Technical Library Implementation of Human Performance Improvement (HPI)

Presented by: Chad Dulac, Technical Writer
Hydro Generation Department

Date: January 10, 2022

Why we're here today

- Explain Standard Operating Procedure (SOP) shortcomings prior to 2019
- Explain how Hydro Engineering and Asset management unified CCPUD's Technical documents
- Showcase HPI methods that are actively implemented in all new or revised procedures

Legacy SOP shortcomings

- Multiple steps in a single line (increased confusion and lost steps)
- Minimal to no safety mentioned in document (at the beginning or throughout)
- Improper/hard to find document labeling, titling and storage
- Poor version control or duplicate copies (ambiguous or lost in drawers)

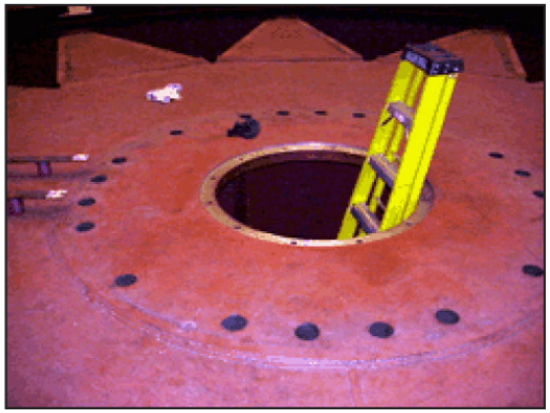
Title

Revised Jan. 7, 2002

References/
Versioning

Reference: Allis-Chalmers 10-500-322-401

1. When the Exciter Spool is unbolted from the top of the Rotor there is access into the rotor hub. This provides access to the inner holddown fasteners on 59-inch bolt circle.



Notes

Legacy SOP shortcomings (cont)

- Lack of continuity of information or format from plant/plant or doc/ doc
- No stated quality control or approval for crew use/ approval chain
- Disparity between maintenance and operational procedures

Safety

5. Grind welds off of the lock nut, full nut, and machine washers (20 fasteners total).

6. Extract Shear Dowels from outer bolt circle as described in item 3.

7. Clean all fasteners and shear dowels and store for Rotor installation.

Imagery/ Referencing

8. Attach the 470-ton Lifting Beam to the North and South Power House Bridge Cranes.

Future Photo

Assumed knowledge

Redesigning SOPs and the Tech Library

- Asset Management invited stakeholders to help create new SOP template and process (anti-silo)
- Technical Writers trained in HPI specifically related to PUDs (Lucas Eng)
- SMEs involved with designing new template (mech/ tech/ ops)
- Created new naming convention to include action based on District asset hierarchy

Redesigning SOPs (cont)

- 2 SOP templates created for universal use at all plants (plant/CM/ops)
- Authority approval chains codified with stakeholders
- New Technical Library created in Sharepoint (version control/ PDF)
- Older legacy SOPs hidden or converted to new format

New SOP standards using HPI

- Standardized templates/ formatting for use District Wide
- Stating pertinent information prior to steps (notes etc)
- Only relevant information (parts/ references/ weights/ safety)
- Action verbs used boldly to identify tasks for clarity.

Title

RR C1-C7 Rotor Removal Procedure

Procedure type: Project Maintenance

1.0 Introduction

1.1 General description- The generator rotor assembly consists of rotor spider, rotor hub, rotor poles and cooling fan. The rotor assembly is responsible for providing DC induced electromagnetic induction to the stator windings to generate 3-phase AC voltage.

