Equipment Manual

SmartCrane™

Wall Panel Stacker

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Rev. A

Equipment Manual

SmartCrane™

Wall Panel Stacker

U.S. and other patents pending.

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Legal Notice

Patents

Made and sold under one or more of the following patents:

U.S. 4,986,052	U.S. 5,385,339	U.S. 5,493,834	U.S. 5,568,862
U.S. 5,630,697	U.S. 5,636,494	U.S. 5,638,658	U.S. 5,640,832
U.S. 5,655,399	U.S. 5,678,395	U.S. 5,702,095	U.S. 5,707,204
U.S. 5,735,087	U.S. 5,810,341	U.S. 5,819,412	U.S. 5,833,222
U.S. 5,837,014	U.S. 5,854,747	U.S. 5,873,567	U.S. 5,884,448
U.S. 5,885,731	U.S. 5,906,264	U.S. 5,934,866	U.S. 5,947,460
U.S. 5,987,828	U.S. 5,996,303	U.S. 6,048,165	U.S. 6,112,968
U.S. 6,134,775	U.S. 6,170,688	U.S. 6,205,637	U.S. 6,212,849
U.S. 6,219,975	U.S. 6,260,263	U.S. 6,317,980	U.S. 6,389,762
U.S. 6,401,422	U.S. 6,412,246	U.S. 6,418,601	U.S. 6,539,615
U.S. 6,666,367	U.S. 6,702,269	U.S. 6,758,022	U.S. 6,817,392
U.S. 6,834,470	U.S. 6,907,820	*Other patents pending	

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Notice of Change

Use this page to record Service Bulletins and Notices that you receive to keep your manual updated.

SmartCrane™
Wall Panel Stacker

Service Bulletin or Notice #	Dated	Title

Contents

Contents

Contents

Contents

Safety (English)

For safety information in Spanish, refer to page 1.

Be Careful.
Be Safe.

Safety Indicators

The following safety alert symbols and signal words are used throughout this document to indicate safety hazards. Please pay careful attention when you see them. The level of severity differs for each symbol or signal word.

Failure to comply with the instructions accompanying each safety alert symbol may result in property damage, personal injury, or even death. Personnel must follow all safety procedures and practices to ensure the safest possible operation of this equipment. However, at no time is this document a substitute for common sense. Personnel must ensure that the work environment is safe and free of distractions.

DANGER

Indicates an imminently hazardous situation which, if not avoided, is likely to result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.

CAUTION

When CAUTION is used ***with*** the safety alert symbol shown here, it indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

When CAUTION is used ***without*** the safety alert symbol shown here, it indicates a potentially hazardous situation which may result in equipment damage.

NOTICE

NOTICE

Calls attention to information that is significant to understanding the operation at hand.

ENVIRONMENTAL

ENVIRONMENTAL

Applies to conditions that may affect the environment but do not have an immediate, direct effect on personnel or equipment.

Safety Rules

Because it is impossible to anticipate every circumstance that might involve a hazard, the safety information provided in this equipment manual and on the machine is not all-inclusive. If this machine is operated or serviced using a procedure not specifically recommended by the manufacturer, the procedure shall be approved by a professional engineer to ensure it will not render the equipment unsafe. Use extreme caution and common sense at all times!

Know Your Equipment

- Read this manual completely before using or maintaining the equipment. Do not operate this machine unless you have a thorough knowledge of the controls, safety devices, emergency stops, and operating procedures outlined in this manual.
- Read and follow all safety notes. Failure to comply with these instructions may result in economic loss, property damage, and/or personal injury including death.
- Refer to the lockout/tagout guidelines on the following pages to safely perform maintenance and troubleshooting of this equipment.
- Observe and obey all safety labels. Replace worn labels immediately.
- Use this equipment solely for the purpose described in this manual.
- Only qualified personnel should attempt to operate or perform maintenance on this equipment. “Qualified personnel” is defined as:

> *...a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training, or experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work—ANSI B30.2-1983*
>
> *...one who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved—NEC 2002 Handbook*

Personal Safety

- Always wear safety glasses and hearing protection in an industrial environment.
- Utilize a filtering facepiece (dust mask) when working near sawdust.
- Wear proper clothing and appropriate personal protective equipment (e.g., safety glasses and hearing protection.) Do not wear loose clothing or jewelry. Confine long hair by tying it back.
- Use caution when lifting heavy parts or material.

Installing the Equipment

- Follow installation instructions completely.

Lockout/Tagout

- Before performing maintenance on the pneumatic or hydraulic systems, bleed the lines to eliminate pressure.
- Lockout/tagout all energized systems before performing maintenance on them. Refer to the *Lockout/Tagout Guidelines* section on page 5.

Keeping a Safe Environment

- Keep children away. All visitors should be kept a safe distance from the work area. Hazards may not be apparent to individuals unfamiliar with the machine.
- Keep work areas well lit.
- Keep the work area clean and free of any trip or slip hazards.
- Do not use the equipment in damp or wet locations, or expose it to rain or snow.

Operating and Maintaining the Equipment

- Ensure that all people, tools, and foreign objects are clear of the restricted zones before operating this equipment. The restricted zones are shown on page 11.
- Perform the safety tests recommended in the Safety Test section on page 2 before operating the equipment at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.
- In case of machine malfunction, stop the machine immediately using an E-stop and report the malfunction to a supervisor.
- Never leave the machine running unattended. Turn the power off! Do not leave the machine until all parts have come to a complete stop and all electrical power has been shut off.
- Check for worn or damaged parts regularly. Repair or replace them immediately.
- Keep the hydraulic, pneumatic, and electrical systems in good working order at all times. Repair leaks and loose connections immediately. Never exceed the recommended pressure or electrical power.
- Check that all safety devices are in working order before each shift starts. All protective guards and safety devices must be in place before and during use of the machine. Never disconnect or bypass any safety device or electrical interlock.
- Periodically inspect the quality of the finished product.

Electrical Safety

- Do not use any liquids in the interior of electrical cabinets.
- When using solvents on and around the machine, remove power to the machine to eliminate the chance of sparking, resulting in explosion or fire. Wear a respirator approved for use with solvents. Wear protective clothing, gloves, and safety glasses.

Lockout/Tagout

Lockout/Tagout Guidelines

All lockout/tagout guidelines must be met according to OSHA 29 CFR 1910.147. A specific procedure should be included in your company's energy control program. This manual is not intended to replace your company's de-energizing or lockout/tagout procedure required by OSHA, but merely to provide general guidance.

The term "lockout," as used in this manual, means placing a lockout device on any and all energy sources to ensure that the energy isolating device and the equipment being controlled cannot be re-energized or operated until the lockout device is removed. The photos on the next page show where the electrical disconnects are located for this machine.

- Energy sources include electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- In the case of electrical energy sources, the main power and control power to the machinery must be turned off and physically locked in the "off" position.
- A lockout device is usually a keyed padlock.
- If more than one person is working in a restricted zone, use a group lockout device that will allow each person to use a lock that can be removed only by the person performing the maintenance.

"Tagout" means that a prominent warning is securely fastened to an energy-isolating device to indicate that the equipment shall not be operated.

Electrical Lockout/Tagout Procedures

When Working on a Machine Outside the Machine's Main Electrical Enclosure

If working on the electrical transmission line to the machine, follow the procedure on page 8.

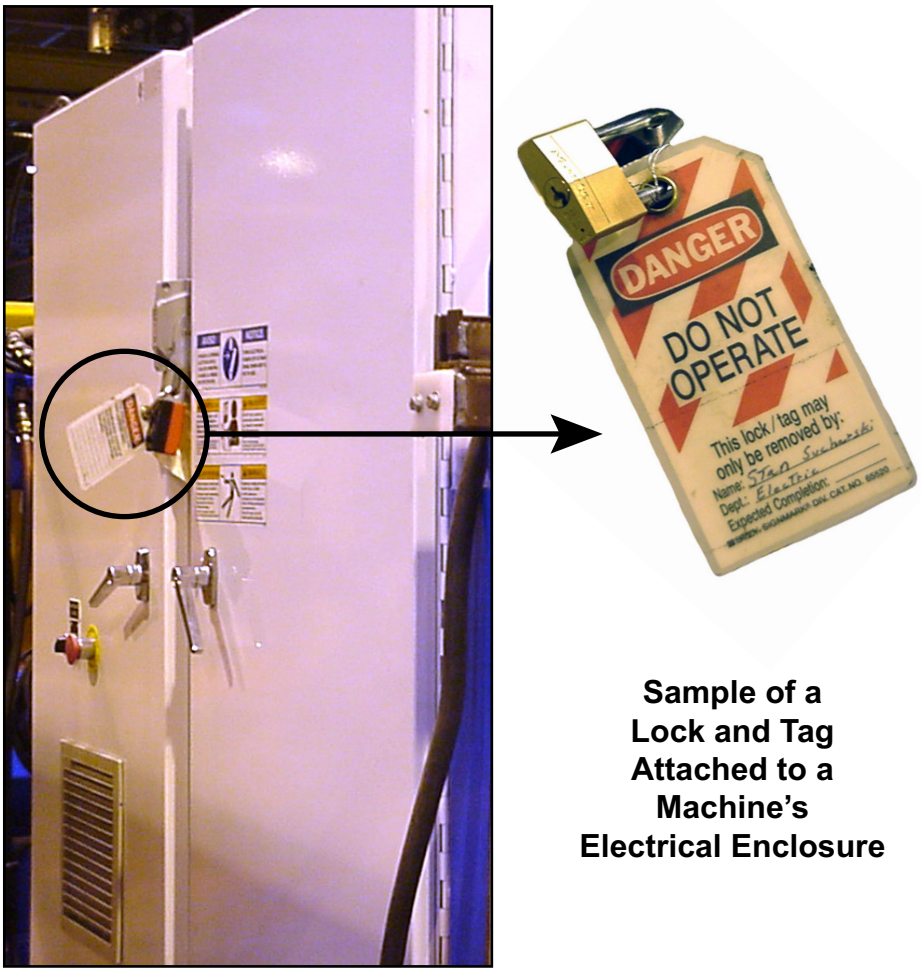
Before performing maintenance on any machine with electrical power, lockout/tagout the machine properly. When working on a machine outside of the machine's main electrical enclosure, not including work on the electrical transmission line to the machine, follow your company's approved lockout/tagout procedures which should include, but are not limited to the steps here.

1. Engage an E-stop on the machine.
2. Turn the disconnect switch handle on the machine's main electrical enclosure to the "off" position. See Figure 1.

	WARNING
	**ELECTROCUTION HAZARD.** **When the disconnect switch is off, there is still live power within the disconnect switch's enclosure. Always turn off power at the building's power source to the equipment before opening this electrical enclosure!**

3. Attach a lock and tag that meet OSHA requirements for lockout/tagout.
4. Restrain or de-energize all pneumatic components and other parts that could have live or stored power.

Figure SAFETY-1: Lockout/Tagout on the Main Electrical Enclosure



Sample of a Lock and Tag Attached to a Machine's Electrical Enclosure

When Working on a Machine Inside the Machine's Main Electrical Enclosure or in the Electrical Transmission Line to the Machine

Before opening the main electrical enclosure, or attempting to repair or replace an electrical transmission line to the machine, lockout/tagout the machine properly. Follow your company's approved lockout/tagout procedures which should include, but are not limited to the steps here.

1. Engage an E-stop on the machine.
2. Shut the power to the machine off at the machine's power source which is usually an electrical service entry panel on the facility wall. One example of a locked-out power source panel is shown in Figure 2.
3. Attach a lock and tag that meets OSHA requirements for lockout/tagout.
4. Open the door to the main electrical enclosure, and using a multimeter, verify that the power is off.

Figure SAFETY-2: Lockout/Tagout on the Power Source Panel

Hydraulic System Lockout/Tagout Procedure

When Lockout/Tagout is Not Required

If working on components other than the hydraulic system, but that requires you to be near the vicinity of movable hydraulic components, you must, at a minimum, physically restrain the hydraulic components from moving. If this is not possible, lockout/tagout the entire hydraulic system.

When Lockout/Tagout is Required

Before attempting repair or maintenance on a hydraulic line or component, lockout/tagout the machine properly. Follow your company's approved lockout/tagout procedures which should include, but are not limited to the steps here.

1. Follow instructions in the electrical and pneumatic lockout/tagout sections to lockout/tagout or prevent movement of these components.

2. Attach a lock and tag that meet OSHA requirements for lockout/tagout to the shutoff valve.

3. Bleed all pressure from all hydraulic lines.

4. Use caution when disconnecting any hydraulic lines or components as there may or may not be stored pressure. Wear proper personal protective equipment.

Pneumatic System Lockout/Tagout Procedure

When Lockout/Tagout is Not Required

If working on components other than the pneumatic system, but that requires you to be near the vicinity of movable pneumatic components, you must, at a minimum, physically restrain the pneumatic components from moving. If this is not possible, lockout/tagout the entire pneumatic system.

When Lockout/Tagout is Required

Before attempting repair or maintenance on a pneumatic line or component, lockout/tagout the machine properly. Follow your company's approved lockout/tagout procedures which should include, but are not limited to the steps here.

1. Follow instructions in the electrical and hydraulic lockout/tagout sections to lockout/tagout or prevent movement of these components.
2. Attach a lock and tag that meet OSHA requirements for lockout/tagout to the air regulator.
3. Bleed all pressure from the reservoir.
4. Bleed all pressure from all pneumatic lines by actuating all pneumatic valves associated with that air source.

