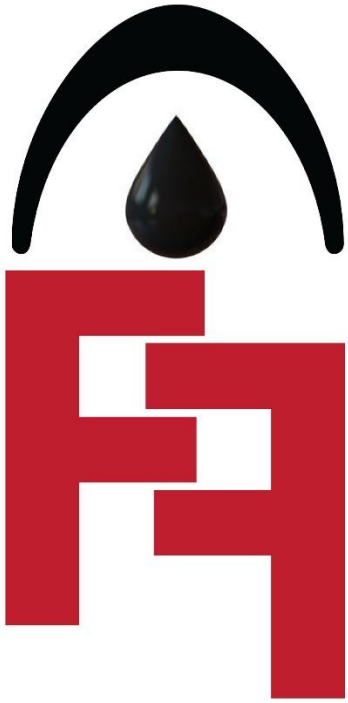
General Running Procedure

Procedure No: FT-RP-000

Rev: 02

Fermata™ Technologies



Approvals

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Revision Control

Rev	Description of Changes	Date Issued
00	Issued for use	11/03/2020
01	Understanding make up graphs, accessories	02/26/2021
02	Clarification Edits	11/01/2024

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1. Inspector and Certification Requirements

1.1. **Inspector:**

1.1.1. Only a Certified Field Service Technician may inspect and repair Fermata™ connections.

1.2. **A Certified Field Service Technician is someone who:**

1.2.1. Has been certified by a Fermata™ Representative.

1.2.2. Holds a valid Fermata™ Field Service Technician Certificate.

2. Cleaning And Drifting

2.1. **Cleaning:**

2.1.1. Remove thread protectors and clean the connections immediately before running casing. Connections should not sit for an extended period of time without some form of corrosion prevention such as light oil.

2.1.2. All thread or storage compound should be removed from the pin and box during the cleaning process.

2.2. **Drift:**

2.2.1. All casing shall be drifted prior to running.

2.2.2. Compressed air may be used if available prior to drifting. Each joint must be blasted from box end to pin end.

- Drift mandrel shall meet API dimensional requirements and a special drift mandrel shall be used when applicable,

2.2.3. Drift from box end to pin end to ensure the mandrel does not damage the connection

2.2.4. Use a plastic drift mandrel on all internally coated and CRA (Corrosion Resistant Alloy) pipe.

2.2.5. If any joints do not drift, the joints shall be clearly marked red and segregated from the remaining prime joints.

2.2.6. The drift mandrel should slide easily through the pipe, do not force it.

3. Running Tools

3.1. **Crossover subs**:

3.1.1. Crossovers from a Fermata™ connection to an API connection are used for well control and cementing. The pin and box ends shall be inspected prior to each use.

3.2. **Handling plugs:**

3.2.1. Handling plugs shall be inspected prior to use. Only authorized handling plugs that are manufactured by OFSI shall be used.

3.2.2. Handling plugs are required when running integral connections and recommended in threaded & coupled connections to protect the box.

3.2.3. Handling plugs are not lift plugs and shall not be used to support the weight of the string.

3.2.4. Handling plugs are required for threaded & coupled connections if tools will be run inside the coupling during make-up.

3.2.5. Clean and inspect handling plugs prior to each casing run.

3.2.6. Always keep handling plugs and box connections free of debris.

3.3. **Stabbing guides:**

3.3.1. Fermata™ recommends the use of a stabbing guide to prevent cross-threading and damage during stabbing.

3.4. **Thread Protectors:**

3.4.1. Install thread protectors prior to any movement of the pipe.

3.4.2. Verify the correct thread protectors are being used.

3.4.3. Do not remove the pin connection thread protector until the joint is ready to stab to prevent damage from accidental mishandling.

3.4.4. Quickie protectors may be used if they do not fall off.

3.5. **Low Torque Valves (LTV):**

3.5.1. All LTV's have a 2 inch by 1502 connection on top and bottom. The valves are rated for 10,000 PSI. All valves shall have the following inspected before and after use:

- Check all seal rings for tears or damage.
- Look for any damage to the valve body.
- Make sure the valve opens and closes, then leave in the open position.

3.6. **Circulating Swage:**

3.6.1. The circulating swage is designed to circulate drilling fluid. The following should be checked on all circulating swages before and after use.

- The ID/OD for damage.
- Check for burrs, dent, tears, and rust and out of roundness on the LC or BC side.
- Check all seal rings for tears or damage.

4. Equipment

4.1. **Elevators:**

4.1.1. **Single joint elevators:**

- Verify the correct size single joint elevator is being used. Single joint elevators shall only lift one joint.
- Single Joint Elevators can be ran with slings (cables) or with CRT arms.
- Center Latch Elevators can also be used as Single Joint Elevators when running an Internal CRT.

4.1.2. **Slip Type Elevators:**

- **Slip type elevators MUST** be used on all integral joint connections and special clearance threaded & coupled connections.
- **Air/Hydraulics slip type elevators:** The joint of casing will be stabbed through the center of the elevators. These will be run with single joint elevators as well, to lift the joint up in the derrick.
- **Manual Slip type elevators – Center Latch elevators with a spacer:** There must be a Spacer to ensure the dies do not bite down on the box on integral joint connections. The spacer pushes down on a plate that engages the dies which bite down on the OD of the pipe body and transfer weight to the dies **(This is important because handling plugs cannot support the weight of the string).**

4.1.3. **Collar Type Elevators:**

- **Collar type elevators:** May be used on threaded & coupled connections.
- **Side door collar type elevators: The** coupling face engages with the top of the elevator. All string weight will be on this point as there are no dies inside. It's critical that the elevators are the correct size. Having the wrong size can cause loss of life and/or dropping the string.
- **Center Latch Elevators: The** coupling face engages with the top of the elevator. All string weight will be on this point as there are no dies inside. It's critical that the elevators are the correct size. Having the wrong size can cause loss of life and/or dropping the string.

