9' X 30' AGGLOMERATOR INSTRUCTION MANUAL



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Chapter 1. Introduction

1.1. General

Westpro Machinery Inc. is a Canadian based company specializing in the supply of mineral processing equipment.

This manual is intended as a guide to assist in the assembly and operation of the equipment. If any problems or difficulties are encountered, the client is requested to contact Westpro whose technical staff is available to offer any assistance required.

1.2. Reading This Manual

Subjects divide this manual into chapters. Each chapter forms an independent instruction manual that allows it to be used separately from other chapters. Before doing so, it is recommended to first read the entire manual.

1.3. Personal Safety

This equipment is designed with the safety of all personnel in mind. Do not attempt to change, modify or eliminate the accident prevention devices installed at the factory. Make sure that all personnel who regularly work or might do work in the area of the equipment are familiar with the safety precautions.

Guards, covers and shields are installed around moving parts at the factory whenever necessary to prevent accidental injury to all personnel operating or working on or near the equipment. Do not remove such installations.

Warning: Whenever there is a "WARNING", it means that bodily injury may result from improper procedures. Each warning note is accompanied by an international alert symbol to help call attention to situations in which danger of bodily harm may be present. Read all warning notes carefully to prevent injury.

Caution: Whenever there is "CAUTION", it means that if procedures are not properly followed, serious and expensive damage to the machine may result.

1.3.1. Safety Rules

- 1. Read all warning, caution and instruction signs.
- 2. Never lubricate the equipment while in motion.
- 3. Do not remove any guards, covers or shields while equipment is running.
- 4. Replace any guards, covers or shields after adjustment or maintenance.



- 5. Always establish a positive lockout of the involved power source before performing maintenance, cleaning, adjusting or repair. Secure the power source lockout to prevent start-up by other persons.
- 6. Block parts as necessary to prevent unexpected motion while performing maintenance, adjustments or repair.
- 7. Do not attempt to remove jammed product or other blockage from running equipment. Shut off and lock out power before doing so.
- 8. Use adequate hearing protection devices whenever the noise level is above acceptable limits.
- 9. Wear an adequate protective breathing mask when dust and fumes are above acceptable limits
- 10. Wear adequate eye protection, goggles or safety glasses with side shields to prevent flying particles from entering eyes.
- 11. Hard hats are recommended in all work sites and required at most. Wear yours.
- 12. Maintain safe work habits by dressing appropriately. Do not wear loose sleeves, flowing hair, long coats, watches or bracelets, or pocket tools. Do not wear thin soles shoes to avoid slipping.
- 13. Always look around equipment before start-up to make sure no one is near moving parts, making adjustments, or performing maintenance. Be aware of where your co-workers are.
- 14. Report to your supervisor any defective machinery or unsafe conditions.
- 15. Save your back. If the load surpasses your lifting capabilities, get help or use proper lifting procedures. Use your leg muscles, not your back for lifting. Keep loads close to your body. Avoid twisting motions and over extension when moving loads.
- 16. Most of all, know your equipment. Understand the machine and the conditions under which it operates. Do not limit safety to only these general rules

1.3.2. Work Area Safety

- 1. Keep the work area neat and clean,
- 2. Keep all warning and caution signs clear and up to date.
- 3. Make certain that all electrical equipment is properly grounded. Wet spots near electrical currents are dangerous.
- 4. Store hazardous materials in restricted access areas and mark them clearly.
- 5. Make certain enough ventilation is present to safely run engines. Do not start an engine in an enclosed space without properly vented exhaust.



- 6. Do not smoke or allow smoking near flammable fuels or solvents. Use non-flammable solvents when possible, for cleaning parts and equipment.
- 7. Avoid electrical and static sparks and any open flame while handling, mopping or pouring fuels, battery electrolytes, hydraulic fluid or coolants.
- 8. Check for leaks in tanks or tubing with flashlights or other proper equipment. Never use an open flame to check for leaks.
- 9. Know where the fire extinguishers and other fire suppression equipment are located. Learn how to use them properly.
- 10. Be alert around any pressurized system: hydraulic or pneumatic. Highpressure gases and oils can be very dangerous.