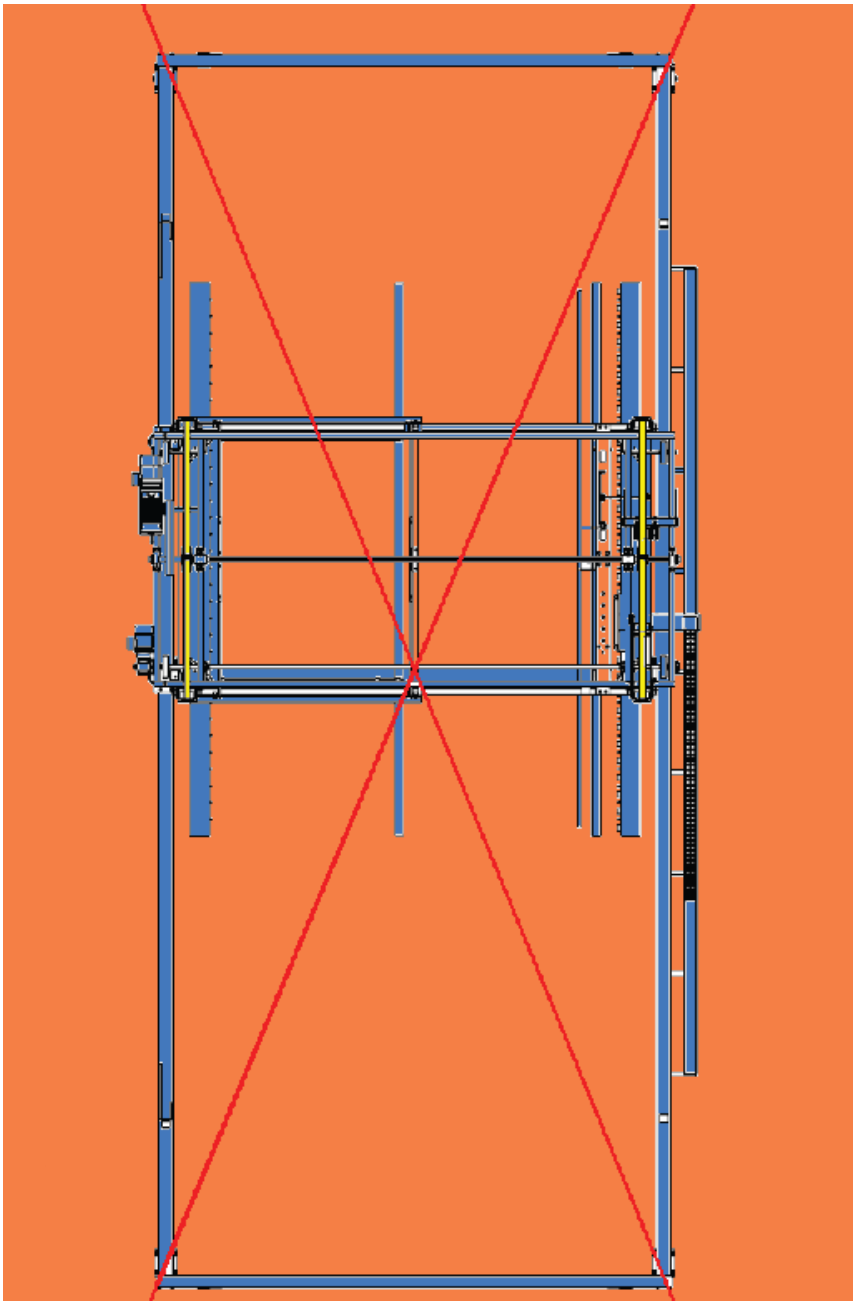
Troubleshooting With an Energized Machine

Only a qualified electrician, using the personal protective equipment and following the procedures recommended in NFPA 70E should ever attempt service or repair of or near an energized area or component of the machine.

Whenever maintenance is performed while the equipment is electrically energized, there is a potential electric arc flash hazard. Refer to NFPA 70E for the personal protective equipment required when working with electrically energized components. Pneumatic and hydraulic components may move unexpectedly if not de-energized. Physically restrain any components capable of movement when working on or near those components.

Restricted Zone

	DANGER
	**Stay out of the restricted zone when equipment is in use. Serious injury or death may result if personnel are in the restricted zone.**



Seguridad (Español)

Sea cuidadoso.

Protéjase.

Indicadores de seguridad

Los siguientes símbolos de alerta de seguridad y palabras de advertencia se utilizan a lo largo de este documento para indicar riesgos de seguridad. Preste suma atención cuando los vea. Cada símbolo o palabra indica un nivel de gravedad diferente.

El no cumplimiento de las instrucciones que acompañan a cada símbolo de alerta de seguridad puede producir daños a la propiedad, lesiones personales e incluso la muerte. El personal debe seguir todos los procedimientos y prácticas de seguridad establecidos para asegurar el uso más seguro posible de este equipo. No obstante, en ningún caso este documento reemplaza el sentido común. El personal debe asegurarse de que el entorno de trabajo sea seguro y esté libre de distracciones.

PELIGRO

Indica una situación de riesgo inminente que, si no se evita, pudiera producir la muerte o lesiones graves.

ADVERTENCIA

Indica una situación potencialmente peligrosa que, si no se evita, puede producir la muerte o lesiones graves.

PRECAUCIÓN

Cuando la PRECAUCIÓN se utiliza ***con*** el símbolo de alerta de seguridad aquí ilustrado, indica una situación potencialmente peligrosa que, si no se evita, puede producir lesiones menores o moderadas.

Cuando PRECAUCIÓN se utiliza ***sin*** el símbolo de alerta de seguridad aquí ilustrado, indica una situación potencialmente peligrosa que podría producir daños al equipo.

AVISO

AVISO

Llama la atención a información importante para entender la operación que se desea realizar.

AMBIENTAL

AMBIENTAL

Se aplica a condiciones que pueden afectar el entorno pero que no tienen un efecto inmediato o directo sobre el personal o el equipo.

Reglas de seguridad

Debido a la imposibilidad de anticipar todas las circunstancias que podrían constituir un riesgo, la información de seguridad suministrada en este manual del equipo y sobre la máquina no es exhaustiva. Si se utiliza o realiza el mantenimiento de esta máquina utilizando un procedimiento no recomendado específicamente por el fabricante, el procedimiento deberá ser aprobado por un ingeniero profesional para asegurarse de que no afecte la seguridad del equipo. ¡Manéjese! siempre con suma precaución y sentido común!

Conozca su equipo

- Lea este manual en su totalidad antes de utilizar o mantener el equipo. No utilice esta máquina a menos que esté perfectamente familiarizado con los controles, los dispositivos de seguridad, los frenos de emergencia y los procedimientos operativos que se describen en este manual.
- Lea y siga todas las notas de seguridad. El no cumplimiento de estas instrucciones podría producir pérdidas económicas, daños a la propiedad y lesiones personales, incluida la muerte.
- Refiérase a las pautas de bloqueo/etiquetado proporcionadas en las siguientes páginas para realizar el mantenimiento y solucionar problemas de este equipo en forma segura.
- Observe y cumpla con todas las etiquetas de seguridad. Cambie las etiquetas gastadas inmediatamente.
- Utilice este equipo únicamente para el propósito que se describe en este manual.
- Sólo personal calificado debe intentar utilizar o realizar el mantenimiento de este equipo. Por "personal calificado" se entiende:

> *...una persona o personas que, por el hecho de poseer un título o certificado de capacitación profesional reconocido o que, por sus amplios conocimientos o experiencia, han demostrado con éxito estar capacitados para resolver problemas relacionados con el tema y el trabajo en cuestión —ANSI B30.2-1983*
>
> *...una persona que posee habilidades y conocimientos relacionados con la construcción y uso de equipos e instalaciones eléctricas y que ha recibido capacitación en seguridad sobre los riesgos posibles—NEC 2002 Handbook*

Seguridad personal

- Use siempre anteojos de seguridad y protección auditiva en un entorno industrial.
- Utilice una máscara protectora cuando trabaje cerca de aserrín.
- Utilice ropa adecuada y equipo de protección personal apropiado (por ejemplo, anteojos de seguridad y protección auditiva.) No use ropa suelta ni joyas. Si tiene el cabello largo, áteselo para atrás.
- Proceda con precaución cuando levante piezas o materiales pesados.

Instalación del equipo

- Siga las instrucciones de instalación al pie de la letra.

Procedimientos de Bloqueo/Etiquetado

- Antes de realizar el mantenimiento de los sistemas neumáticos o hidráulicos, purgue las líneas para eliminar la presión.
- Bloquee y etiquete todos los sistemas energizados antes de realizar tareas de mantenimiento en ellos. Refiérase a la sección *Pautas de bloqueo/etiquetado* en la página 6.

Cómo mantener un entorno seguro

- Mantenga alejados a los niños. Todos los visitantes deben mantenerse a una distancia segura del área de trabajo. Los riesgos pueden no ser evidentes a las personas no familiarizadas con la máquina.
- Mantenga las áreas de trabajo bien iluminadas.
- Mantenga el área de trabajo limpia y libre de cualquier riesgo de tropiezo o resbalamiento.
- No utilice el equipo en lugares húmedos o mojados y no lo exponga a la lluvia o a la nieve.

Uso y mantenimiento del equipo

- Asegúrese de que no haya personas, herramientas y objetos extraños en las zonas restringidas antes de utilizar este equipo. Las zonas restringidas se indican en la página 13.
- Realice las pruebas de seguridad recomendadas en la sección Prueba de seguridad en la página 2 antes de utilizar el equipo por primera vez, después de cualquier tarea de mantenimiento y conforme a la frecuencia de mantenimiento establecida.
- En caso de que la máquina no funcione correctamente, deténgala inmediatamente utilizando un freno de emergencia e informe el problema a un supervisor.
- No deje nunca la máquina encendida si no está junto a ella. ¡Apáguela!. No abandone la máquina hasta que todas las piezas se detengan completamente y hasta que se haya apagado la alimentación eléctrica.
- Verifique periódicamente que no haya piezas gastadas o dañadas. Repárelas o cámbielas inmediatamente.
- Mantenga los sistemas hidráulicos, neumáticos y eléctricos en buen funcionamiento en todo momento. Repare las fugas y las conexiones sueltas inmediatamente. No exceda nunca la presión ni potencia eléctrica recomendadas.
- Verifique que todos los dispositivos de seguridad estén en buen funcionamiento al comienzo de cada turno. Todos los dispositivos protectores y de seguridad deben

estar en su lugar antes y durante el uso de la máquina. No desconecte ni evite nunca ningún dispositivo de seguridad ni interbloqueo eléctrico.

- Inspeccione periódicamente la calidad del producto terminado.

Seguridad eléctrica

- No utilice líquidos en el interior de los gabinetes eléctricos.
- Cuando utilice disolventes sobre o alrededor de la máquina, desconecte la alimentación para eliminar las probabilidades de chispas, que pueden producir una explosión o incendio. Use un respirador aprobado para el uso con disolventes. Use ropa protectora, guantes y anteojos de seguridad.

Bloqueo/Etiquetado

Pautas de bloqueo/etiquetado

Deben cumplir con todas las pautas de bloqueo/etiquetado conforme a la norma OSHA 29 CFR 1910.147. El programa de control de energía de la compañía debe incluir un procedimiento específico. El objetivo de este manual no es reemplazar el procedimiento de desenergización o bloqueo/etiquetado requerido por la OSHA, sino proporcionar pautas orientativas generales.

El término "bloqueo", según se utiliza en este manual, se refiere a la colocación de un dispositivo de bloqueo en las fuentes de energía para asegurar que el dispositivo aislador de energía y el equipo controlado por éste no puedan reenergizarse o utilizarse hasta que se retire dicho dispositivo. Las fotos de la página siguiente muestran los lugares en los que se encuentran los interruptores de desconexión eléctrica de esta máquina.

- Las fuentes de energía incluyen energía eléctrica, mecánica, hidráulica, neumática, química, térmica y otras.
- En el caso de fuentes de energía eléctrica, la alimentación principal y la alimentación de control a la maquinaria deben apagarse y bloquearse físicamente en la posición "off" (apagado).
- Por lo general, como dispositivo de bloqueo se utiliza un candado con llave.
- Si hay más de una persona trabajando en una zona restringida, utilice un dispositivo de bloqueo grupal que permita a cada persona utilizar un candado que sólo pueda ser retirado por la persona que realiza el mantenimiento.

"Etiquetado" significa que debe colocarse una advertencia fácil de ver en un dispositivo aislador de energía que indique que el equipo no debe utilizarse.

Procedimientos de bloqueo/etiquetado eléctricos

Cuando trabaja en una máquina fuera del gabinete eléctrico principal de la máquina

Si trabaja en la línea de transmisión eléctrica a la máquina, siga el procedimiento de la página 9.

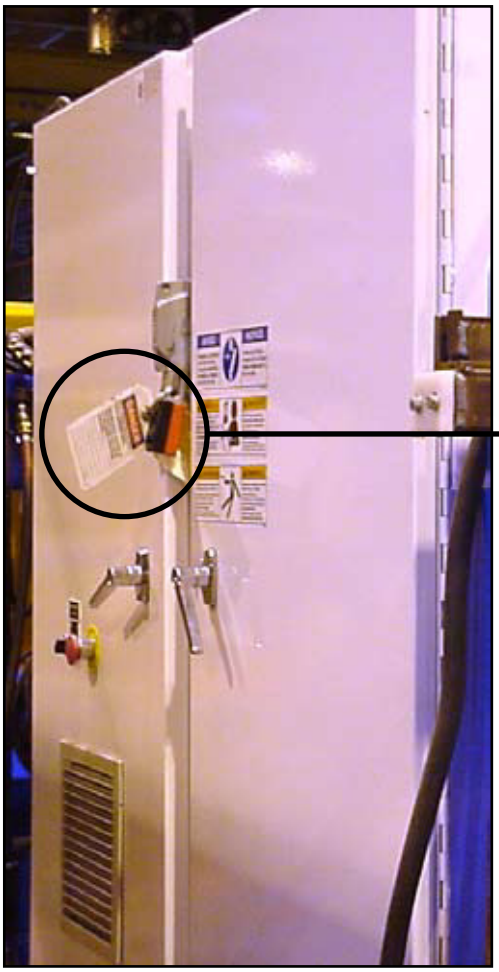
Antes de realizar el mantenimiento de cualquier máquina con alimentación eléctrica, bloquee y etiquete la máquina de forma adecuada. Cuando trabaje en una máquina fuera del gabinete eléctrico principal de la máquina, salvo en el caso de trabajos en la línea de transmisión eléctrica a la máquina, siga los procedimientos de bloqueo/etiquetado aprobados por la compañía, los cuales deberían incluir, entre otros, los pasos aquí indicados.