4.1.4. **Bottleneck elevators (Drill Pipe):**

- **Bottleneck elevators (Drill Pipe) shall not be used with any Fermata™ connections.** Bottleneck elevators are designed to work with rotary shoulder drill pipe connections – not casing connections.

4.2. **Casing running tool (CRT):**

4.2.1. There are two basic types of CRT's (1) Internal and (2) External. Some differences between the two are: internal tools generally have a lower torque output than external CRT's. However, internal CRT's can generally rotate faster than external CRT's. Care must be taken to ensure that the torque indicators and over-torque dump valves are accurate. If a CRT is used to make-up the connection, a dump test and calibration must be completed with the Top Drive and the torque sub. When the connection is stabbed, the CRT should be rotated counter clocker wise 1/2 of a turn to ensure the connection is not crossed threaded. If using an automated drill rig, a reference torque can be set to the top drive. This will slow down the CRT when the make-up torque hits the reference number. Set the low shoulder torque

number as the reference number. This will help prevent the top drive from dumping late and over-torquing the connection.

4.3. **Tongs:**

4.3.1. Power tongs shall be calibrated at least semiannually and be within the required torque range of the pipe size being run. It shall have the correct size jaws properly installed to prevent damage to the pipe.

4.3.2. Integrated back-up tongs are recommended for all sizes. A compression load cell must be used with integrated torques see torque turn section for more details.

4.3.3. Back-up tongs are recommended for the first 50 joints or until there is adequate string weight to prevent the string from rotating.

4.3.4. Power tong grip pressure should be as low as possible and the gripping area should be as large as possible prevent damage to the casing.

4.3.5. The snub line shall be at 90° to the power tongs arm and horizontal to ensure accurate torque readings.

4.3.6. The power tongs shall be perpendicular to the casing. A level may be used to ensure that the power tongs, back up tongs, and the snub line are horizontal.

4.3.7. The dump valve must be tested prior to running casing to ensure it is working properly (dead stick test).

4.3.8. The turns counter must be calibrated with the gears in the tongs prior to running casing.

4.4. **Torque turn:**

4.4.1. Torque turn monitoring is required for assessing a proper make-up of Fermata™ connections.

4.4.2. System must have torque vs turns. Torque vs time can also be used with torque vs turns however all graphs MUST have at a minimum have Torque vs turns displayed on the graph.

4.4.3. The graph requires the last section of the thread interference torque, transition to seal/shoulder interference, torque shoulder and final torque.

4.4.4. A torque shoulder must be visible (except for Constrictor™ Thread Form connections).

4.4.5. The torque shoulder must be properly marked in the graph for proper calculation of delta turn and delta torque.

4.4.6. The scale of the graph can cause the make-up graph to look different. If it is stretched, it will look like more turns were made. If it is shortened, it will look like fewer turns were made.

4.4.7. The operator must confirm the correct placement of the torque shoulder marking if the torque turn system uses automatic shoulder detection.

4.4.8. In case of a re-run, each joint shall be labeled with the same tally number as the previous make-up attempt following by a hyphen or a period and the make-up attempt number to indicate that it is subsequent makeup of the same joint. EXAMPLE: 105.1 or 105-1 is the first re-run of joint 105.