1.3.3. Equipment and Tool Safety

- 1. Clean and properly label all tools.
- 2. Always use hoisting equipment for heavy loads. Regularly check hooks, cables, shackles and chains for stretch and wear. Never overload the lifting capacity of lifting devices.
- 3. Keep equipment clean and free of dirt and grease so it can be checked for loose, cracked or broken parts. Replace defective parts.





Chapter 2. Equipment Description

2.1. General Description

The Agglomerator is used to process feed material by adding an agglomerating agent to create pellets for further processing. The feed material and agglomerating agent are combined via a spray bar within a rotating drum. Lifter bars within the drum promote the agglomerating process and the entire drum is tilted to allow the material to flow through the machine at the desired rate.

2.2. Operation Description

The Agglomerator drum is driven via a chain and sprocket system. Power is fed by an electric motor through a parallel shaft reducer which is coupled to the drive sprocket. The entire powertrain is designed to rotate the drum at a pre-determined speed for the process. The drum rotates counter clockwise as viewed from the feed end. The drum is equipped with two concentric, machined riding rings which turn freely on four (4) trunnion wheel assemblies (two trunnions per riding ring). Two stationary thrust rollers located at the feed end keep the drum properly located along its axis. Product is fed at the high end of the drum and exits through the discharge chute as the drum rotates. The agglomerating fluid is introduced via a spray bar within the drum.

2.3. Precautions

The Agglomerator should only be operated in accordance with this manual. Do not overload the Agglomerator as doing so will cause serious damage to the equipment and may result in major repairs and lengthy shutdowns.

To ensure a long operating life of the Agglomerator, routine maintenance is essential. All bearings should receive proper lubrication and the gear reducer oil should be replaced periodically. See Chapter 5 for detailed maintenance procedures for the Westpro Agglomerator.





Chapter 3. Installation

3.1. Assembly Instructions

3.1.1. Site Preparation

Prior to installation, ensure the ground has been prepared and inspected as per the Foundation Plan drawing and the structural engineer's requirements.

Lay out the foundation studs as per the foundation plan drawing. Ensure the studs are installed as per the fastener manufacturer's requirements. Refer to the Foundation drawing for point load requirements.

Arrangements should be made for an appropriate sized crane to lift the components into place. Listed on the Operating Assembly drawing in Appendix B are the component weights.

Ensure that all the necessary installation equipment is available such as:

- Transit
- Level
- Plumb line
- 100lb line
- Bottle jacks
- Wrenches, sockets.
- Hammers
- Measuring tape
- Fasteners
- Come-along
- Heavy weight steel wire (Piano wire)
- Dial Indicators

3.1.2. Pre-assembled Components

The Westpro Agglomerator is test fitted at the Westpro assembly facility prior to shipping for ease of installation. Some of the components may be shipped pre-assembled, including the following:



- Trunnion Wheels and Thrust Rollers plus associated jacking screws, guards and fasteners on to the Roller Cross Member Weldments.
- Liners and Lifter Bars into the drum.
- Riding Rings and Wedges are aligned and installed on the Drum.
- Reducer, Motor, Drive Sprocket and associated hardware on to the Drive Base.
- All Feed and Discharge Chute Liners.

3.1.3. Frame Installation

Install the frame as per the Frame Assembly**Error! Reference source not found.** drawing. All weldments are test fitted and match marked prior to shipping to site to ease in final assembly.

Ensure the ground is sufficiently packed. There should be no gaps below the frame beams. Any gaps or loose columns are to be packed with material to avoid any movement during operation.

All beams and bracing should be installed and all fasteners properly tightened prior to further assembly.

3.1.4. Drum, Trunnion Wheels and Thrust Rollers

The Drum is shipped with the Liners, Lifter bars and Riding Rings pre-installed and aligned. Remove all corrosion inhibitor from Riding Ring, Trunnion and Thrust Wheel surfaces. If not pre-assembled, install the Trunnion Wheels as per the Trunnion Wheel Assembly drawing in Appendix B. If pre-installed, remove the Thrust Rollers prior to installing the Drum. Install the Drum onto the trunnion wheels. Install the Thrust Wheels as per the Thrust Wheel Assembly drawing. Refer to Section 3.2 to align the Trunnion Wheels and Section 3.3 to align the Thrust Rollers.