1. Coloque un freno de emergencia sobre la máquina.
2. Coloque el mango del interruptor con fusibles del gabinete eléctrico principal de la máquina en la posición "apagado/apagada". Vea la figura 2-1.

	**RIESGO DE ELECTROCUCIÓN.** **Cuando el interruptor con fusibles está apagado, sigue habiendo energía dentro del gabinete del interruptor. ¡Apague siempre la alimentación en la fuente de alimentación del edificio antes de abrir este gabinete eléctrico!**

3. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA.
4. Trabe o desenergice todos los componente neumáticos, componentes hidráulicos y otras piezas que tengan alimentación directa o almacenada.

Figura SEGURIDAD-1: Bloqueo/etiquetado en el gabinete eléctrico principall



Ejemplo de un candado y etiqueta fijados al gabinete eléctrico de una máquina

Cuando trabaje en una máquina dentro del gabinete eléctrico principal de la máquina o en la línea de transmisión eléctrica a la máquina

Antes de abrir el gabinete eléctrico principal o intentar reparar o reemplazar una línea de transmisión eléctrica a la máquina, bloquee y etiqueta la máquina en forma adecuada. Siga los procedimientos de bloqueo/etiquetado aprobados por la compañía, los cuales deberían incluir, entre otros, los pasos aquí indicados.

1. Coloque un freno de emergencia sobre la máquina.

2. Apague la alimentación a la máquina en la fuente de alimentación, que, por lo general, es un panel de entrada de suministro eléctrico que se encuentra en una pared de las instalaciones. En la figura 2-2 se muestra un ejemplo de panel de fuente de alimentación bloqueado.

3. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA.

4. Abra la puerta del gabinete al que necesita acceder y usando un multímetro verifique que la alimentación esté apagada.

Figura SEGURIDAD-2: Bloqueo/Etiquetado del panel de fuente de alimentación

Procedimiento de bloqueo/etiquetado de sistema hidráulico

Cuando no se requiere bloqueo/etiquetado

Si trabaja con componentes que no son del sistema hidráulico pero que requieren su presencia en la proximidad de componentes hidráulicos móviles, debe, como mínimo, trabar físicamente estos componentes para que no se muevan. Si no es posible, bloquee/etiquete todo el sistema hidráulico.

Cuando se requiere bloqueo/etiquetado

Antes de intentar reparar o realizar el mantenimiento de una línea o componente hidráulico, bloquee y etiquete la máquina en forma apropiada. Siga los procedimientos de bloqueo/etiquetado aprobados por la compañía, los cuales deberían incluir, entre otros, los pasos aquí indicados.

1. Siga las instrucciones de las secciones de bloqueo/etiquetado eléctrico y neumático para bloquear y etiquetar o evitar el movimiento de estos componentes.

2. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA en la válvula de cierre del lado de salida del reservorio.

3. Purgue la presión de todas las líneas hidráulicas.

4. Proceda con precaución cuando desconecte las líneas o componentes hidráulicos ya que puede haber presión almacenada. Use el equipo de protección personal adecuado.

Procedimiento de bloqueo/etiquetado del sistema neumático

Cuando no se requiere bloqueo/etiquetado

Si trabaja con componentes que no son del sistema neumático pero que requieren su presencia en la proximidad de componentes neumáticos móviles, debe, como mínimo, trabar físicamente estos componentes para que no se muevan. Si no es posible, bloquee/etiquete todo el sistema neumático.

Cuando se requiere bloqueo/etiquetado

Antes de intentar reparar o realizar el mantenimiento de una línea o componente neumático, bloquee/etiquete la máquina en forma apropiada. Siga los procedimientos de bloqueo/etiquetado aprobados por la compañía, los cuales deberían incluir, entre otros, los pasos aquí indicados.

1. Siga las instrucciones de las secciones de bloqueo/etiquetado eléctrico y neumático para bloquear y etiquetar o evitar el movimiento de estos componentes.

2. Coloque un candado y una etiqueta que cumplan con los requisitos de bloqueo/etiquetado de la OSHA en el regulador de aire.

3. Purgue toda la presión del reservorio.

4. Purgue la presión de todas las líneas neumáticas activando las válvulas neumáticas asociadas con dicha fuente de aire.

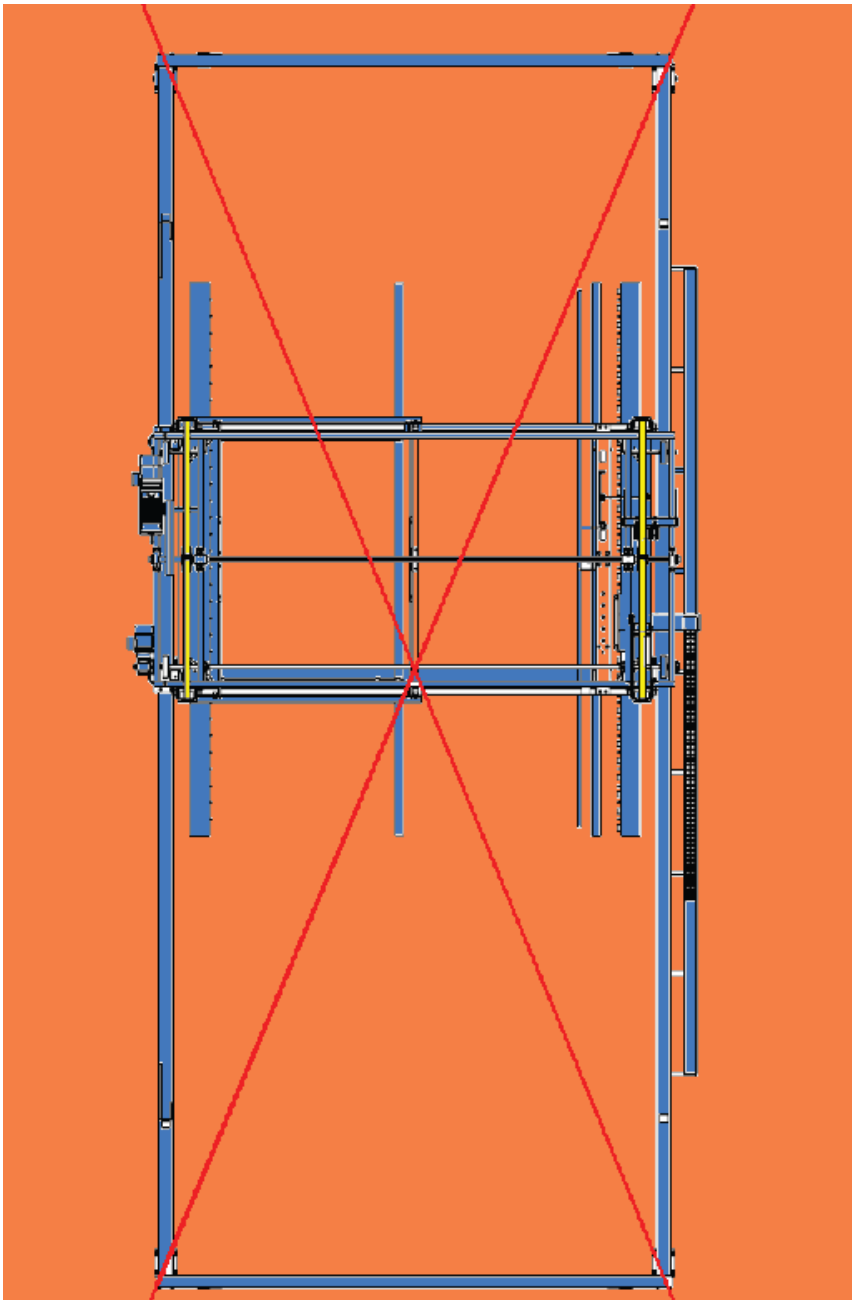
Solución de problemas con una máquina energizada

Sólo un electricista calificado que utilice el equipo de protección personal y siga los procedimientos recomendados en la norma NFPA 70E debe intentar realizar tareas de reparación o mantenimiento en un área o componente energizados de la máquina o en su proximidad.

Cada vez que se realizan tareas de mantenimiento mientras el equipo está eléctricamente energizado, existe un riesgo potencial de formación de un arco eléctrico. Consulte en la norma NFPA 70E el equipo de protección personal requerido para trabajar con componentes eléctricamente energizados. Los componentes neumáticos e hidráulicos pueden moverse de manera imprevista si no se desenergizan. Trabe físicamente cualquier componente que pueda moverse cuando deba trabajar en ellos o en su proximidad.

Zonas restringida

	Manténgase afuera de la zona restringida cuando el equipo esté en uso. Pueden producirse lesiones graves o incluso la muerte si el personal está en la zona restringida.



Introduction

Chapter 1

Purpose of Chapter

This chapter explains how to navigate through the equipment manual and how to contact MiTek.

Introduction to the Manual

	WARNING
	**Read this manual completely before using this equipment!** **Do not operate this machine until you have a thorough understanding of all controls, safety devices, emergency stops, and operating procedures outlined in this manual.** **All hazard instructions must be read and observed. Failure to do so may result in economic loss, property damage, and/or personal injury.** **This manual must always be available to personnel operating and maintaining this equipment.**

Purpose and Scope of This Equipment Manual

In order for this equipment manual to be useful, it must be kept in a location where operators and maintenance personnel have easy access to it.

This manual addresses the most recent versions of the equipment as of the creation or revision date on the title page. For earlier revisions, contact MiTek Wall Panel Division Customer Service. The part number is listed on the title page, but the revision you require depends on the date your equipment was manufactured.

This manual can be a valuable training tool.

- The Introduction and *General Information* chapter contain information on truss terminology and provides basic information about the equipment.
- The *Operation* chapter teaches operators how to efficiently operate the machine.
- The *Maintenance* chapter is written specifically for maintenance personnel.
- The appendices provide valuable technical and training information to keep your equipment running.

Navigation

The graphics in Table 1-1 are used throughout the manual to quickly communicate a specific type of information.

Table 1-1: Navigational Tools Used Throughout the Manual

Graphic	Explanation
	Important safety note!
	Indicates that you must lockout/tagout at the disconnect switch located on the equipment using approved methods described in OSHA 29 CFR 1910.147 before continuing with the procedure.
	Indicates tools required before beginning a procedure.
	Gives additional information to the steps or text.
	Refers reader to another section, table, graphic, or drawing for further explanation.

Additional Resources

Supplemental Documentation

In addition to the equipment manual, refer to the manufacturer's documentation on the parts that are listed in this section. The supplemental documentation is provided at the time of installation, or it may be found inside an electrical enclosure. Refer to these documents when you need more detailed information on these components than the MiTek manual provides.

- Motors manual
- Inverters manual
- PLC hardware manual

Web Site

Visit the MiTek Web site at www.mii.com for up-to-date information on all MiTek equipment. View the latest revision of this manual and all Service Bulletins, or order parts on-line through our *eStore*™.

Contacting Us

For technical assistance or to order parts, contact the Wall Panel Division Customer Service Department using one of the methods listed in Figure 1-1.

Figure 1-1: Contacting MiTek

MiTek Wall Panel Division
Customer Service Department
1391 Boone Industrial Dr.
Columbia, MO 65202

Parts Orders (with part number)
eStore™ at http://estore.mii.com
E-mail: mitekparts@mii.com

Web Site
www.mii.com/machinery

Technical Assistance
Phone: 888-727-4433

Purpose of Chapter

This chapter provides an overview of the equipment and the means to identify it.

Introduction to the Equipment

Purpose of the Equipment

The *SmartCrane* wall panel stacker is a fast, accurate, and economical method of stacking finished wall panels for the construction of manufactured homes.