4.4.9. Only competent personnel such as Field Service Technicians certified by Fermata™ can approve torque turn graphs.

4.4.10. The unit should be capable of a minimum pulse rate of 500 samples per turn, with up-to-date calibration.

4.4.11. Improper equipment can result in poor make-up graphs and damage to the connection. See Image 1.

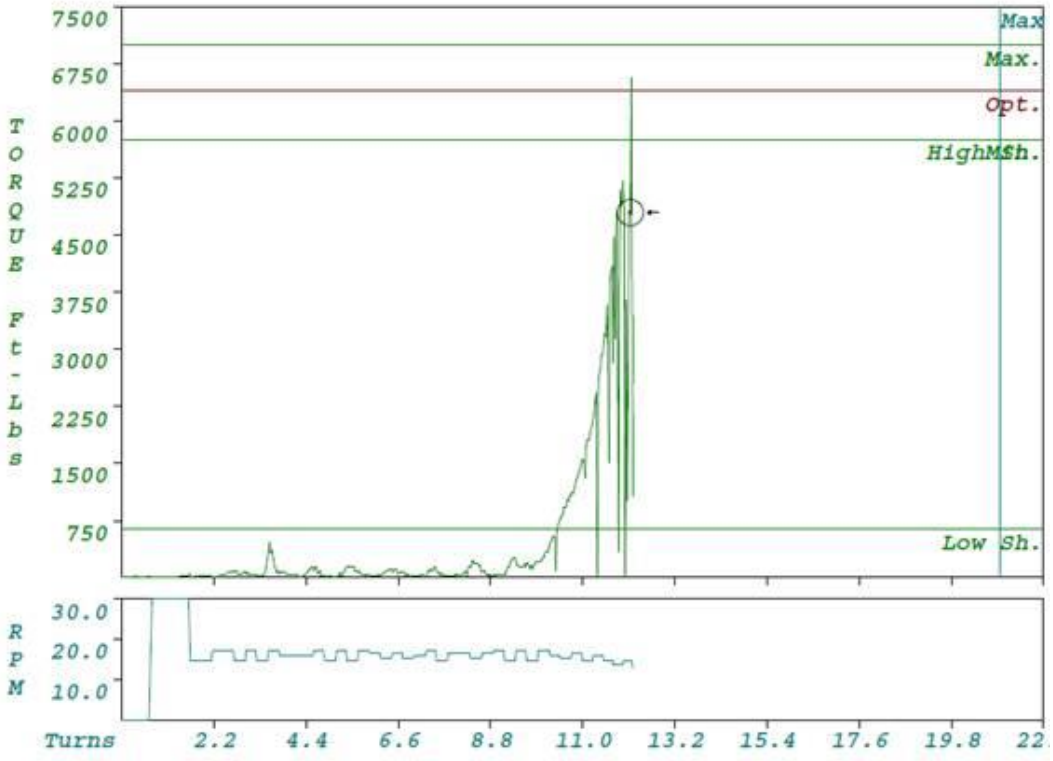

Image 1: Example of bad graph due to improper equipment

4.5. **Parts of a Torque-Turn System:**

4.5.1. Refer to image 2 for torque-turn system. Tension Load cell measures torque by pulling on the snub line when running power tongs.

4.5.2. Remote box sets on the tongs and lets the operator know what torque is being applied.

4.5.3. Turns counters attaches to the tongs and counts the number of turns.

4.5.4. Torque vs turn load cells measure torque readings as the turns counter counts turns.

4.5.5. Compression load cell measures torque by an arm on the back-ups pressing on it, when running integrated back-up tongs, a compression cell must be used.

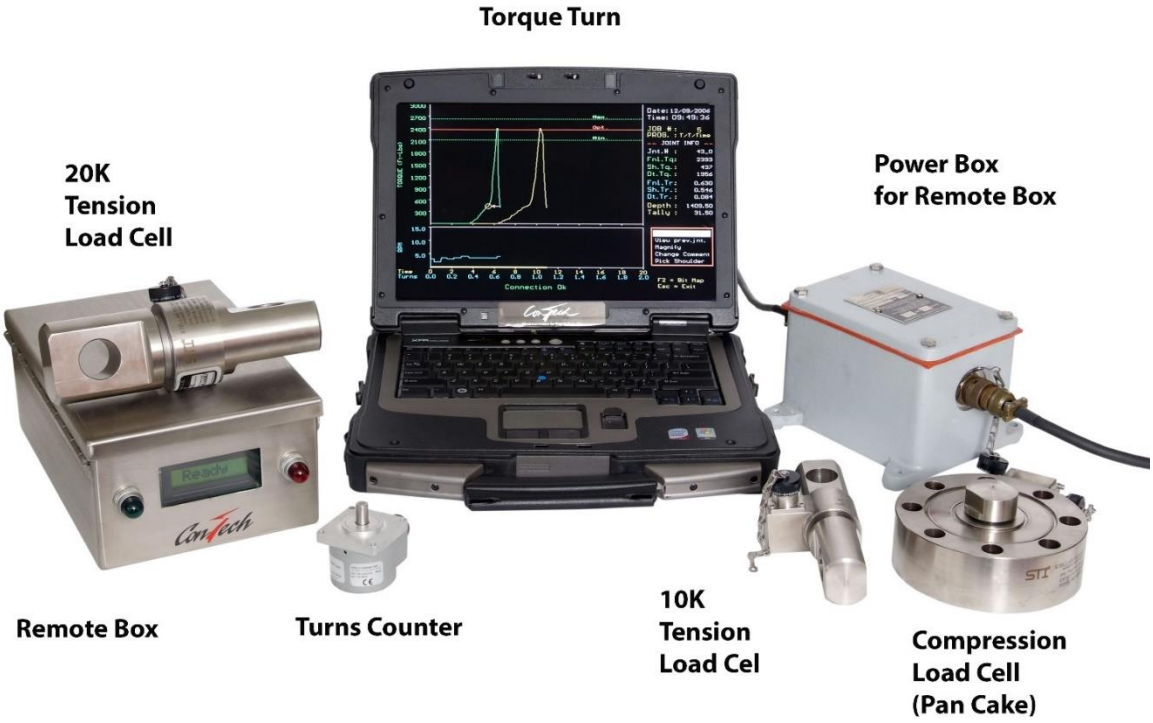

Image 2: Torque-Turn System (Photo Courtesy of ConTech)

5. Understanding Make-up Graphs

Graph Definitions:

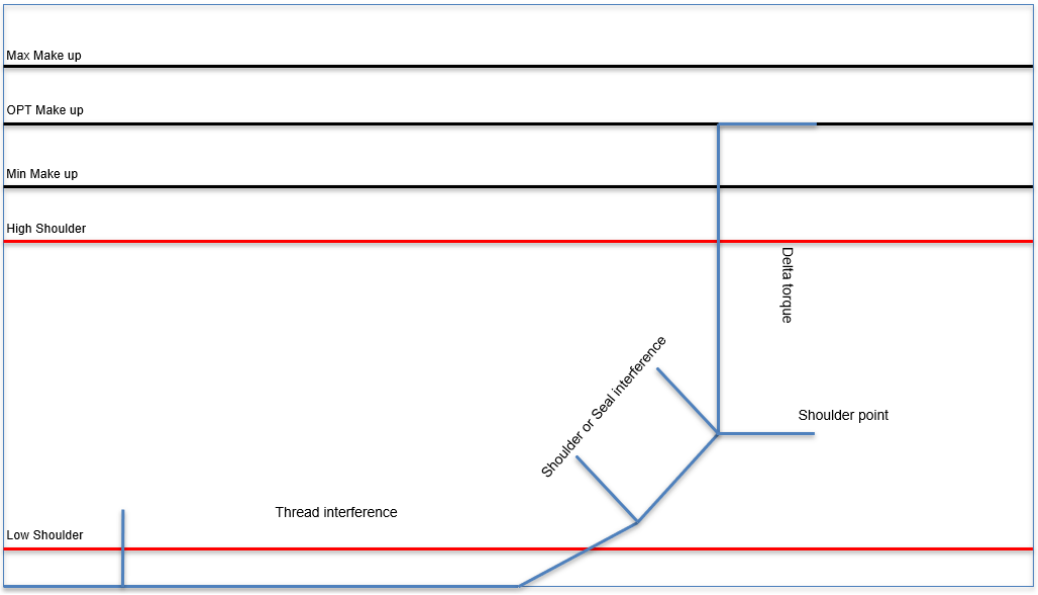

Image 3: Graph Detail

5.1. Thread inference is defined as the part of the graph where only torque generated by thread interference can be seen.
5.2. Seal interference is defined as the part of the graph where only torque generated by combined thread and seal interference can be seen. Shoulder point: this is where the shoulder points meet, and the graph will spike straight up
5.3. Delta torque is defined as the amount of torque past the torque shoulder contact.
5.4. Delta turns is defined as the amount of turns past the torque shoulder contact.
5.5. Dump torque is the point after the connection shoulders and torque has stopped being applied. It should be some were in between MIN and MAX torque.

5.6. **Acceptable make-up graph with a wave:**

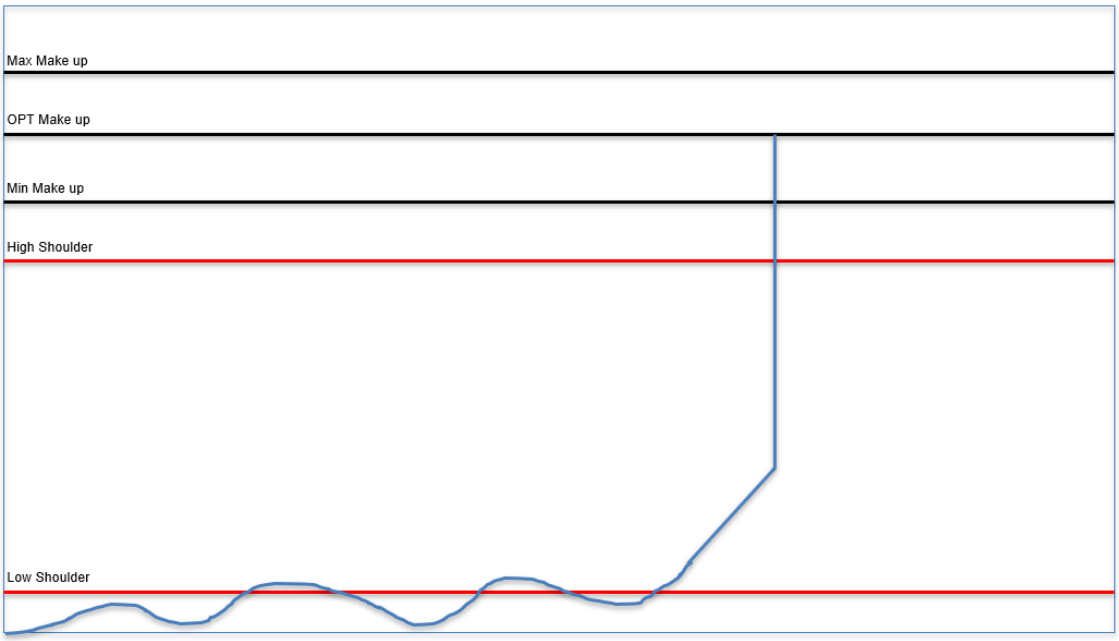

Image 4: Example of acceptable make-up graph with a wave

5.6.1. **Possible causes:**

- Too much thread compound
- The tongs are moving back and fourth.

5.6.2. **Solutions:**

- It has an acceptable shoulder and reached optimal torque. This is an acceptable make-up.