Note: the Trunnion and Thrust Wheel guards should not be installed until after final alignment is complete.

3.1.5. Drive Components

Install the Drive Base complete with Reducer, Motor and Sprocket onto the Frame as per the General Assembly and the Drive Assembly drawings. Align the Driver Sprocket onto the reducer with the sprocket on the drum to within +/- 1/16". To align the sprockets, the drum position must be adjusted.

Install the chain over the reducer and drum sprockets. A cable puller may be used to maneuver the chain. If required, the drive components may be moved to allow easy installation, however adjust the number of links so that the drive base assembly is approximately at half of the total take-up upon completion. Adjust the drive base jacking bolts to set the chain free play. The recommended free play is



approximately 3 1/8". See Section 5.8.2 for more details. Ensure excessive chain sag is reduced to avoid frame interference. There should be at least twelve (12) inches of take-up remaining to allow for chain stretch. Chain stretch should be limited to two (2) to three (3) inches only through normal operation.

Install the Chain Tensioner assembly as per the Chain Idler Assembly drawing. The Chain Tensioner should be centered on the chain so the guide blocks do not wear excessively. Adjust the chain tensioner as per Section 5.8.3.

3.1.6. Guarding

Install the drive-side chain guard as per the Chain Guard assembly and Top Level Assembly **Error! Reference source not found.** drawings and the following procedure:

- 1. Install the drive-side guard on to the frame.
- 2. Attach the guard bottom to the drive side guard and support the bottom and opposite side.
- 3. Install the guard top, fastening it to the frame, guard bottom and drive-side guard.
- 4. Attach the cover plate and bottom cover to the drive-side guard.
- 5. Install the idler guard.

With the drive aligned, install the remaining Trunnion and Thrust Wheel guards as shown in the Fixed and Floating Riding Gear Assembly drawings in Appendix B. Install the Graphite Blocks into each trunnion guard.

3.1.7. Chain Lubricator

Install the Chain Lubrication assembly onto the Chain Guard as per the Chain Guard Assembly drawing. The lubrication system is equipped with an adjustable mounting system and should be mounted at a slight angle. See the Drip Lube System Assembly drawing for more information.

3.1.8. Feed Chute

Install the Feed Chute as per the General, Feed Chute Structure and Feed Chute Liner Assembly drawings. All weldments are test fitted and match marked prior to shipping to site to ease in final assembly. The support columns and bracing should be installed before mounting the Feed Chute. Ensure the ground is packed and level between the drum and feed chute structure or the feed chute will not fit into the drum properly. There should be no gaps below the beams.

The feed chute must always be removed from the feed chute structure prior to moving the equipment. The feed chute and structure should never be moved in one piece.



Ensure the liners are installed and all bolts are properly tightened prior to mounting the feed chute on the support structure. Install the Feed Chute and ensure there is sufficient clearance between the Feed Chute and Agglomerator Drum.

All beams and bracing should be installed and all fasteners properly tightened prior to further assembly.

3.1.9. Discharge Chute

Install the upper and lower Discharge Chute pieces to the frame at the discharge end of the drum. Refer to the Discharge Chute Assembly drawing for details.

3.1.10. Spray Bar

Install the Spray Bar as shown in the Spray Bar Assembly drawing. Feed the spray bar through the opening in the Discharge Chute. Ensure the spray bar is placed through the mounting hole in the Discharge Chute prior to mounting to the Feed Chute. Connect the on-site piping to the Spray Bar assembly.

CAUTION: Too much spray at the discharge end may dissolve agglomerates.

3.1.11. Periphery

Install all connecting equipment, such as feed and discharge conveyors (not supplied by Westpro).

Double check that all braces are installed with all the fasteners properly tightened.

3.1.12. Electrical

Connect the motor power to the onsite electrical system. All electrical work should be performed by qualified personnel.

3.2. Trunnion Wheel Alignment

CAUTION: A drum shell sitting stationary in the hot sun may temporarily take on a bowed shape due to an uneven temperature distribution between the top and bottom of the shell. If this condition happens, the Agglomerator should be run for a period of time to allow the shell temperature to become uniform.