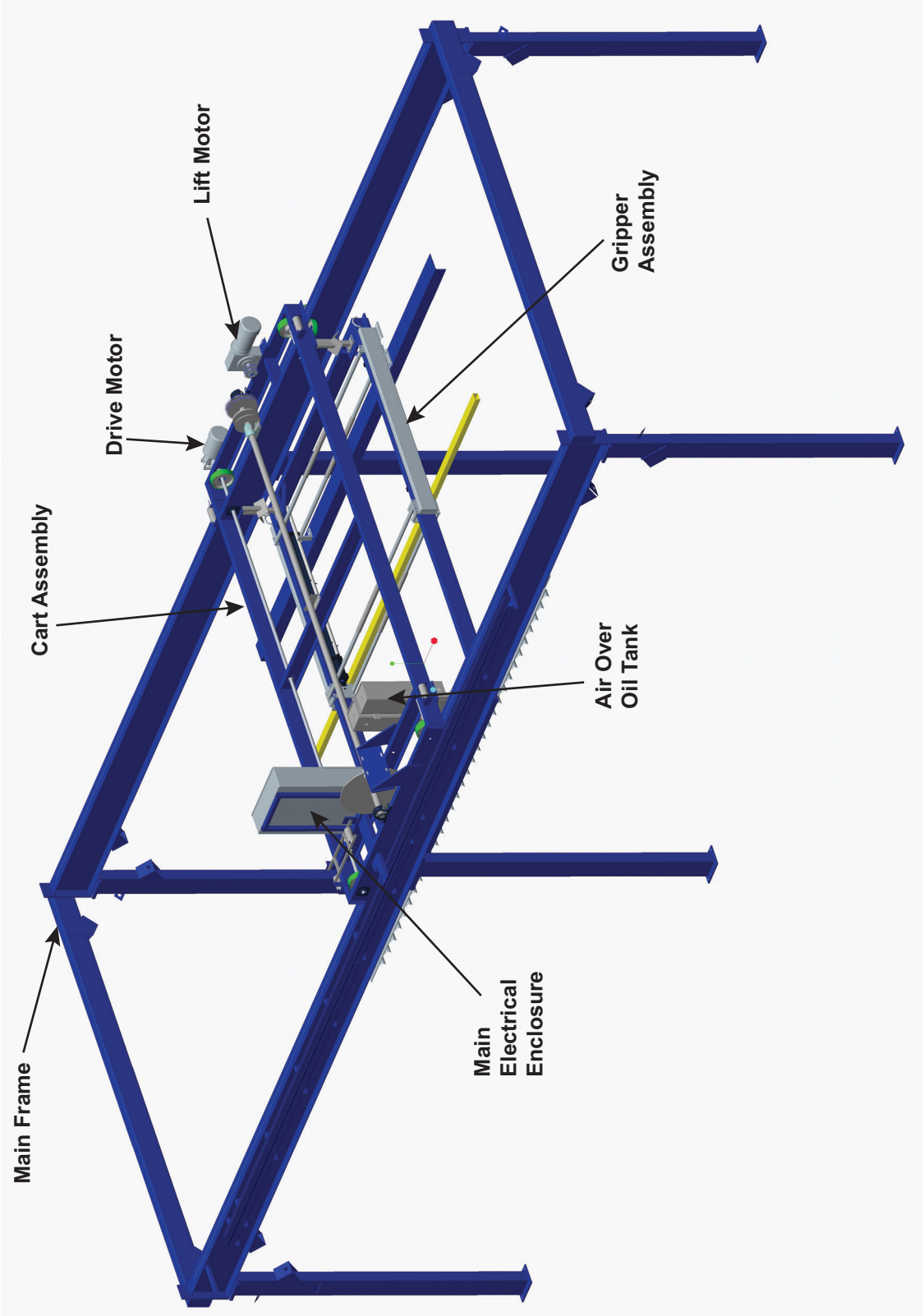
Description of the Equipment

The *SmartCrane* is a free-standing, overhead bridge crane machine designed to safely and automatically stack finished wall panels. The process of manually stacking wall panels is typically slow, labor-intensive, and dangerous to personnel. This machine is designed to handle many types of wall panels.

The *SmartCrane* stacks layers of wall panels, as defined by design software, automatically.

Figure 2-1 shows a *SmartCrane*. Refer to the *Maintenance* chapter for more detailed graphics.

Figure 2-1: Getting to Know Your System



Main Components and Optional Equipment

Table 2-1 lists the main components that comprise this system.

Table 2-1: Main Components

Component	Description	Part #
Cart assembly	Carries the gripper assembly back and forth across the main frame, and up and down from the floor to the top of the main frame	60302-501-xxxV
Gripper assembly	Grips the wall	60303-501
Main frame	Supports the cart and gripper assembly	60301-501

System Identification

Table 2-2 lists the models available for this equipment and the part numbers that identify each model.

Table 2-2: Available Models

System Description	Part #
Right-Hand Crane	60304-501-xxxV
Left-Hand Crane	60442-501-xxxV

General Specifications

Table 2-3: General Specifications

General	
Work area	35' 4" x 17' 1/4" x 13' 1"
Maximum open height between grippers	154"
Minimum close height between grippers	84"
Cycle time	90 sec
Cart Motor	
Horsepower	1 hp
Voltage	480/230/208 V
Amperage	3/5/6 amps
Cycles	60
Phases	3
Gripper Motor	
Horsepower	3 hp
Voltage	480/230/208 V
Amperage	5/10/12 amps
Cycles	60
Phases	3
Air Over Oil	
Flow	Rated 10 GPM
Nominal operating pressure	120 psi
Hydraulic fluid capacity	20 gallons
Recommended hydraulic fluid	Mobile DTE 24 or equivalent
Pneumatics	
Minimum air pressure	80-90 psi
Minimum port size	3/4"
Long cylinder setting	80 psi
Finger cylinder setting	60-70 psi
Low pressure brake setting	40-60 psi
Dimensions of System Components	
See Table 3-2	
Weight of System Components	
See Table 3-5	

Prior to Installation

Chapter 3

Purpose of Chapter

This chapter covers what you must consider or complete before this equipment can be installed.

MiTek's Responsibilities

Prior to Installation

MiTek will provide the following items and information prior to the installation date:

1. A Prior to Installation package that:
   - Outlines this chapter and requests your signature of agreement.
   - Gives dates to expect shipment, delivery, and installation.
   - Explains the number of people required to help with installation.
   - Provides guidelines on providing an electrician, welder, and other specialists.
   - Describes payment information.
2. Upon request, a layout showing how you have indicated that you wish the equipment to be arranged within your building.

During Installation

Upon request, a MiTek Customer Service Technician (CST) can be present to oversee the installation of your equipment.

Customer Responsibilities

Before the installation of your equipment, the items and procedures in this chapter must be arranged, purchased, or assembled. Table 3-1 provides an overview of these items. Each topic listed in the table is explained in detail in the text following the table.

If these requirements are not satisfied before the scheduled installation date, it may be necessary to reschedule the installation. Any additional cost may be the customer's responsibility.

Table 3-1: Summary of Customer Responsibilities

Space Requirements	This equipment requires enough space to allow for the machine dimensions listed in Table 3-2, plus additional working space for operation and maintenance. Space should have adequate lighting.
Location Requirements	Reinforced concrete, a minimum of 6 in. thick 3,500 psi, is required to support the weight of the crane. The equipment discussed in this manual must be used in dry conditions under a roofed area.
Electrical Requirements	The standard electrical requirements are shown in Table 3-3. Contact your MiTek representative immediately if custom power specifications need to be accommodated.
Air Over Oil Requirements	Hydraulic fluid that meets the requirements in Table 6-1 must be on-hand during the installation process.
Pneumatic Requirements (Compressed Air)	See Table 3-4.
Shipping Requirements	See Table 3-5 for shipping weights.
Customer-Supplied Items	The customer is responsible for having the supplies listed in Table 3-6 available at the time of installation.

Space Requirements

Refer to these guidelines when planning your space allocation. MiTek can provide help with plant layout and space utilization upon request.

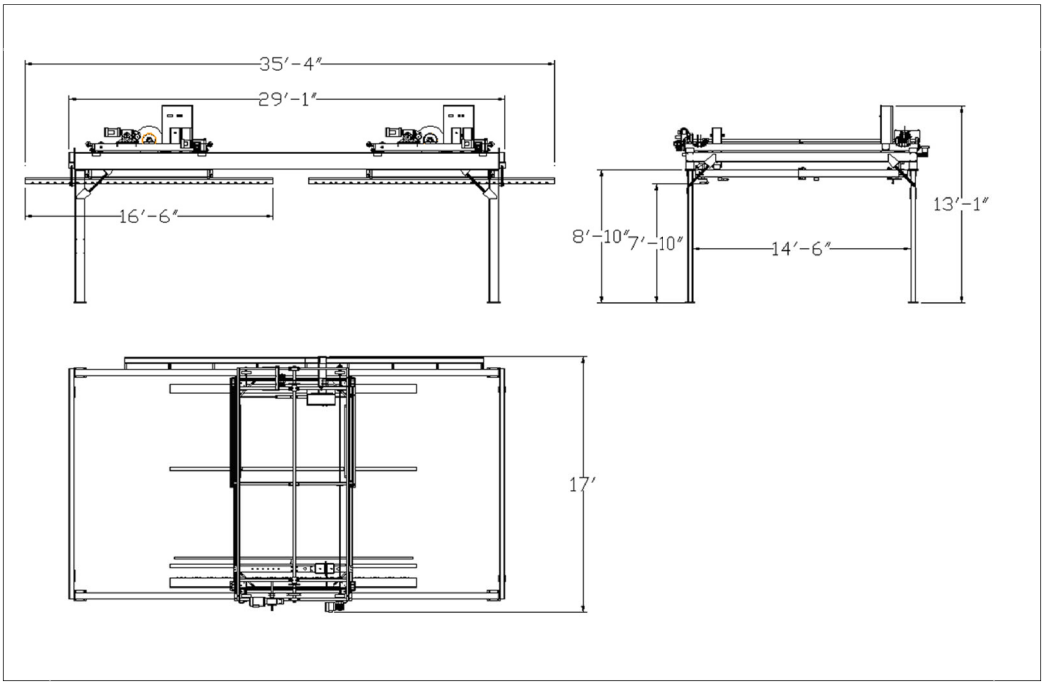
Space for the Equipment

It is the customer's responsibility to provide adequate space for the installation, operation, and protection of the equipment. The physical dimensions of the equipment are shown in Table 3-2. Additional space is required for operation, maintenance, and optional equipment.

Table 3-2: Approximate Equipment Dimensions

Dimension	Measurement
Length	35' 4"
Width	17' 1"
Height	13' 1"

Figure 3-1: Dimensions for Entire System



Space for Operation and Maintenance

Additional space must be allocated for operation and maintenance. Space should allow for safe operation, freedom of movement, storage space, and free flow of raw and finished materials.

Location Requirements

Floor Structure

A level and structurally sound concrete slab must be provided for the installation of the equipment. This slab should be designed and installed in accordance with local building code requirements. Reinforced concrete should be a minimum of 6 in. thick. 3,500 psi concrete is recommended. Refer to your layout drawing.

Environment

The equipment must be used in dry conditions under a roofed area.

Lighting should be adequate for safe operation and maintenance.

Electrical Requirements

	WARNING
	**ELECTRICAL HAZARD!** **All electrical work must be performed by a licensed electrician.** **Follow approved lockout/tagout procedures (OSHA 29 CFR 1910.147).**

The standard electrical requirements are shown in Table 3-3. Each machine can be adapted for use with any of the incoming voltages listed.

The power supply must have a fused disconnect switch, separate from the disconnect switch on the machine. The power supply line must reach the disconnect enclosure on the machine.

You must indicate what voltage is available at the machine's proposed location when placing the order. This information must be correct. Depending on the voltage available, revisions to the electrical system or a transformer may be necessary.

Table 3-3: Minimum Electrical Requirements for This Equipment

Voltage	480/230/208 VAC
FLA Plus Control Amperage	10/20/22 amps
Equipment Disconnect Protection	20/40/50 amps
Cycles (Frequency)	60 Hz
Phases	3

Hydraulic System Requirements

30 gallons of hydraulic fluid must be available for the initial charge of the machine prior to startup.

	WARNING
	**HIGH PRESSURE HAZARD.** **Compressed air and hydraulic lines should be installed only by qualified personnel familiar with all governing regulations. Failure to use proper materials and installation practices can result in ruptured lines leading to personal injury, equipment damage, and equipment failure.**

You must have 30 gallons of hydraulic fluid on-site during the installation of this equipment. It can not operate without the proper hydraulic fluid.

Refer to Table 6-1 on page 14 in the *Maintenance* chapter for hydraulic fluid specifications.

Pneumatic System Requirements

	WARNING
	**HIGH PRESSURE HAZARD.** **Compressed air and hydraulic lines should be installed only by qualified personnel familiar with all governing regulations. Failure to use proper materials and installation practices can result in ruptured lines leading to personal injury, equipment damage, and equipment failure.**

This equipment uses compressed air, also referred to as pneumatic power. Your current air compressor may be adequate. If you need to install a new compressor, the air source must be supplied and installed prior to the scheduled installation date of the MiTek equipment. Table 3-4 describes the pneumatic system requirements.

Table 3-4: Pneumatic System Specifications

Connecting Air Source to System	Pressure
Minimum of 3/4-in. diameter tube between air source and air regulator; discuss location of air regulator with your MiTek representative before installation; customer to supply FRL	100 psi at FRL, 80-90 psi for air over oil

Shipping Information

When the equipment arrives, you must have the proper transport and lifting equipment available to remove it from the truck and place it in your facility. Table 3-5 lists the weight of the individual components of a typical system.

	DANGER
	**Transport and lifting equipment such as forklifts and cranes must be designed and rated for the load and application The weight of each major component is given in Table 3-5.** **Inadequate transport equipment may result in property damage, personal injury, or death.**

Table 3-5: Shipping Information

Contents of Shipment	Approximate Weight
Cart and Gripper Assembly	9,500 lb
I-Beams, Legs, and Cross Braces	4,500 lb

Customer-Supplied Parts

The customer must supply the parts shown in Table 3-6. Some must be installed before installation of the equipment and some must be available for use at the time of installation.

