# HIGGINS GENERATING STATION

# ACC FAN HUB FIXTURE

A SAFE AND EFFICIENT WAY TO SUPPORT FAN HUB AND BLADES DURING A GEAR REDUCER CHANGE OUT.

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# SOME ISSUES THAT NEED TO BE OVERCOME WHEN CHANGING GEARBOXES.

FAN AND HUB ASSEMBLY DIFFICULT TO HOLD IN POSITION WITH GEAR REDUCER REMOVED.

INABILITY TO HAVE STRAIGHT RIGGING CONNECTIONS

WIND UPDRAFTING THROUGH CELL

# ORIGINAL METHOD LEFT MUCH TO BE DESIRED WHILE WORKING.

RIGGING APPROACH BEGINNING TO BE UNSAFE.

COME-A-LONGS HAVING DIFFERENT LOAD BEARING AT EACH POINT

HARD TO KEEP LEVEL AND IN POSITION

# HUB HARDWARE INTERFERES

# ODD NUMBER OF BLADES

- In addition to bolts, clamps, balance weights, and the offset position of hub to frame work, clearance issues that make supporting the hub and blade assembly difficult in the best of situations. This often leads to shortcuts being taken in order to ‘get the job done’. The shortcuts, while not exactly unsafe still leave a margin of uncertainty while working around the rigged assembly.

# THE "FIX"

- AFTER MUCH CONSIDERATION, DISCUSSION AND SEVERAL CHANGES OF GEAR REDUCERS THE NEED FOR A BETTER WAY TO HANDLE A GEARBOX CHANGE-OUT WAS BROUGHT TO THE FRONT.

- ORIGINAL DESIGN PLAN BY THE MECHANIC'S AT HIGGINS LED TO AN ENGINEERED DESIGN FINISHED PRODUCT.

FOLLOWING THE LOTO PROCEDURE, THE CELL FAN DRIVE MOTOR IS ELECTRICALLYLOCKED OUT AND TESTED TO BE SAFE FOR WORKING ON.

# SAFETY FIRST ALWAYS

# BLADE / HUB ASSEMBLY TIED OFF BEFORE WORK BEGAN

ROPE TIES TO STRUCTURE

LOOPED AROUND FAN BLADE

# TWO REMOVABLE CROSS BEAMS ARE INSTALLED AS SHOWN

NORTH END

SOUTH END

# FOUR B7 HI STRENGTH 1 ¼” ALL THREAD RODS WITH CLAMPING MECHANISIM (B7 HAS OVER 100K TENSILE STRENGTH)

HUB CLAMP IN POSITION

TWO RODS TIED INTO CROSS BEAM

# CLAMPED CROSS BEAMS TO MAIN GEAR REDUCER SUPPORT BEAMS

WEST SIDE

EAST SIDE

# CLAMPED IN POSITION BEFORE AND AFTER GEAR REDUCER REMOVAL

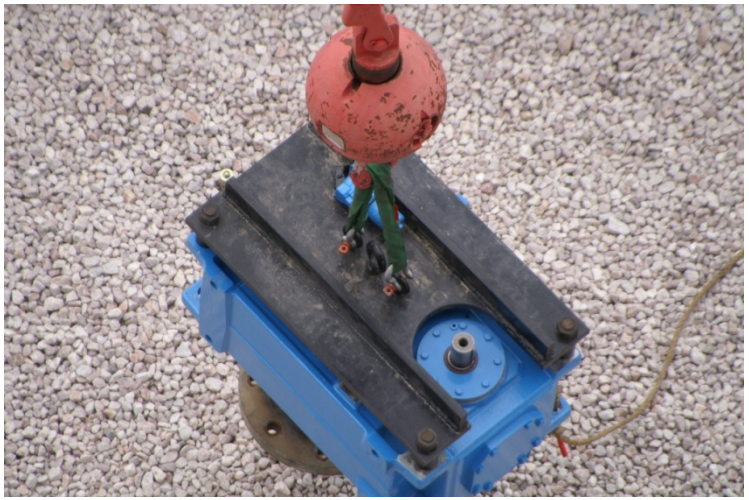
BEFORE REMOVAL

ALL FASTENERS TENSIONED IN POSITION.

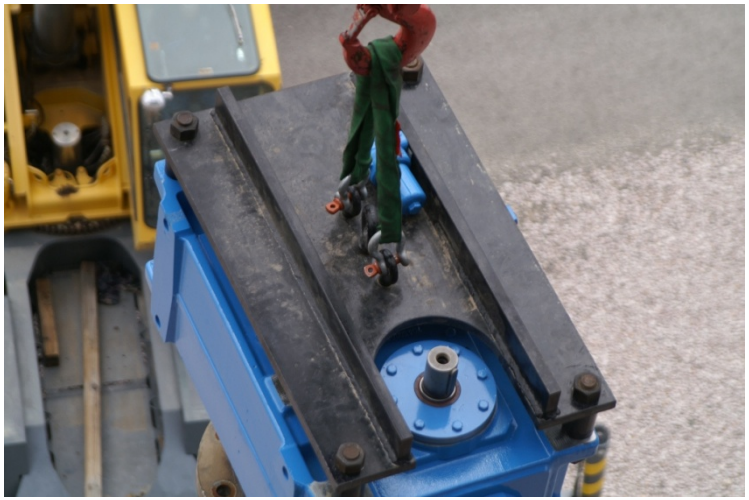
AFTER REMOVAL

(BOLTS PLACED INTO FIVE GALLON BUCKET)

# WITH THE ADDITION OF THE GEAR BOX FIXTURE TO HANDLE THE REDUCER, THE JOB IS SAFER AND HELPS LEAD TO BETTER / BEST PRACTICE'S



REBUILT BOX ON THE WAY UP



NOTE THE EYEBOLTS FOR RIGGING

# FIXTURE WORKS BETTER THAN EXPECTED AND IS SOLID IN POSITION

- THE COMPONENTS FIT IN (WITH SOME MANUVERING) TO A STABLE POSITION.
- THE CLAMPS LOCK CROSS BEAMS IN POSITION
- THE RODS SHOWED NO SIGNS OF STRETCHING
- WHILE IN USE THE WIND WAS UPDRAFTING HARD THROUGH THE CELL AND THERE WAS LITTLE OR NO FLEXING OF BLADES / HUB.
- EASE OF SET UP COULD BE IMPROVED BY MAKING COMPONENTS OUT OF ALUMINUM (WEIGHT)

# THANK YOU

NVEnergy