3.2.1. Initial Alignment

Initially, all Trunnion Wheel shafts should be parallel to the rotating axis of the drum. This will keep the distance between the shafts and the rotating axis of the drum the same for all shafts. It is necessary to check both the horizontal and vertical alignment of the Trunnion Wheels, starting with the horizontal alignment.



3.2.1.1. Horizontal Alignment

Stretch a heavy weight wire parallel to the axis of the shell. Locate this line on the center of the Roller Cross Member Weldments. If the thrust rollers block the path of the wire on the centerline of the beds, select a position for the wire which is off center. Measure the distance between this wire and the centerline of each bearing. The distance should be the same at all points. If not, use the jacking bolts to adjust the Trunnion bearings until proper alignment is achieved. As a double check, use trammel points, or other means of measurement set to the horizontal centers of the trunnion shafts and check that the Trunnion shafts are equidistant apart. If all centers check, the bearings are parallel and properly aligned.

3.2.1.2. Vertical Alignment

The vertical alignment of the Trunnion shafts is best determined by the contact line between the trunnion and the riding ring. If this line extends only partially across the face of the trunnion and a gap can be seen or measured, a vertical adjustment is required. This contact point should be observed with the drum shell both stationary and rotating to verify that the condition observed is consistent throughout the rotation of the shell.

To adjust the vertical alignment of the trunnion shafts, apply shims as required between the bearing housing and mounting surface to achieve the correct alignment.

3.2.2. Dynamic Alignment

CAUTION: The following adjustments should only be made by highly experienced personnel familiar with rotating drums.

Once the initial parallel alignment is completed, skew the Trunnion Wheels as shown in Figure 1. Skew the bearings to move the drum in the uphill direction towards the feed end. Skewing must be performed twice – initially with the Drum empty and again with the Drum loaded. Use a dial indicator on the bearings and move them very slightly each rotation until the proper angle has been achieved. For more information, contact Westpro Machinery.











IN THE ABOVE DIAGRAMS THE STRAIGHT ARROWS INDICATE THE DIRECTION IN WHICH THE SHELL TENDS TO MOVE WHEN THE TRUNNION ADJUSTMENT AND SHELL ROTATION ARE AS SHOWN.

Figure 1 - Trunnion Skewing Adjustment



3.3. Thrust Wheel Adjustment

3.3.1. Horizontal Adjustment

Install the Thrust Wheel as per Section 3.1.4. Adjust the thrust wheels as per Figure 2. There should be a 3/16" gap (nominal) between the wheel and riding ring faces. Under actual operating conditions, it may be necessary to re-adjust the gap between the Riding Ring and Thrust Wheel faces to compensate for thermal expansion. The gap should be in the range of 1/8" to 5/16". The Riding Ring should 'float' between the Thrust Wheels, contacting each wheel alternately.







3.3.2. Vertical Adjustment

The Thrust Wheels are equipped with a vertical height adjustment. Four set screws secure the Thrust Wheel shaft in place. Loosen the set screws and set the height, then re-tighten the set screws. The height should be set as low as possible to avoid interference with the Riding Ring Wedges. See Figure 3.



Figure 3 - Thrust Wheel Height Adjustment

3.4. Riding Ring Adjustment

The drum has been shipped with the riding rings pre-set in the factory, and should not require any further adjustment. If the Riding Rings need adjustment or replacement, contact Westpro for further details.



Chapter 4. Operation

4.1. Commissioning

4.1.1. General

Fully assemble the Westpro Agglomerator as per Chapter 3 prior to commissioning. All external connections (spray bar, feed/discharge conveyors, etc.) must be completed and all guards installed.

4.1.2. Trunnion and Thrust Wheel Alignment

The Trunnion and Thrust Wheels must be properly aligned prior to startup. Refer to Sections 3.2 and 3.3 for detailed setup procedures.

4.1.3. Gear Reducer

The Gear Reducer is shipped without oil. Fill the Reducer with oil and ensure the breather is unobstructed. Refer to Appendix C for more details.

4.1.4. Drive Chain

The drive chain and sprockets must be properly aligned. The free play should be set according to Section 5.8.2. Ensure the chain tensioner is properly adjusted.

4.1.5. Chain Lubrication

The chain lubrication reservoir is shipped empty. Fill the reservoir with oil as per Section 5.8.1.