Table 3-6: Customer-Supplied Parts

Item	When Needed	Description
Compressed Air		Supply line from air compressor to air regulator that meets the requirements in Table 3-4
		Air compressor that can meet the requirements in Table 3-4
		Connector for tube from air source to 1/2-in. NPT port on the air regulator
Electrical Equipment		All electrical requirements to provide power to the disconnect enclosure on the *SmartCrane* are the customer's responsibility
Transport Equipment		A heavy-duty forklift or truck wrecker is required to move the equipment during unloading and placement of the machine
		All transport and lifting equipment must meet the requirements given in the *Shipping Information* section
Tools That May Need to be Rented		Industrial hammer-drill
		Forklift
General Tools		Level
		Standard wrench set
		1-7/8" wrench
		10' ladder
		Transit

Training Provided

If MiTek is overseeing the installation of your equipment, the MiTek representative trains your operators and maintenance personnel on the equipment's proper operation and maintenance. The representative explains the warranty policy, gives an overview of the equipment manual, and requests your signature that the manual was received.

If a MiTek representative is not required to be present, it is your responsibility to ensure all necessary personnel read the Equipment Manual and address all guidelines and safety instructions given.

Chapter 4

Purpose of Chapter

This chapter describes the entire installation process in detail. The instructions assume that the prior-to-installation requirements are satisfied.

Responsibilities During Installation

Upon request, MiTek will provide installation supervision to ensure that the system is installed properly and operates correctly. We will also provide operating and maintenance training at the time the equipment is installed. The customer is responsible for providing all labor and equipment needed to complete the installation. These requirements are explained in the *Prior to Installation* chapter.

All customer responsibilities before and during installation are described in the *Prior to Installation* chapter!

Delivery

Checking for Damage

All shipments from MiTek are covered with tarps. When your shipment arrives, check to ensure that the tarps are in place. Displaced tarps may indicate a potential problem.

After removing the tarps, inspect the shipment for water/moisture, debris, and damage. Report any findings as required by the transport company. Document any findings by taking photographs or a video. Note any and all damage to the equipment on the bill of lading to ensure proper documentation for insurance claims. Without this note, any damage in transit is the responsibility of the customer to repair.

Notify MiTek Wall Panel Division Customer Service of any unacceptable findings discovered during the receipt inspection. Although your findings may not appear to be a problem, they may cause premature failure of components, poor performance, or erratic performance.

Unloading

Refer to...

Table 3-5 on page 6 for the weight of each component

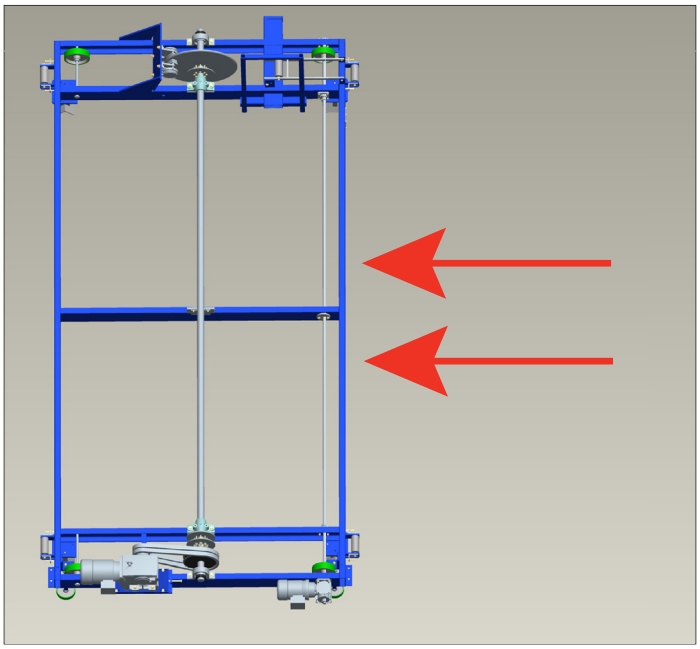
Refer to the *Prior to Installation* chapter for information regarding preparing for the delivery.

Even if a MiTek representative is present, it is the customer's responsibility to provide equipment and labor for unloading, placement, and wiring of the equipment. A heavy-duty forklift or truck wrecker is required to move the equipment during unloading and placement of the machine. The lifting equipment must be rated appropriately for the weights shown in Table 3-5 on page 6.

Exercise extreme caution to avoid damage or misalignment during unloading. Do not apply pressure on any moving parts or fittings. Lift components from the middle, with the forks evenly aligned on either side. Figure 4-1 shows how to lift and move the cart assembly safely.

	WARNING
	**CRUSH HAZARD.** **Failure to lift the equipment in the prescribed manner may cause serious injury, including death, or equipment damage.** **Personnel not involved in the off-loading from the truck shall remain clear of the area.** **Transport and lifting equipment such as forklifts and cranes must be designed and rated for the load and application.**

Figure 4-1: Lift Points for the Cart Assembly



Unpacking

After successful unloading, remove the protective crating material from the pallets. Detach and set aside all loose parts. Move the equipment to the desired location using a forklift or crane appropriate to the weight of each unit. Lift the equipment to remove the pallet, and gently place each unit in its new location.

Equipment Layout

Each component must be located in specific locations. Refer to your own layout during installation. Your MiTek representative will provide your layout to you before the equipment is installed.

Mechanical Installation

Assembling the Main Frame and Cart Assembly

1. Assemble the main frame.
    a) Bolt the I-beams and cross pieces together.
    b) While the frame is on the floor, check to make sure it is square.
2. Place the cart assembly on top of the I-beams.
3. Fill the hydraulic tanks and cylinders with hydraulic fluid.
4. Connect wiring to the electrical enclosure. Refer to your electrical schematic.
5. Install the bogey wheels on the cart assembly by bolting them on.
6. Using two forklifts, one under each of the cross pieces, lift the frame and cart just high enough to place the legs underneath the frame.
7. Attach the legs to the main frame.
8. Bolt on the braces that go from the legs to the main frame.
9. Square the legs by adjusting the nuts of the leg braces.
10. Check the location of the machine to make sure it is correct according to your layout.

Attaching and Adjusting the Gripper Assembly

1. Turn on power to the machine and lower the cart to the floor.
2. Lockout/tagout the machine.
3. Bolt the angle iron with the finger cylinders to the fixed side gripper angle.
4. Bolt the angle iron with bolts to the moveable side gripper angle.
5. Bolt on the gripper resting beam.
6. Bolt the wall detection bar to the gripper resting beam.
7. Level the cart with the strap and U-bolts. The corner with the slack sensor should be approximately 2 in. lower than the opposite end of the gripper, and should land first.

Completing Mechanical Installation and Testing

1. Set the home and stack sensors.
    - Adjust the long bar barrel prox sensor to the height of detection.
    - There are two (2) long bar barrel prox sensors on each end of the machine.
2. Level the legs with the braces and adjust the alignment as needed.
3. Test the machine to verify that it is operating correctly and that the finger cylinders are in the correct location.
4. Bolt the machine to the floor.

Air Over Oil System

Hydraulic Fluid

See Table 6-1 on page 14 for hydraulic fluid specifications. The indicated amount of hydraulic fluid must be available during installation.

CAUTION
Add hydraulic fluid before turning on the system. The equipment is shipped with the reservoir empty.

Connecting the Hoses

All hoses will be connected before the machine is shipped. Prior to starting the machine, check all connections for tightness, and reconnect if necessary.

Pneumatic System

This equipment uses compressed air, also referred to as pneumatic power. The air source must be supplied and installed prior to the scheduled installation date of the MiTek equipment. Table 3-4 in the *Prior to Installation* chapter lists the specifications for the pneumatic air source, tubing, and connectors.

Electrical System

	DANGER
	**ELECTRICAL HAZARD!** **All electrical work shall be done by a licensed electrician and shall conform to all regulating codes. In the event that information in this manual conflicts with local code requirements, please contact MiTek Machinery Division Customer Service.** **Do not turn on electrical power until you have read the startup procedure. Follow approved lockout and tagout procedures in accordance with OSHA 19 CFR 1910.147.**

Checking Existing Wiring

Heavy gauge wire can work loose during shipping and handling. Before power is connected to the machine, conduct a pull test on all pre-wired connections inside the electrical enclosures.

Connecting Power to the Equipment

All electrical work is the customer's responsibility and must be performed by a licensed electrician. The machine design addresses electrical components starting with the disconnect enclosure. Installation and maintenance of all electrical requirements up to the disconnect enclosure are the responsibility of the customer. Your MiTek representative can provide guidance regarding when the electrical will need to be available during the installation.

Installation Checklist

- ☐ Check shipment for damage
- ☐ Unload equipment
- ☐ Unpack equipment
- ☐ Place equipment in desired location
- ☐ Assemble the main frame
- ☐ Place the cart assembly on the frame
- ☐ Attach the gripper assembly
- ☐ Adjust the gripper assembly
- ☐ Set the home and stack sensors
- ☐ Bolt the machine to the floor
- ☐ Fill the hydraulic tanks with fluid
- ☐ Check hydraulic connections
- ☐ Check pneumatic connections
- ☐ Check wiring
- ☐ Connect power to the equipment
- ☐ Check that safety labels and guards are in place
- ☐ Discuss contents of manual

	WARNING
	**ELECTROCUTION, HIGH PRESSURE, CRUSH, CUT, AND CHEMICAL HAZARDS!** **Do not attempt to start the system without a MiTek representative present!** **Serious injury and/or equipment damage may result.**

Purpose of Chapter

This chapter describes the operating mechanisms on this equipment and the procedure to operate it in most circumstances.

Preparing the Air Over Oil System

The equipment is shipped with the hydraulic fluid reservoirs empty. Add fluid before turning equipment on!

Fill the hydraulic oil reservoir with hydraulic fluid that matches the specification listed in Table 6-1 on page 14. Ensure that you have the required amount of hydraulic fluid prior to planning the startup. The reservoirs should be filled to the level indicated on the side of the tanks. Monitor the fluid level by looking through the transparent tanks. Refer to the procedure in the *Maintenance* chapter.

	CAUTION
	**SLIP HAZARD.** **Do not overfill. Clean up any spillage immediately to avoid injury.**

Checking Motor Rotation

Check the motor rotation of the two electric motors to ensure they are rotating in the same direction as the arrow on their housing. Refer to the *Checking Motor Rotation* section on page 18 to remedy a motor rotating in the wrong direction.

Safety Tests

To ensure the safety mechanisms are in working order, perform these safety tests every day and after any maintenance, adjustments, or modifications.

	WARNING
	**CRUSH HAZARD.** **Before turning on the equipment, make sure that all personnel and equipment are out of the restricted zone (see page 11).**

Testing E-Stops

1. While moving the cart, press the E-stop on the operator control panel. The cart should stop immediately.
2. Reset the E-stop.
3. While moving the cart, pull one of the perimeter safety cables. The cart should stop immediately
4. Reset the perimeter safety cable.
5. While moving the cart, pull the other perimeter safety cable. The cart should stop immediately
6. Reset the perimeter safety cable.
7. Recheck each E-stop while lowering the gripper assembly. The gripper should stop within 6 in.

If gripper does not stop within 6 in., refer to the *Checking the Brake Adjustment* section on page 21 for information on adjusting the brake gap.

Testing Controls

While the power is off, move the switches to each position and push each button control to make sure the controls do not bind or stick in any position.

Mechanical Checks

Make sure the horn is sounding while the machine is in operation.

Check the lifting straps for signs of wear, particularly broken edge seams. Replace if necessary.

Check to see if the rod tips of the pneumatic cylinders are bent. Replace the cylinder immediately if the tip is bent.

Before You Begin

Safety Operating Notes

	WARNING
	**ELECTROCUTION, HIGH PRESSURE, CRUSH, AND CHEMICAL HAZARDS!** **Read this section AND the safety section in the preliminary pages before operating or maintaining this equipment.** **Do not operate this machine until you have a thorough understanding of all controls, safety devices, E-stops, and operating procedures outlined in this manual.** **Read and observe all warnings. Failure to do so may result in economic loss, property damage, and/or personal injury.** **This manual must always be available to personnel operating and maintaining this equipment.**

	WARNING
	**CRUSH HAZARD.** **Before turning on the equipment, make sure that all personnel and equipment are out of the restricted zone (see page 11).**

	WARNING
	**CRUSH HAZARD.** **Never walk under a suspended wall panel! Walking under a suspended panel could result in serious personal injury or death.**

Stopping the Machine

Emergency stops (E-stops) immediately cease electrical power transmitting to the control circuit. Utilize any of the E-stops on this machine to cease power, which will stop all motion.

Do not use the E-stops as a standard stopping method during the operation procedure. Overuse may cause certain components to wear faster.

An E-stop pushbutton is located on the operator control panel, and two E-stop pull-cords run the length of the machine.

E-Stop Pushbutton

A typical E-stop pushbutton is shown in Figure 5-1 To activate a pushbutton, push the entire red button in. To release a pushbutton E-stop, pull straight up on the pushbutton. It will return to its extended position and the machine will operate again.

Figure 5-1: E-Stop Pushbutton

Perimeter Safety Cable (Pull-Cord)

Pull the perimeter safety cable away from the machine to cease power transmitting to the control circuit.

There are two cable and switch box pairs. You must press the button on the correct switch box to reset the circuit after someone pulls a perimeter safety cable. See the *Maintaining the Perimeter Safety Cable* section for instructions on reconfiguring the switch to adjust the tension of the cable.

Disconnect Switch

The disconnect switch controls the power supplied from that switch to the rest of the machine. Turning the disconnect handle to the ON position supplies electrical power to the entire machine. To remove power to the machine, turn the disconnect handle to the OFF position. The disconnect handle should be turned off when the machine is not in use.

	WARNING
	**When the disconnect switch is off, there is still live power to the disconnect switch's enclosure. Always turn off power at the main power source before opening electrical enclosure!**

Indicators

Indicator Lights

The indicator lights listed in Table 5-1 provide the operator with information about the status of the machine.