5.7 Acceptable make-up graph with a slip:

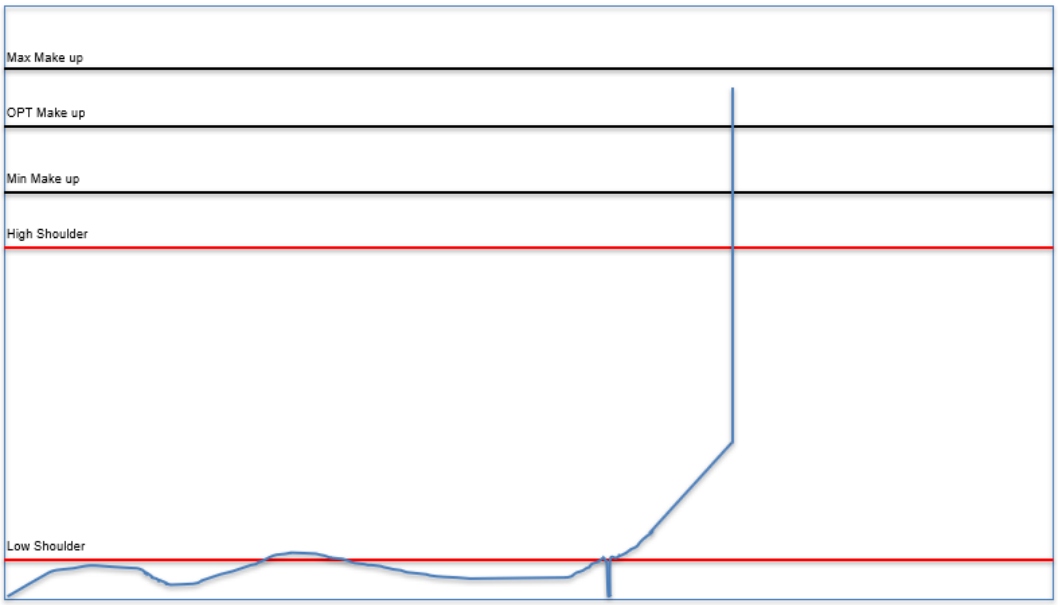

Image 5: Example of an acceptable make-up graph with a slip

5.7.1 **Possible causes:**

- The back-up tongs moved.
- The slips moved
- Late shift

5.7.2 **Solutions:**

- It has an acceptable shoulder and reached optimal torque. This is an acceptable make-up.
- String weight may fix this issue
- Have the tong operator shift earlier

5.8 Acceptable make-up with a slip after the shoulder point:

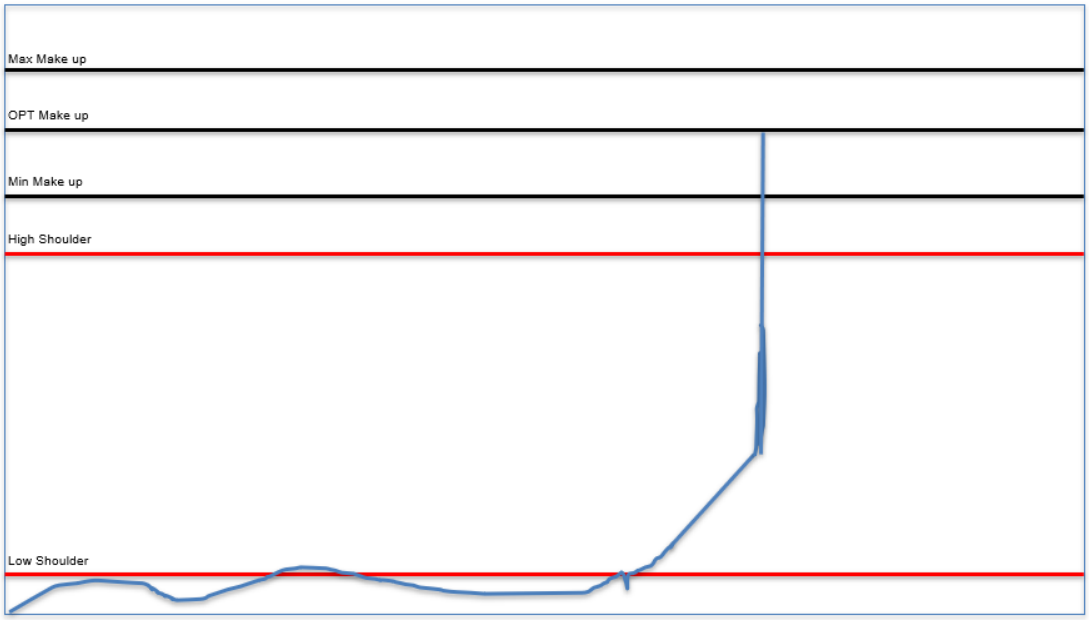

Image 6: Example of acceptable make-up with a slip after the shoulder point

5.8.1 **Possible causes:**

- The back-up tongs moved
- The slips moved
- The power tong dies slipped
- If using a CRT, the driller may have let off early and went back in

5.8.2 **Solutions:**

- It has an acceptable shoulder and reached optimal torque. This is an acceptable make-up.
- String weight may fix this issue
- Ensure the slips are chained down properly if not using hand slips
- Ensure the back-up tong dies are clean and are biting properly
- Ensure the power tong dies are clean and biting properly