4.2. Initial Start-up Procedure

Before loading the Agglomerator, a dry test run should be performed to ensure all systems are operating as intended.

- 1. Ensure all tools and personnel are clear of the Agglomerator before commencing operation.
- 2. Open the valve on the chain lubrication assembly to commence lubrication.
- 3. Start the Agglomerator for two (2) seconds to check the direction of rotation. The drum should be rotating counter clockwise as viewed from the feed end.
- 4. If the direction is not correct, adjust the motor wiring to reverse the direction.
- 5. Run the drum dry continuously. Closely watch for any movement or misalignment of the Drum, Riding Rings and Trunnion Wheels. If movement occurs, re-adjust the Trunnion Wheels as per Section 3.2.



6. Once the agglomerator is running properly empty, slowly introduce feed, gradually ramping up to the operation feed rate. As feed is being introduced, closely watch the Drum, Riding Rings and Trunnion Wheels for any movement or misalignment. If movement/misalignment occurs, re-adjust the Trunnion Wheels as per Section 3.2. Repeat until proper alignment at the operating feed rate is achieved.

4.3. Operation

After completing commissioning and the initial start-up procedure, the Westpro Agglomerator is ready for regular operation. To start the Agglomerator for regular operation, refer to the following procedure:

- 1. Ensure the chain lubrication is turned on prior to startup.
- 2. Start the Agglomerator drum motor.

CAUTION: The Agglomerator should only be started with the drum empty. Starting the drum with material inside will damage the drive components and will void the warranty.

- 3. Start the discharge conveyor and introduce the agglomerating agent via the spray bar.
- 4. Start the feed conveyor and introduce feed to the Agglomerator. The Agglomerator feed rate should be kept consistent to ensure optimal Trunnion Wheel alignment and long operating life of the equipment.

CAUTION: The maximum drum loading volume is 25% of the total drum volume. Exceeding this amount will damage the drive and riding gear components and will void the warranty.

4.4. Shutdown

To shutdown the Westpro Agglomerator, use the following procedure:

- 1. Shutdown the feed conveyor.
- 2. Allow the Agglomerator drum to empty, then shutdown the motor.
- 3. Once the discharge conveyor is empty, shut it down.
- 4. Turn off the spray bar and chain lubrication when the Agglomerator is not in operation.



Chapter 5. Maintenance

5.1. Maintenance Schedule

To ensure longevity of the Westpro Agglomerator, periodic maintenance is required. Perform maintenance procedures at the intervals listed in Table 1. This maintenance schedule is based on continuous operation of the Agglomerator.

Procedure	Service Interval	
Inspect Trunnion/Riding Ring Graphite Lubrication Block	Daily	
Check Chain Lubrication	Daily	
Refill Chain Lubrication Reservoir	Daily/As Needed	
Grease Trunnion Wheel Bearings	Monthly	
Grease Thrust Wheel Bearings	Monthly	
Check Chain Free Play and Tension	Monthly	
Check Trunnion Wheel Alignment	Monthly or if uneven wear is visible	
Replace Trunnion/Riding Ring Graphite Block	As Required	
Inspect Chain and Sprockets	Annually	
Inspect Drum Lining	Annually	
Grease Electric Motor	Monthly*	
Change Reducer Oil	See Appendix C	

Table 1 - Maintenance Schedule

*Depending on operating conditions. See appendix C for more detail



5.2. Lubricant Table

Table 2 lists the most common brands of lubricants and the types recommended for the application for use with the Westpro Agglomerator. Note this table is not exhaustive and equivalent lubricants from other brands may be used. Consult the lubricant manufacturer to select an equivalent lubricant.

Application	Brand	Туре	Quantity
Gear Reducer	Various*	ISO 220 Grade*	86 liters
Electric Motor Bearings	ExxonMobil	Polyrex EM or equivalent polyurea grease	Until new grease appears at discharge port
Trunnion Wheel Bearings	NSK	EP-2	34 g
Thrust Wheel Bearings	NSK	EP-2	38 g
Chain Lubricant	Varies	SAE 30 or 40W Gear Oil. See Note 1.	Fill reservoir as required

*See appendix C for further details

Notes:

1. Oils with additives are usable as long as they do not cause caking or build-up of film. Never use oils with a detergent (i.e. automotive engine oil) as any exposure to moisture can cause the oil to foam and lose lubrication properties.