Table 5-1: Functions of Indicators

Indicator	Function
E-stop pushbutton	Indicates when the E-stop is activated
Fault	Indicates a VFD fault
Auto Control	Indicates when the machine is running in Auto-Cycle Mode
Operating Mode	Indicates the current operating mode
E-stop perimeter safety cables	Indicates when a safety cable has been activated

Indication of Movement (Horn)

A horn will sound when the machine is lowering and raising the gripper assembly.

Operator Control Interface

Figure 5-2: Overview of Control Mechanisms

Table 5-2: Functions of Control Mechanisms

Control	Function
E-stop	Stops all motion and activates finger cylinders. All E-stops must be in the released position for the machine to operate
Auto-Cycle button	Will start an automatic cycle if the cart is in the home position and the operating mode is set to Auto
Manual Controls joystick	Positions the cart
Clamp	Moves the gripper together
Release	Moves the gripper apart to release the wall panel
Operating Mode switch	Allows the operator to select between manual mode, automatic mode, and off

Operating Procedure

	WARNING
	**CRUSH AND CUT HAZARD.** **Before turning on the equipment, make sure that all personnel and equipment are clear.** **Never allow personnel to walk under the crane while it is in operation.**

	WARNING
	**CRUSH HAZARD.** **Never leave a suspended load unattended.**

	WARNING
	**CRUSH HAZARD.** **Before turning on the equipment, make sure that all personnel and equipment are out of the restricted zone (see page 11).**

	WARNING
	**CRUSH HAZARD.** **Never walk under a suspended wall panel! Walking under a suspended panel could result in serious personal injury or death.**

Auto-Cycle Operation

1. Perform the safety tests in the *Safety Tests* section on page 2.
2. Turn the disconnect handle to the ON (vertical) position.

3. Move the cart to the home position using the joystick.

The home position for the cart is at the operator end of the crane.

4. Raise the gripper to the top position.
5. Release the gripper long cylinders and finger cylinders by pushing the RELEASE button.
6. Turn the selector switch on the operator control panel to AUTO.

The other buttons on the operator control panel, with the exception of the E-stop, will not function while the *SmartCrane* is in auto-cycle mode. The E-stop will still function normally.

7. The crane will automatically cycle when it receives a signal from the *PowerFramer* or *Squaring Conveyor*. The auto-cycle consists of the following actions:
    a) The gripper lowers to the wall panel until the DOWN prox sensor is activated.
    b) The gripper finger and long cylinders clamp the wall panel.
    c) The gripper lifts until the UP photo eye is activated.
    d) The cart moves with the wall panel to the stack position.
    e) The gripper lowers the wall panel to the stack and releases the wall panel.
    f) The gripper raises up and the cart returns to the home position.

Manual Operation

1. Perform the safety tests in the *Safety Tests* section on page 2.
2. Turn the disconnect handle to the ON (vertical) position.
3. Turn the selector switch on the operator control panel to MAN.
4. Use the joystick to move the cart assembly directly over the wall panel that will be lifted.

5. Use the joystick to lower the gripper assembly until it rests on the panel.

When the gripper assembly is resting on the wall panel, there should be slight slack in the lifting straps.

6. Close the gripper assembly until it clamps the panel by pressing the CLAMP button.
7. Use the joystick to lift the panel.
8. Use the joystick to move the panel to the desired stacking position.
9. Lower the panel onto the stack.
10. Press the RELEASE button to release the gripper assembly and stack the panel.
11. Raise the gripper assembly and move the cart back to its home position.

The home position for the cart is at the operator end of the crane.

Restart Procedure

1. Reset the E-stop.
2. If the machine stopped during an auto-cycle, use the manual controls to move the wall panel over the stacking area.
3. Lower the panel onto the stack.
4. Press the RELEASE button to release the gripper assembly and stack the panel.
5. Raise the gripper assembly and move the cart back to its home position.

The home position for the cart is at the operator end of the crane.

Air Over Oil System Operation

The hydraulic system operates with the pneumatic system to grip the wall panel.The gripping motion is controlled by two cylinders, one located on each side of the gripper assembly. Air pushes oil from the tanks into the cylinders.

A pneumatically-controlled flow valve stops the gripper in either the open or closed position. The hydraulic system controls the main gripping motion of the gripper assembly.

Pneumatic System Operation

The pneumatic system operates with the hydraulic system to grip the wall panel. Air goes into the regulator valves in located in the electrical panel, causing the cylinders to extend and grip the wall panel. Spring-return cylinders retract the rod back into the cylinder when the system is turned off.

The pneumatic system controls the fine-tuned gripping action of the gripper assembly, compensating for flaws in the wall panel or the wood itself, and ensuring each panel is gripped securely.

Chapter 6

Purpose of Chapter

This chapter provides step-by-step instructions as well as information to help you understand how your equipment works to enable you to make repairs and perform preventive maintenance.

Introduction to Maintaining Your Equipment

This manual contains sufficient information for proper maintenance under most conditions. Certain operating environments may necessitate preventive maintenance at more frequent intervals. Because consistent preventive maintenance is so important for keeping mechanical equipment in good operating condition, MiTek recommends that you stock certain replacement parts to minimize downtime.

Review the table of contents and utilize the index to locate the information you need. The following appendices will also assist in maintaining and repairing your equipment:

- Troubleshooting
- Parts List
- Maintenance Checklists
- Drawing Set

Refer to Figure 1-1 for an overview of component locations that may require maintenance during the life of your equipment.

Read the *Performing Maintenance Safely* section before beginning maintenance on this equipment.

Performing Maintenance Safely

Read the safety pages in the preliminary pages and adhere to all rules and guidelines. This section provides additional safety information specific to maintenance topics.

Before Operating This Equipment

Adhere to these warnings before operating this equipment:

	WARNING
	**ELECTROCUTION, HIGH PRESSURE, CRUSH, CUT, AND CHEMICAL HAZARDS!** **Read this section AND the safety section in the preliminary pages before operating or maintaining this equipment.** **Do not operate this machine until you have a thorough understanding of all controls, safety devices, E-stops, and operating procedures outlined in this manual.** **Read and observe all hazard instructions. Failure to do so may result in economic loss, property damage, and/or personal injury.** **This manual must always be available to personnel operating and maintaining this equipment.**

	WARNING
	**CRUSH HAZARD.** **Before turning on the equipment, make sure that all personnel and equipment are out of the restricted zone (see page 11).**

	WARNING
	**CRUSH HAZARD.** **Never walk under a suspended wall panel! Walking under a suspended panel could result in serious personal injury or death.**

	WARNING
	CRUSH HAZARD. **The gripper assembly should be in the lowered position when maintenance is conducted, unless otherwise indicated.**

Lockout/Tagout

The lock and tag symbol shown here indicates that proper lockout/tagout procedures must be used prior to starting the procedure where the symbol occurs.

	WARNING
	ELECTROCUTION AND HIGH PRESSURE HAZARDS. **Always turn the power off by activating an E-stop when the equipment is not in operation.** **Always verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures (OSHA 29 CFR 1910.147) before performing any maintenance on this equipment.** **If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.** **Turn off the air switch or shutoff valve if appropriate.** **Bleed pneumatic and hydraulic lines if appropriate.**

Making Adjustments

Be careful when making mechanical adjustments. Untrained personnel may damage the machine or cause harm to themselves and others.

	WARNING
	The components on this machine can cause severe injury if adjusted improperly. Follow all procedures in this manual thoroughly and do not make adjustments to the machine without guidance from MiTek or MiTek documentation. **Only trained personnel should make mechanical adjustments to this machine.**

Replacing Parts

Special materials have been used for some of the components of this equipment. It is critical to the future performance of this machine that only specified replacement parts are used. Order all replacement parts through MiTek. Do not substitute parts without first consulting MiTek to determine if it is safe and effective. No electrical system component, cable, connector, or device should be modified, removed, disconnected, changed without specific approval and guidance from MiTek.

Wearing Personal Protective Equipment

Follow OSHA guidelines regarding the proper personal protective equipment (PPE) while performing maintenance. The most common guidelines are in regards to eye protection, hearing protection, dust masks while blowing off sawdust, gloves while working with solvents, and fire- retardant clothing when troubleshooting an energized machine.

Conducting Safety Tests

Ensure safety devices are always operating properly. Perform the safety tests described in the *Safety Tests* section on page 2 before operating the equipment at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.

Overview Graphics

Figure 1-1 through Figure 1-4 provide an important overview of the equipment to help you better understand the procedures in the *Maintenance* chapter.