5.9 Acceptable make-up with dope squeeze or a turning coupling:

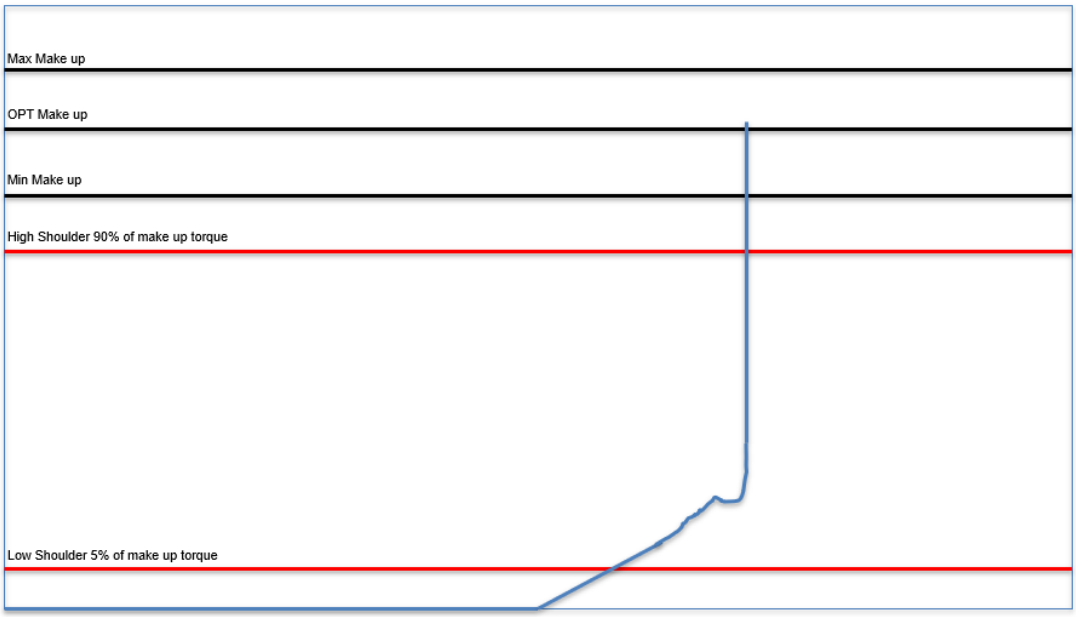

Image 7: Example of an acceptable make-up with dope squeeze or a turning coupling

5.9.1 **Possible causes:**

- Coupling turned
- Dope squeeze
- Drilling fluid overflowed

5.9.2 **Solutions:**

- Check the doping of the connection and ensure there is no thread compound in the seal or dope relief groove
- Verify the rig has good vertical alignment
- If a coupling turns on the next make-up, stop and bite the back-up tongs on the mill side of the coupling and complete the make-up
- If it has a clear shoulder, hit optimal torque, has no sign of yielding, and the coupling turned less than ¼ of a turn, then this is an acceptable make-up.

5.10 Acceptable make-up with a late dump:

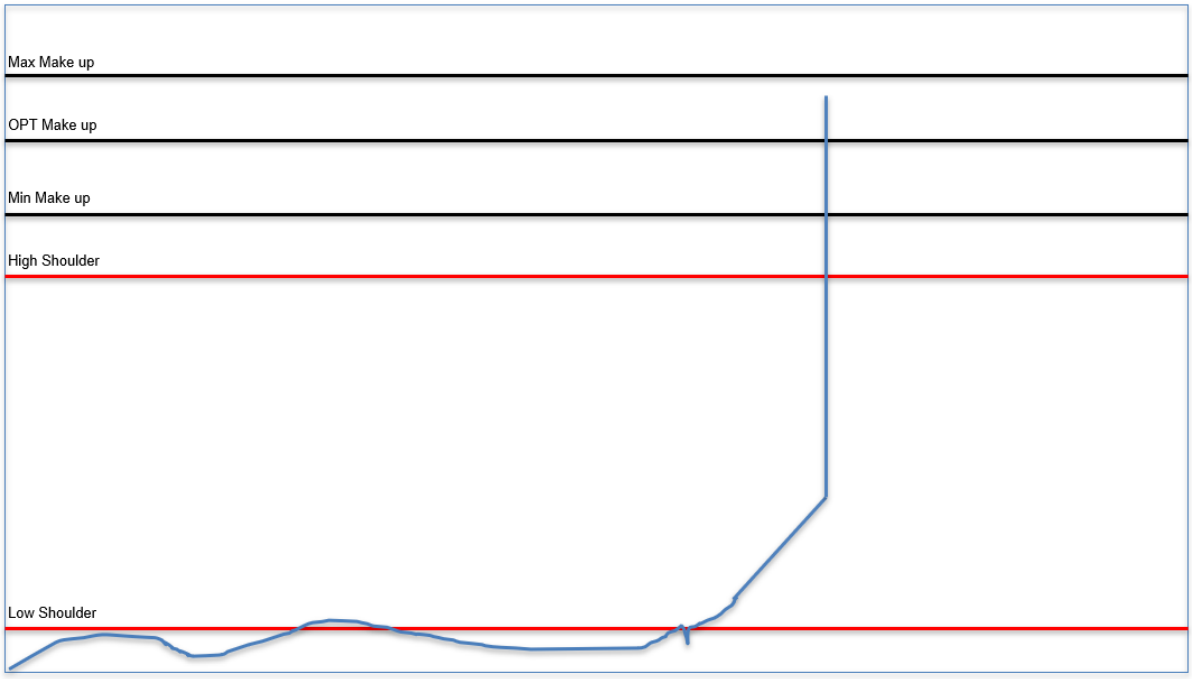

Image 8: Example of an acceptable make-up with a late dump

5.10.1 Possible causes

- High rpm in low gear or rpm not steady
- The power unit may be revved up too high
- If the torques are too close together the unit could dump late

5.10.2 Solutions:

- If the torque is close, lower the dump torque by a few hundred ft-lbs to get it to dump at optimum torque. Ensure the torque is not lowered too much and that the make-up still dumps above minimum torque
- Turn down the power unit
- This is an acceptable make-up if the final torque was lower than max operating torque and there is no indication of yielding.