5.3. Reducer

The gear reducer requires periodic oil changes and re-greasing of lubrication points. Refer to Appendix C for more details.

5.4. Motor

The motor requires periodic greasing to ensure longevity. Refer to Appendix C for more details.



5.5. Riding Rings and Trunnion Wheels

The Riding Rings and Trunnion Wheels must be kept clean. Dirt or other contaminates on the contact surfaces will act as a lapping compound and result in increased wear and reduced life of the Riding Rings and Trunnion Wheels. The contact surfaces are lubricated by a graphite block. Check the graphite lubrication block for wear and binding as per the interval listed in Table 1. Ensure the block moves freely within its guide. The graphite blocks do not require additional pressure beyond their weight to lubricate the Trunnion Wheels. Replace the block when it reaches the wear limit as shown in Figure 4. To obtain replacement blocks, contact your Westpro sales representative.



Figure 4 - Graphite Block Wear Limit

Periodically check the alignment of the Trunnion Wheels at the service interval listed in Table 1 or if uneven wear is present on the components. To check and/or adjust the Trunnion Wheel alignment, refer to Section 3.2.

5.6. Trunnion Bearings

Grease the Trunnion Wheel bearings the interval listed in Table 1. Refer to Table 2 for the appropriate lubricant.

5.7. Thrust Wheels

The Thrust Wheels require periodic maintenance to ensure longevity of the wheels, bearings and riding rings. The Thrust Wheel and Riding Ring contact surfaces must



be kept clean from dirt and dust. Failure to do so will result in increased wear of the Riding Rings and Thrust Wheels.

The Thrust Wheels are equipped with grease fittings to aid in greasing the internal bearings. Grease the bearings at the interval listed in Table 1. Refer to Table 2 for the appropriate lubricant.

The Thrust Wheel height should be checked periodically. For height adjustment, refer to Section 3.3.

5.8. Chain & Sprockets

The drive chain and sprockets require periodic maintenance to ensure longevity of the components. The components should be kept free from dirt, dust and other contaminants that will increase wear and reduce the operating life. In addition, they require lubrication and proper tension and free play adjustment.

CAUTION: Failure to properly maintain the chain and sprockets will void warranty.

5.8.1. Lubrication

The chain and sprockets require constant lubrication to ensure longevity of the components. The Westpro Agglomerator is equipped with a drip lubrication system attached to the drive guard. During operation of the Agglomerator, regular inspections should be conducted to ensure that oil is flowing and 'drops' are produced from each nozzle every 10-15 seconds. The reservoir should be inspected daily and should require filling every 1-1.5 days during operation. Refer to Table 2 for the appropriate lubricant.

5.8.2. Free play

The chain free play should be checked periodically. Note that the chain tensioner must be loosened or removed to properly check the free play. There should be approximately 3-1/8" free play on the slack side of the chain. See Figure 5. To adjust the chain free play, loosen the drive base bolts and use the jacking screws to move the drive base and adjust the sag. Ensure the drive to driven sprocket alignment is correct.





CAUTION: Failure to maintain proper alignment of the drive sprockets will result in increased wear to the drive components and will void warranty.

Figure 5 - Chain Free Play

5.8.3. Tensioner

The Westpro Agglomerator is equipped with a rubber dampened chain tensioner. The tensioner should be adjusted after the chain free play has been adjusted. Set the tensioner to take some of the chain weight and remove 1/3 of the chain free play. The tensioner should be periodically inspected for wear, and worn or damaged components should be replaced as required. Contact your Westpro sales representative for replacement components.



5.9. Troubleshooting

The following information is intended to serve as an aid in troubleshooting problems with the Westpro Agglomerator. For issues specific to the drive components, refer to Appendix C.

Problem	Solution
Drive does not turn on	Check power connections. Check for obstructions. Check for drum overloading.
Riding Rings and Trunnion Wheels wearing abnormally	Check lubrication blocks. Check trunnion alignment.
Abnormal vibration	Check chain free play and tensioner. Check riding gear alignment.



Notes:



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