Figure 6-1: Components Discussed in the *Maintenance* Chapter

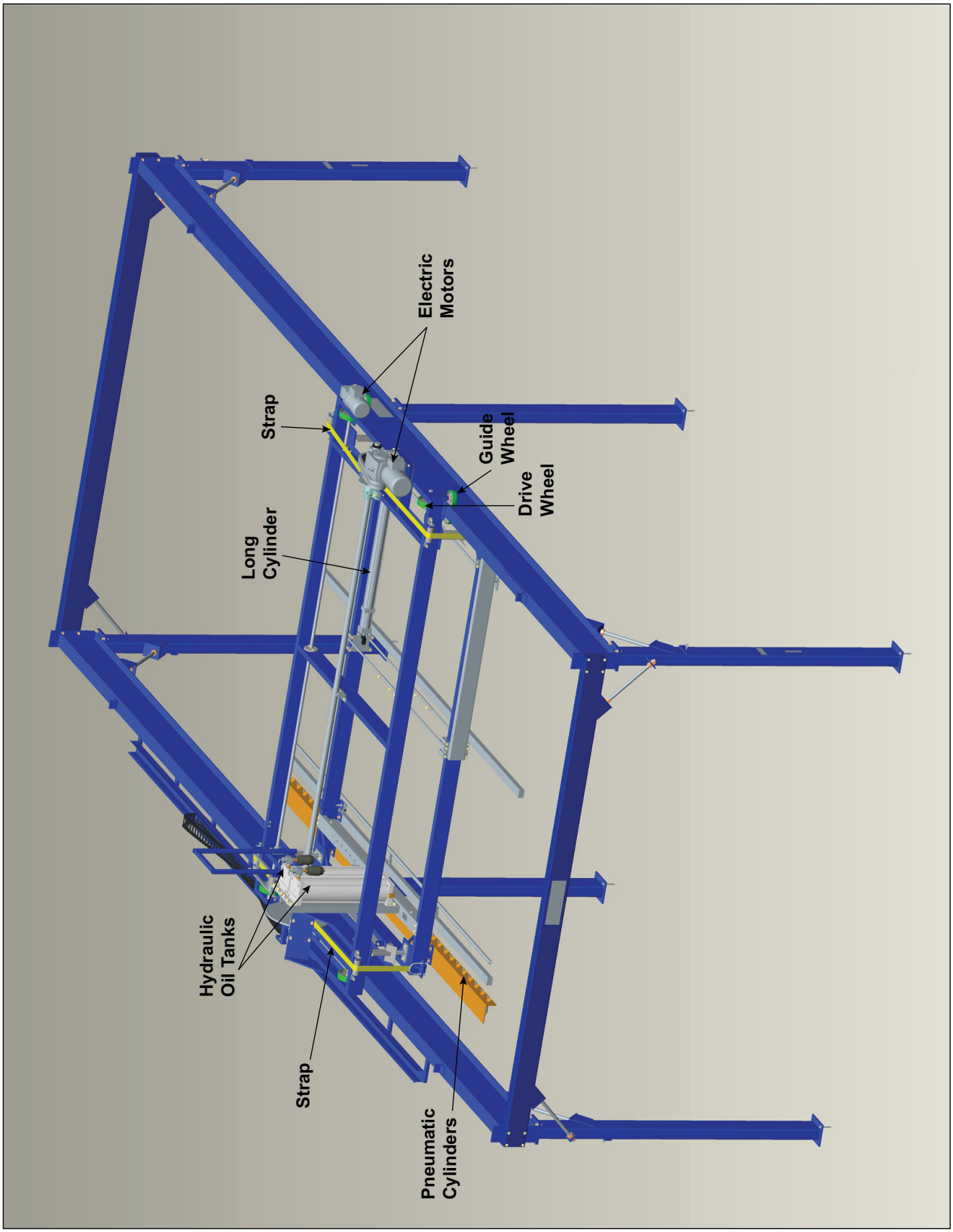


Figure 6-2: Wheels and Chains

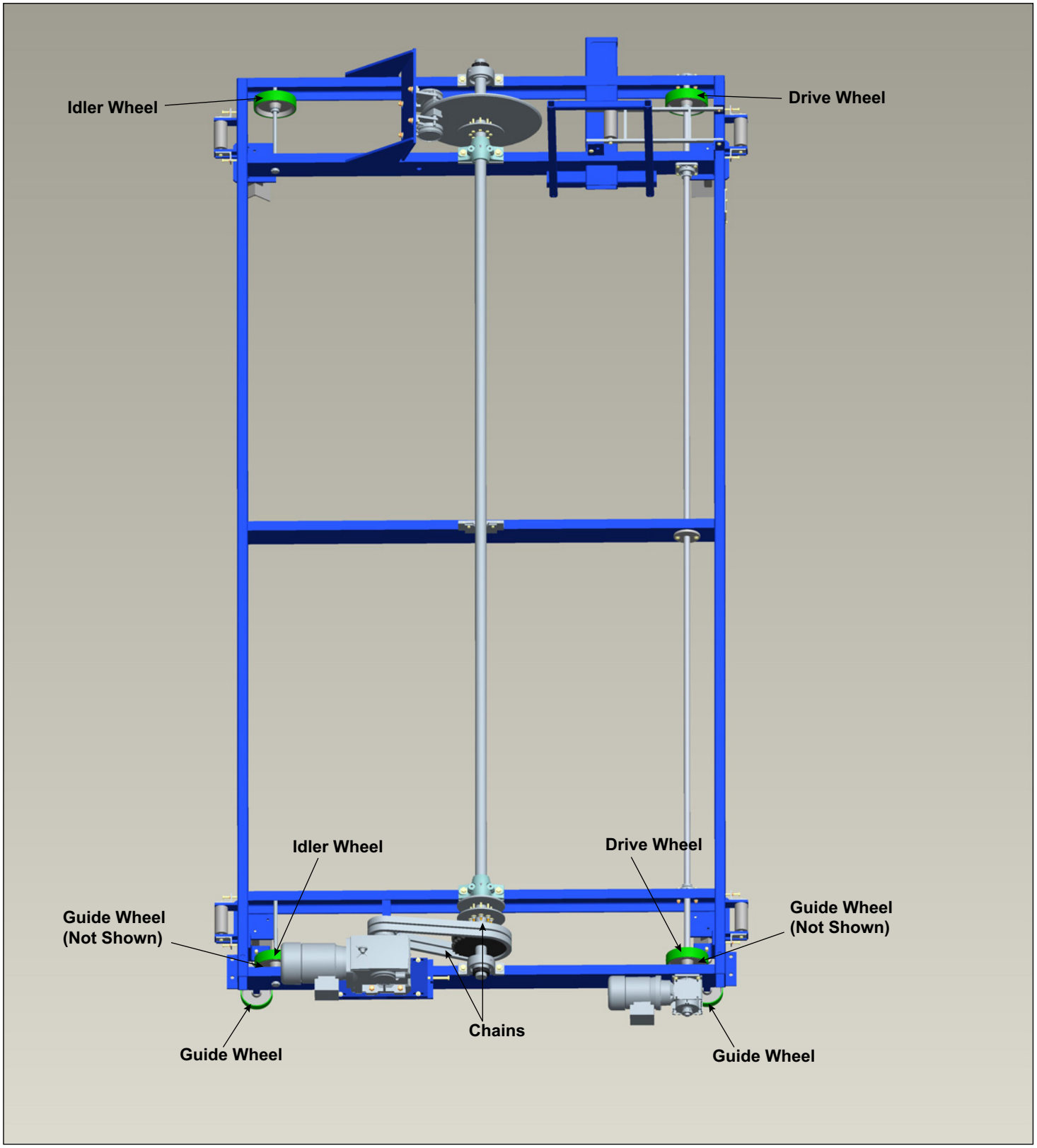


Figure 6-3: Bearing Lubrication Points

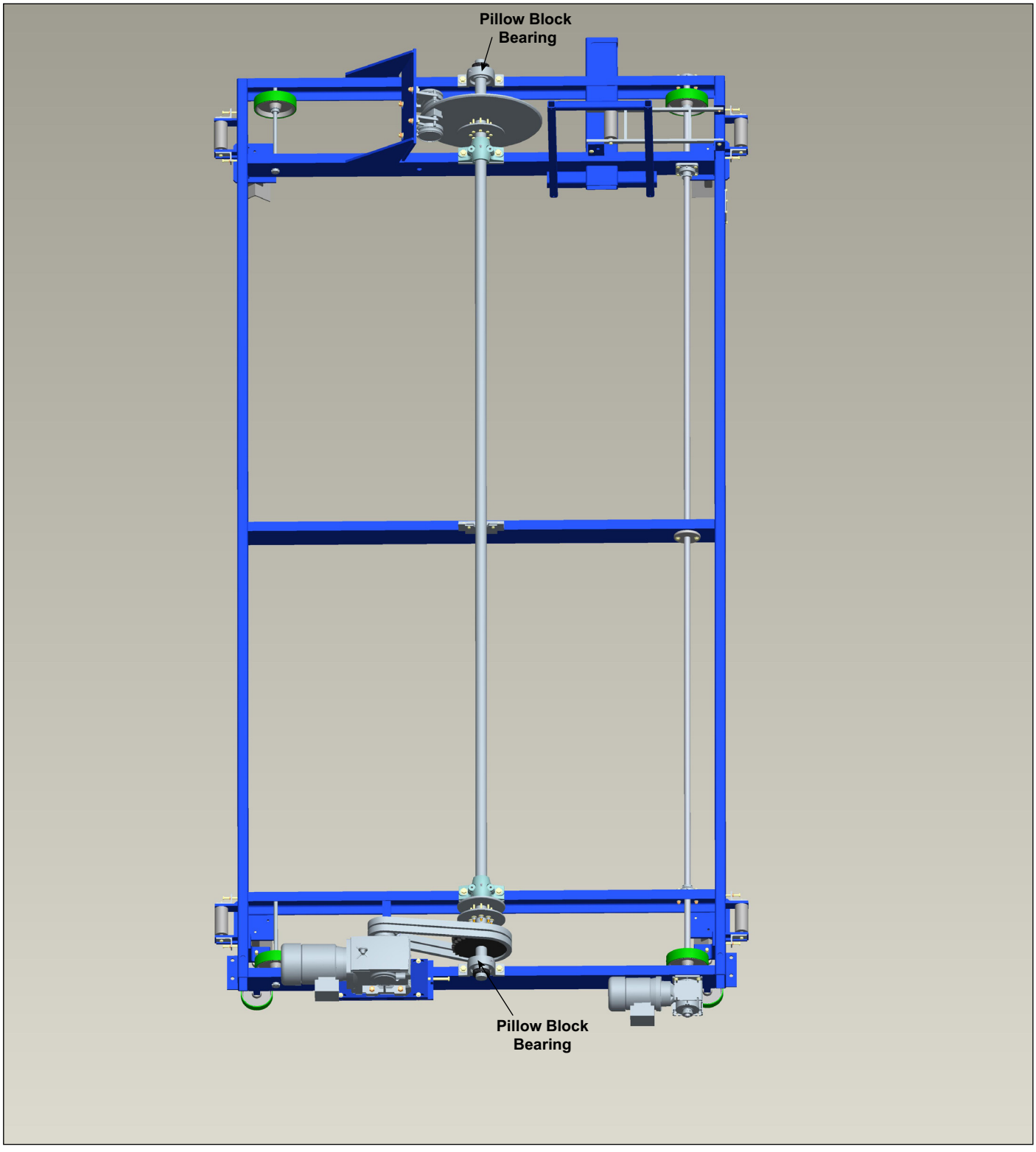
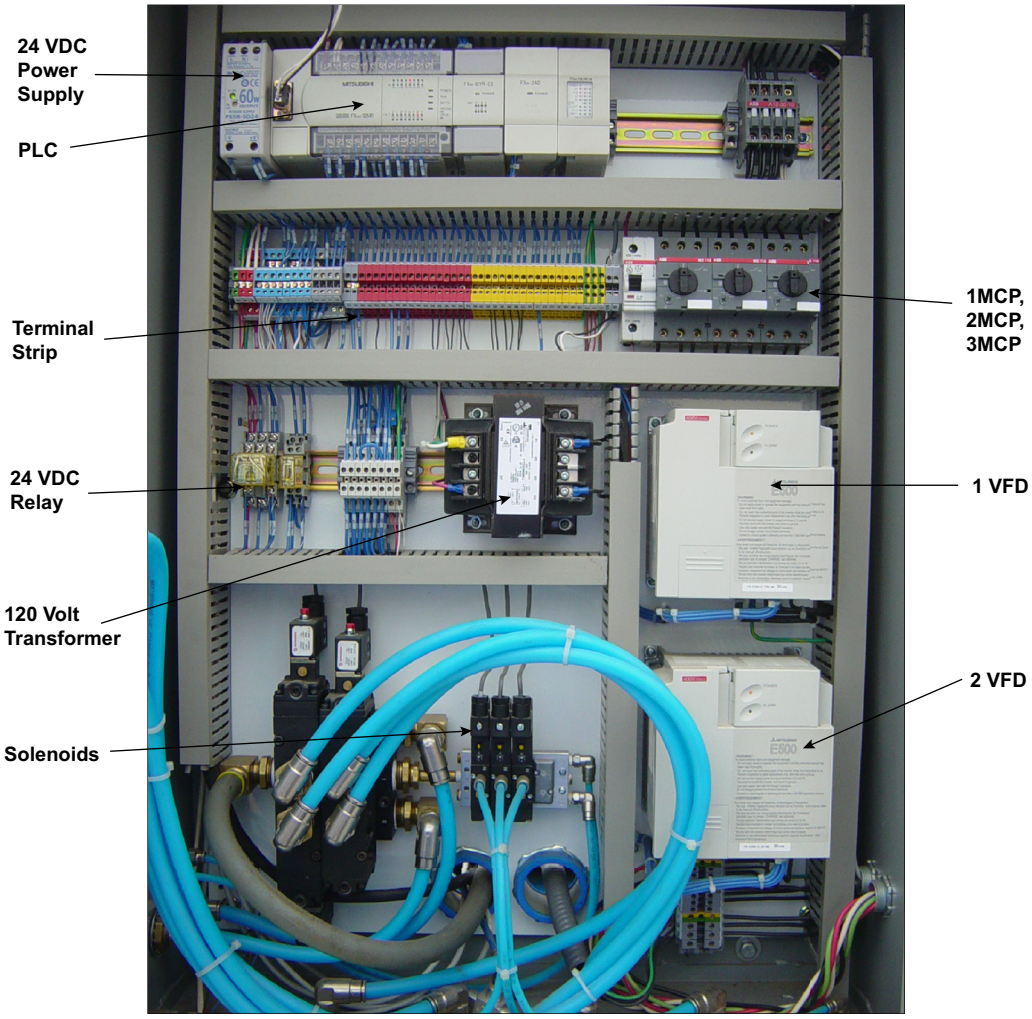


Figure 6-4: Electrical Enclosure



Operating Procedures for Maintenance Personnel

	WARNING
	CRUSH AND CUT HAZARD. Before turning on the equipment, make sure that all personnel and equipment are clear.

	WARNING
	CRUSH HAZARD. The gripper assembly should be in the lowered position when maintenance is conducted, unless otherwise indicated.

	WARNING
	CRUSH HAZARD. Before turning on the equipment, make sure that all personnel and equipment are out of the restricted zone (see page 11).

	WARNING
	CRUSH HAZARD. Never walk under a suspended wall panel! Walking under a suspended panel could result in serious personal injury or death.

Adjustments

Adjusting the Cart Position

The cart position may be adjustable on machines shipped before 1 January 2007. If your machine was shipped after this date, this adjustment cannot be made.

The cart will stop at locations determined by adjustable magnets on the main frame. These magnets are detected by four photo eyes located on the motor end of the cart. There are two photo eyes on each side.

To adjust the cart position:

1. Manually move the long magnets by picking them up and moving them to the desired positions.
   - The long magnets cause the cart to slow down.
   - There are two long magnets on each end of the frame, one on each side, for a total of four long magnets.
2. Manually move the short magnets by picking them up and moving them to the desired positions.
   - The short magnets cause the cart to stop.
   - There are two short magnets on each end of the frame, one on each side, for a total of four short magnets.
3. Remove the lockout/tagout devices and restart the machine.
4. Run the cart back and forth to make sure the cart slows and stops in the proper location. Adjust the magnets as needed.

Leveling the Gripper

The alignment of the gripper assembly is adjusted by changing the length of the straps.

To adjust the gripper alignment:

1. Unbolt the strap. See Figure 1-5.
    a) Loosen and pull out the bolt the strap is attached to on the pulley wheel.
    b) Remove the strap from the bolt.
    c) Reinsert and tighten the bolt.
2. Reposition the strap on another bolt. The straps should be even.
    a) Loosed and pull out the bolt to which the strap will be attached.
    b) Put the strap on the bolt.
    c) Reinsert and tighten the bolt.
3. Micro-adjust the straps by loosening or tightening the U-bolt. See Figure 1-6.
4. Remove the lockout/tagout devices and restart the machine.

Figure 6-5: Leveling Gripper

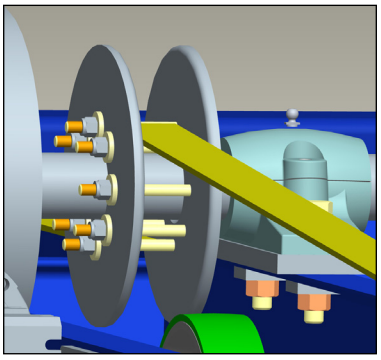
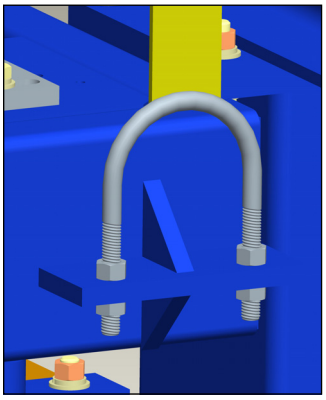


Figure 6-6: U-Bolt



Adjusting Gripper Squaring

The gripper assembly squaring is adjusted by adjusting the gripper belt strap pulleys. There are four (4) gripper belt strap pulleys, one (1) per strap.

1. Loosen the bolts that mount the pulley on either side of the gripper belt strap pulleys.
2. Loosen or tighten the bolts on the adjustment angle until the gripper is square.
3. Retighten the bolts on the gripper belt strap pulleys.

Cleaning, Lubricating, and Inspecting

Cleaning

	DANGER
	CRUSH AND CUT HAZARD **Guards must always be in place during operation to avoid serious injury and possibly death.** **Always replace guards after maintenance is complete and before removing the lockout/tagout device.**

CAUTION
Do not use compressed air inside the electrical enclosures! It may force contaminates into the electrical connections.