1.2 Scope- This procedure covers removal of the rotor assembly but not disassembly or removal of other rotor components.

1.3 Preliminary considerations

- This procedure assumes unit Kaplan head, stub shaft, slip ring housing and upper bracket have been removed.
- Rotor pedestal is in place and mating surfaces cleaned.
- Ensure rotor pedestal has been leveled (as needed).
- Perform crane pre-inspection.
- Inspect Cal rod heater to ensure it works properly

watermark

2.0 Job Requirements

2.1 Staff/ crafts needed

- 2- Crane operators
- 8- Electricians and Mechanics
- Qualified Rigger

Clarified requirements and References

2.2 Skills and qualifications

- Crane operation

2.3 Tools and equipment

- Cal Rod heater (should be located at RR generator floor)
- 50' extension cords, 110V
- Florescent trouble light with magnet
- Rotor bolt PVC sleeves (for protection threads on removed bolts)
- Rotor dowel pin removal device (located on Generator floor behind C3 and C4)

2.4 Parts and materials

- (10-20) Masonite slats
- Extreme Pressure Ultra Moly or equivalent anti-seize grease

- Denatured alcohol
- Dry graphite

3.0 Safety

- Perform a pre-task plan prior to starting work.
- Notify affected crews and Operations of work to be performed.
- Perform pre-lift meeting with crane operators and persons directly involved with removal.
- Confined space entry permit required

4.0 References

4.1 Prints/ drawings – 2-51710-001 Rotor Spider and lower Shaft Coupling Arrangement

4.2 Manuals/ OMI/ associated procedures

- Allis-Chalmers 10-500-322-401
- RR Powerhouse Crane Tandem Control procedure

4.3 SRS/ data sheets (ITP)/ check sheets

- Crane inspection sheet (located in belly box inside crane cabinet)

4.4 Component weights

- Rotor weight = 772,400 lbs.
- Rotor spool weight = 50,000 lbs.
- Lifting beam weight= 62,000 lbs.
- Rotor with spool and lifting beam total weight = 884,400lbs.

5.0 Procedure

5.1 Remove rotor nuts

1. **REMOVE** inner rotor hub access cover **(see Figure 1).**
2. **REMOVE** all nut locking flat bars from nuts.
3. **MEASURE** distance between shaft flange and rotor hub spigot.

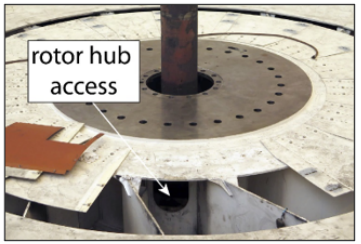


Figure 1- Rotor hub access panel removed

New SOP standards using HPI (cont)

- One task per line
- Tasks written at the appropriate user level
- Review/ Approval/ Publication guidance strictly followed
- Revision capability and version control enforced

5.2 Crane Coupling

1. **COUPLE** cranes according to RR Powerhouse Crane Tandem Control procedure.

5.3 Attach Lifting Beam to Powerhouse Cranes

NOTE: Perform inspection of lifting beam prior to attachment.

NOTE: Check all surfaces for loose items or tools prior to attaching lifting beam.

1. **INSPECT** fasteners and attachment points for fractures, wear or breakage.
2. **ROTATE** powerhouse crane 250-ton hoist picking eyes to ensure free movement.
3. **CLEAN** lifting beam pins and hook boss with denatured alcohol, and lubricate with dry graphite.
4. **ALIGN** each 250-ton hook with lifting beam boss.
5. **INSTALL** lifting beam pins **(see Figure 3)**.
6. **INSTALL** locking rods in pins **(see Figure 4 on page 4)**.

Figure 3- Lifting beam pin

Reviewed/Approved by:	*Description*	*Date*	*Version/ Revision number*
Mike Simpson/RR SME Scott Hanson CM-Jim Mayfield CM-Wenbo Jia EPM	*New Procedure. Document converted to new HPI template*	*09/09/19*	*Ver 1. Rev 0*
Mike Simpson/RR SME Scott Hanson, CM- Wenbo Jia EMP	*Made significant changes to personnel, tools, notes, warnings and cautions.*	*01/15/20*	*Ver. 2 Rev 0*

Summary

- Creating technical documents for Chelan County PUD is a complicated and detail-oriented exchange of information between mechanics, technicians, operators and supervisors in a multitude of departmental areas throughout the District.

- To ensure consistency of work for all crews, it is critical to build procedures that are **verified** to be **safe** and **accurate** by the people that use them.

Questions?