5.11 Unacceptable make-up with a low shoulder and a yielding

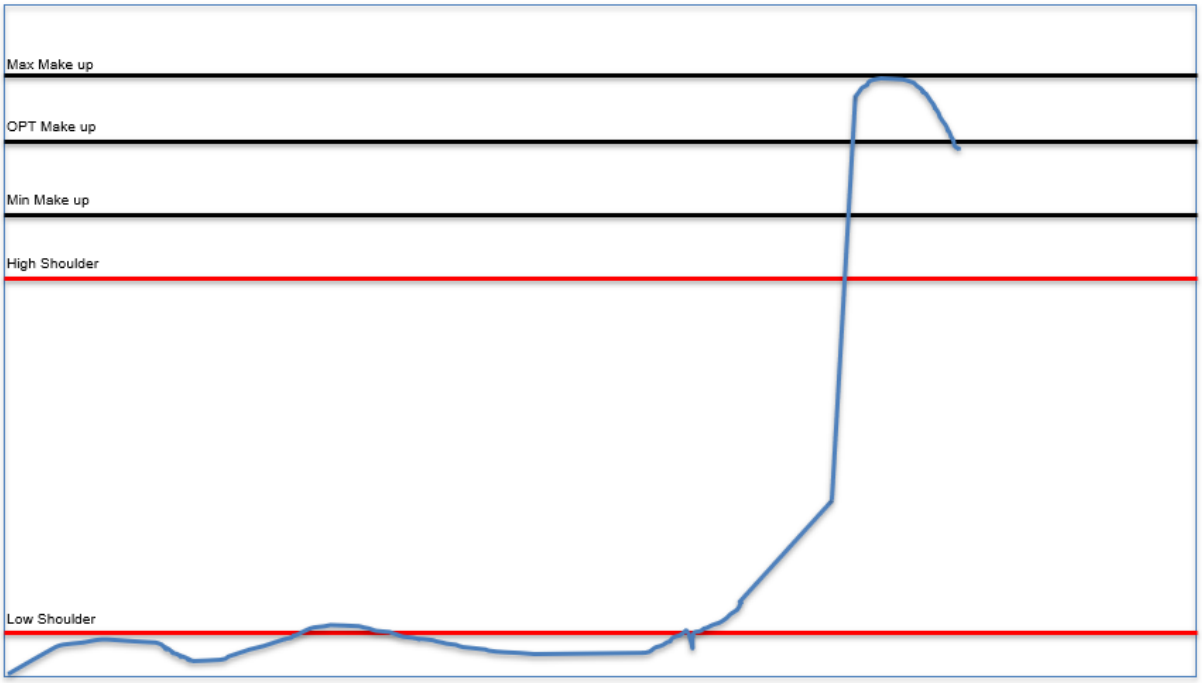

Image 9: Example of an unacceptable make-up with a low shoulder and a yielding

5.11.1 **Possible causes:**

- Seal damage
- Thread damage
- Over torqued
- Appling thread compound improperly

5.11.2 **Solutions:**

- Inspect seal for damage
- Check thread compound
- Back joint out and lay down pin and box

5.12 Unacceptable make-up with a high shoulder

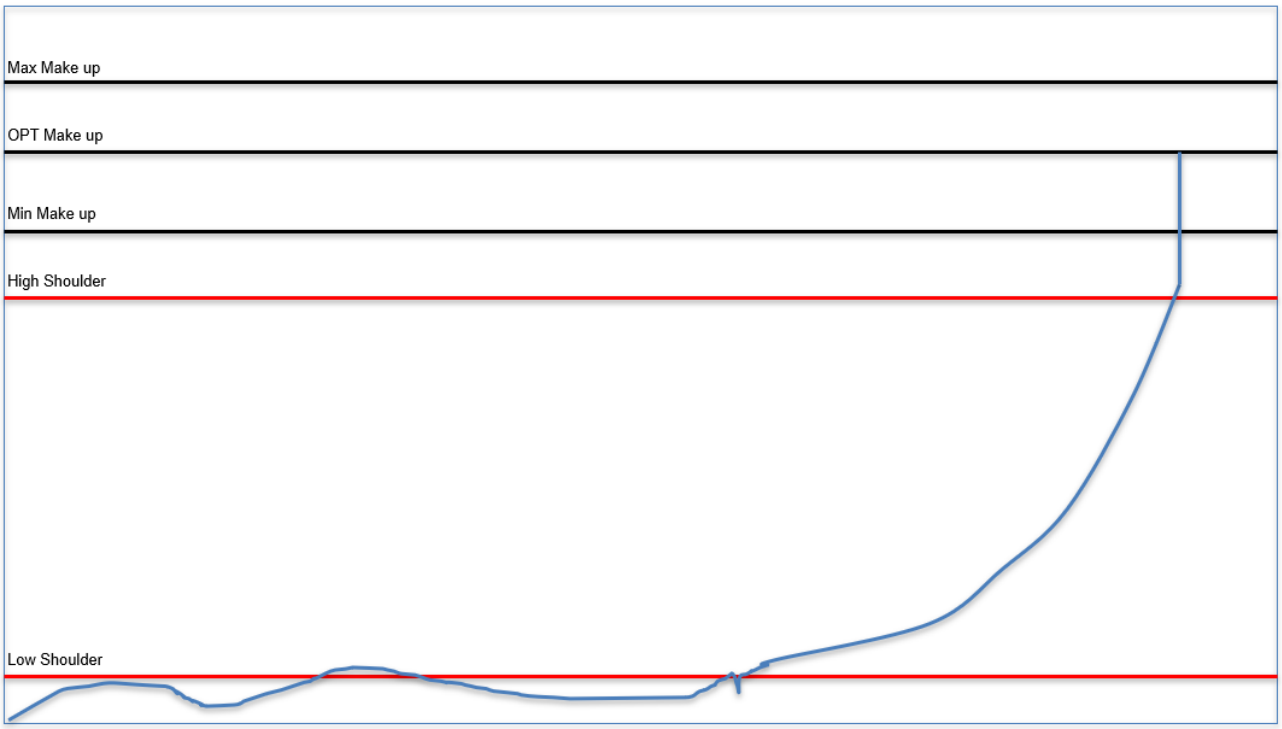

Image 10: Example of an unacceptable make-up with a high shoulder

5.12.1 **Possible causes:**

- Dirty threads
- Vertical alignment
- Thread damage
- Appling thread compound improperly
- Running thread lock with a factor of 1.51 without adding 5% torque

5.12.2 **Solutions**:

- Backout, clean, and inspect. If the threads are acceptable, re-make the connection.

