE FREQUENCY DRIVES
  - SPEED – EDDY-CURRENT CLUTCH/MAGNETIC DRIVES

# TUNING



- **PUMP OUTPUT - CENTRIFUGAL**
  - GPM - FLOW CONTROL DISCHARGE VALVES  
(NEVER SUCTION)
  - GPM – IMPELLER SIZE

# TUNING



- **PUMP OUTPUT – POSITIVE DISPLACEMENT**

- SPEED=GPM - GEAR REDUCERS & SHEAVES
- VOLUME=GPM - VARYING STROKE LENGTH

# THE WRAP UP

- ROUNDS
- PAINT & KEEP IT CLEAN
- READ ALL ABOUT IT
- LOOK, LISTEN & TOUCH
- TEST & DOCUMENT