5.13 Unacceptable make-up with cross-threading

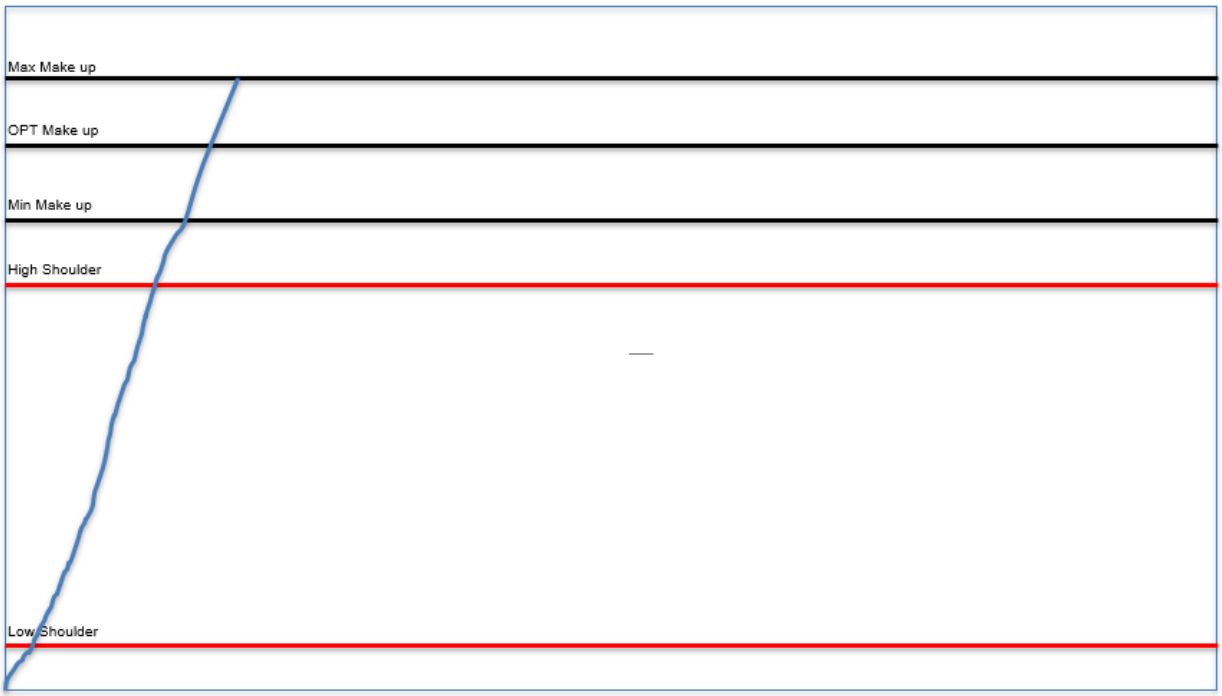

Image 11: Example of an unacceptable make-up with cross-threading

5.13.1 **Possible causes:**

- Bad stab
- Bad vertical alignment
- Driller stacking out on the joint
- When using a CRT to make connections, the driller may have failed to turn the joint counter clock wise

5.13.2 **Solutions:**

- Back out the joint, clean, inspect, and repair if needed. If the joint is acceptable, apply thread compound and re-make. If the joints are unacceptable, lay them down. Note: if you see this happening, try to stop the make-up as soon as possible to potentially save the joints.
- Ensure the driller turns the joint counterclockwise before making up the joint.

6 Job Safety Analysis

6.1 A JSA is a tool used to identify and reduce the risk associated with a task. A JSA and a pre-run meeting will be conducted before any casing is run. Below are points that need to be covered in a pre-run meeting. After the meeting follow up with the tong operator and the torque operator to see if they have any questions.

- A stabbing guide **shall be** used with every connection make-up.
- If running a threaded and coupled connection, a handling plug shall be used any time a CRT or fill up tool is used. If running an integral connection, a handling plug **shall be used at all times.** The handling plug shall be made up hand tight and bumped tight with a bar. Never use a hammer to hit the bar as this will cause damage to the handling plug and the connection.
- Thread protectors will be used any time casing is being moved, including being brought up to the V door.
- Watch for pinch points and never put your hand under a joint of casing hanging in the derrick.
- If a stab is missed do not try to knock the joint in, have the driller lift up the joint and try to re-stab. Knocking the connection in can cause damage to the connection.
- If the connection looks crossed before make-up, turn counter-clockwise until the thread hops and fully engages.
- Never put a dirty thread protector on a connection. Clean it before Installing.
- If anyone sees a damaged thread, notify the district supervisor or lead immediately.
- Review the max RPM's in high and low gear and the turns at which the casing crew should shift to low gear **(See connection specific running sections for RPM's and turns)**.
- Review rotating limits **(See connection specific running sections for rotating limit)**.
- If the couplings are spinning on a pin to pin connections, instruct the casing crew to stop and bite the back-up tongs on the mill side of the coupling if it begins to turn.
- Ensure that the elevators are not engaged during make-up.