Figure 6-7: Never Use Compressed Air Inside an Electrical Enclosure

Lubricating

Proper amounts of motor oil and grease must be maintained at all times. The type of lubrication used, frequency of application, oxidation, and contamination of the lubricant affect service life and parts efficiency of gears and bearings. Improved performance will be obtained by following the guidelines in this manual. Lubrication guidelines are given in this chapter for each part or system that requires lubrication. The information is also in the *Maintenance Checklist* appendix.

CAUTION
Mixing synthetic lubricants with mineral lubricants is not recommended. Check with your lubricant supplier.

Lubricating With Grease

Bearings

Use an EP2 lithium-based grease to grease the drive shaft and split bearings weekly. Lubriplate #1242 grease is recommended. Refer tothe *Bearings* section for bearing locations and the procedure for lubricating them.

Wheels

Use an EP2 lithium-based grease to grease all wheels except for idler wheels monthly. Lubriplate #1242 grease is recommended.

Lubricating With Oil

Instructions and specifications for oil are described in the section for each specific component requiring oil.

Air Over Oil System

	CAUTION
	**HIGH PRESSURE HAZARD.** **Bleed all pressure from the lines before performing any maintenance on the hydraulic components.**

Hydraulic Fluid Specifications

Refer to Table 1-1 for hydraulic fluid specifications. See the footnotes if operating outside the recommended temperature range.

Table 6-1: Recommended Hydraulic Fluid

Recommended Operating Viscosity Range		60-245 SUS
Temperature	At Startup	>68°F
	During Operation	86-120°F
ISO Grade[a]		ISO 32
Reservoir Capacity		20 gal
Capacity of Hydraulic Lines		10 gal

a. If operating outside of the recommended temperature range, select a hydraulic fluid that will operate at the proper SUS range for your temperatures.

Checking and Adding Hydraulic Fluid

Check the level of the hydraulic fluid in the reservoir daily by viewing the fluid level through the transparent tanks.

To fill the reservoirs, uncscrew the reservoir cap and pour a recommended oil into the reservoir until the fluid reaches the capacity line on the side of the tank. If pumping oil into the reservoir, you must remove the collar and screen underneath the cap.

Always replace the screen and cap immediately to prevent debris from falling into the reservoir.

Replacing the Hydraulic Fluid

The acceptable time between hydraulic oil changes depends on both the fluid used and the operating conditions involved.

In general, fluid should be changed when contaminated with water or dirt. Periodic laboratory analysis is the most accurate method to determine when and how often fluid should be changed. The supplier can often run these tests, or check the condition of the used oil. A trained maintenance mechanic can quickly determine the fluid level in the reservoir sight gauge and possible water contamination. Dirt and discolored oil both indicate that the oil should be changed. Additional indicators that the fluid must be changed are unusual noises, excessive temperatures, excessive vibration, leaking lines and fittings, and oil deposits on or around the machine.

Completely drain and refill the reservoirs if you change the type of hydraulic oil in use.

At a minimum, it is recommended to completely drain and replace the hydraulic fluid every year. Always use a hydraulic fluid that matches the specifications described in Table 1-1 on page 14 in the *Maintenance* chapter.

Tips for Replacing Hydraulic Fluid

- It is best to change hydraulic fluid when the system is at operating temperature. This will drain off as much of the impurities in suspension as possible.
- To eliminate the possibility of spillage, use a suction pump to remove the fluid from the reservoir. Some suppliers offer this service.
- Completely drain and refill the reservoir if you change the type of hydraulic fluid in use.

Procedure for Replacing Hydraulic Fluid.

1. Remove the drain plug from the reservoir. Allow the oil to drain completely.
2. Reinsert the drain plug.
3. Fill the tanks with the recommended hydraulic fluid until it reaches the capacity line on the outside of the tank.

ENVIRONMENTAL
Always dispose of used hydraulic fluid in accordance with local, state, and federal laws.

Adjusting the Long Cylinder Pressure

The long cylinder pressure controls the main gripping action of the gripper assembly. To set the long cylinder pressure:

1. Bleed the cylinder.
2. Unlock the regulator adjustment knob on the control panel door by pulling it straight up. The panel is located on the gripper assembly.
3. Turn the knob clockwise to increase pressure or counterclockwise to decrease pressure.
4. Once a pressure of 80 psi is achieved, push the knob down to lock it in place.

Replacing Hydraulic Components

Replacing the Quick Exhaust Valve

If the quick exhaust valve leaks, you must replace it. The valves are located on top of teh hydraulic oil tank. To replace the quick exhaust valve:

1. Turn off the pressure and bleed the hydraulic system
2. Unhook the reducer plug.
3. Unhook the hose fitting at the top of the quick exhaust valve.
4. Unhook the quick exhaust valve from the tank.
5. Replace the quick exhaust valve.
6. Reattach the hose fitting to the top of the quick exhaust valve.
7. Reattach the reducer plug.
8. Remove the lockout/tagout devices and restart the machine.

Replacing the Ball Valve Assembly

1. Bleed the hydraulic system and drain the hydraulic oil tanks.
2. Remove the fittings from the ball valve.
3. Replace the ball valve.
4. Reattach the fittings.

5. Replace the hydraulic fluid.
6. Remove the lockout/tagout devices and restart the machine.

Replacing the Hydraulic Oil (Long) Cylinder

1. Lower the gripper assembly.
2. Unhook the hydraulic lines and allow the hydraulic fluid to drain.
3. Unhook the yoke from the cylinder.
4. Unbolt the cylinder.
5. Replace the cylinder and tighten the bolts.
6. Reattach the yoke.
7. Reattach the hydraulic lines.
8. Replace the hydraulic fluid.
9. Bleed the hydraulic lines.
10. Remove the lockout/tagout devices and restart the machine.

Motors

There are two (2) electric motors on the *SmartCrane*. The 1-hp motor powers the cart, and the 3-hp motor raises and lowers the gripper.

Certain preventive maintenance is required to keep the motors in optimal working order.

Checking Motor Rotation

Check the motor rotation to ensure each motor is rotating in the same direction as the arrow on its housing. If the motor is rotating in the wrong direction, switch any two lead wires to reverse the direction.

Adding and Changing Oil

Check the oil in the gearbox reducer at least once a year. When additional oil is needed, use one of the oils recommended in Table 1-2 or a comparable type.

Table 6-2: Recommended Brake Motor Oil

ISO VG	Brand and Type			
	Operating Temperature of 23ºF to 104ºF (-5ºC to 40ºC)		Operating Temperature of 22ºF to 176ºF(-6ºC to 80ºC)	
220	Shell	Omala EP220	Shell	Omala HD220
	Mobil	Mobilgear 630 Mobilgear XMP220		

Drain and refill the oil in the gearbox every 10,000 working hours. When refilling the oil, use one of the oils shown in Table 1-2 or a comparable type.

Motor Drive Parameter Settings

Table 6-3: Motor Drive Parameter Settings - Lifting Motor

Parameter	Parameter #	220V Setting	480V Setting
Torque Boost	0	30	30
Acceleration Time	7	2	2
Deceleration Timie	8	1	1
Electronic Thermal Overload	9	9.6	4.8
Applied Motor	71	3	3
Operation Mode	79	3	3
Motor Capacity	80	2.2	2.2
Rated Motor Voltage	83	240	480
Rated Motor Frequency	84	60	60
Auto-Tuning Setting	96	1	1

Table 6-4: Motor Drive Paramter Settings - Cart Motor

Parameter	Parameter #	220V Setting	480V Setting
Torque Boost	0	6	6
Acceleration Time	7	2	2
Deceleration Timie	8	2	2
Electronic Thermal Overload	9	3.6	1.9
Applied Motor	71	3	3
Operation Mode	79	3	3
Motor Capacity	80	0.75	0.75
Rated Motor Voltage	83	240	480
Rated Motor Frequency	84	60	60
Auto-Tuning Setting	96	1	1

Replacing the Motor

Socket set (metric and English)

Slotted screwdriver

Phillips head screwdriver

Rubber mallet

Pry bars

1. Lockout/tagout all power to the machine.
2. Verify that there is no load on the reducer so when the brake is removed, the load is not released.
3. Drain oil from the gearbox or rotate motor so oil will not leak out.
4. Remove the bolts holding the motor on the gearbox.
5. Remove the existing motor.
6. Remove and clean the gasket surface of the gearbox. Make sure no debris falls into the gearbox during this time.
7. Place the clean gasket back in the gearbox.
8. Slide the new motor into position, making sure the input pinion gear teeth properly mesh with the input gear teeth.
9. Rotate the motor as needed to seat the flange surface and make sure the bolt holes are properly aligned.
10. Re-install the bolts.
11. If needed, fill the reducer with an oil recommended in Table 1-2.
12. Reconnect power and remove lockout/tagout devices.

Brakes

Checking the Brake Adjustment

To check brake adjustment:

1. Switch the machine to manual mode.
2. With the cart in the home position, lower the gripper assembly until it reaches full speed.
3. Press the E-stop while you are lowering the gripper. The gripper assembly shoudl stop within 6 in.

Adjusting the Brake

To adjust the brake:

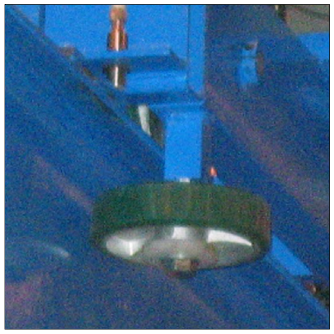
1. Switch the machine to manual mode.
2. Lower the gripper assembly on top of a wall panel.
3. Switch the machine off.
4. Select SMART CRANE from the menu bar in the Squaring Conveyor or Power Framer software.
5. Select SET BRAKE. The brake will open.
6. Using a 1/4-in. Allen wrench, turn the bolt in until you cannot see any light between the brake pad and the disc.
7. Back the bolt out until youcan just see light coming between the brake pad and the disc. The brake pad and disc should be as close to touching as possible, without touching.
8. Adjust the bolt on the other side of the brake in the same way.
9. Tighten the nuts and check the brake adjustment.

Bearings

Grease the gripper main shaft bearings, pillow block bearings, and split bearings monthly.

Figure 6-8: Split Bearing

Figure 6-9: Wheel



Wheels

Replacing the Guide Wheels

1. Remove the lock nut from the end of the bolt.
2. Unscrew the bolt that holds the guide wheel in place. Remove the bolt and flat washers.
3. Remove the guide wheel.
4. Replace the guide wheel.
5. Reinsert the bolt and flat washers and tighten the bolt.
6. Attach and tighten the lock nut.
7. Remove the lockout/tagout devices and restart the machine.

Replacing the Drive Wheels

1. Remove all four (4) guide wheels.
    a) Unscrew the bolts that hold the drive wheels in place.

b) Remove the guide wheels.

2. Support the cart frame with a fork truck on the side that requires the replacement wheel. The cart should be lifted about one (1) in. above the frame.
3. Loosen all the locking collars at both ends of the wheel assembly.
4. Unbolt the support bearings at both ends of the wheel assembly.

    a) Remove the keys.

    b) Slide the shaft out of the gearbox far enough to slide the wheel off of the shaft.

    c) Remove the wheel.

    d) Replace the wheel.

    e) Slide the shaft back into the gearbox.

    f) Reinsert the keys.

Save the keys for re-use.

5. Reattach the support bearings.
6. Tighten the locking collars.
7. Lower the cart assembly back onto the frame.
8. Reinstall the guide wheels.
9. Remove the lockout/tagout devices and restart the machine.

Replacing the Idler Wheels

1. Remove all the guide wheels.
    a) Unscrew the bolts that hold the drive wheels in place.
    b) Remove the guide wheels.
2. Support the cart frame with a fork truck on the side that requires the replacement wheel. The cart should be lifted about one (1) in. above the frame.
3. Undo the locking collars.
4. Slide the shaft out.
5. Remove the wheel.
6. Replace the wheel.
7. Tighten the locking collars.
8. Lower the cart assembly back onto the frame.
9. Reinstall the guide wheels.
10. Remove the lockout/tagout devices and restart the machine.

Straps

The straps must be replaced when they show signs of wear. To replace a strap:

1. Switch the machine to manual mode.
2. Place a wall panel under the gripper assembly.
3. Press and hold the AUTO-CYCLE button.
4. Press the joystick down and continue to hold it in the down position after the gripper assembly is resting on the wall.
5. The straps will continue to unroll. Stop holding the joystick down when the straps are completely unrolled from the coil and you can see the mounting bolts.
6. Press the E-stop and lockout.tagout the machine.
7. Remove the bolt that is holding the damaged strap to the drive shaft on top of the machine.

8. Remove the U-bolt that is attaching the damaged strap to the gripper assembly.
9. Attach a new strap to the U-bolt.
10. Attach a new strap to the mounting bolt on the drive shaft. Make sure the strap is not twisted.
11. Restore power to the machine.
12. Press the joystick upward to lift the gripper assembly off of the wall panel.
13. Check to make sure the gripper assembly is level. The side with the brake should be about 1/2-in. lower than the opposite side. If the gripper assembly is not level, see the *Leveling the Gripper* section on page 11.

Chains

Lubricating Chains

The chains should be lubricated weekly. The lubricant used should be a high-grade, non-detergent, petroleum-base oil. Anti-foam, anti-rust, and film-strength improving additives are often beneficial. SAE 30 grade is recommended.

To apply the oil, brush it on the inside surface of the chain. Apply it to the upper edges of the link plates in the lower span of the chain at a point close to where the chain engages a sprocket. Gravity and centrifugal force will aid in carrying the lubricant to the critical pin and bushing surfaces. Do not be concerned about surplus lubricant spilling over the link plate edges as it will lubricate the roller and bushing surfaces.

Adjusting the Chain Tension

You can adjust the chain tension on any of the chains by performing the procedure below.

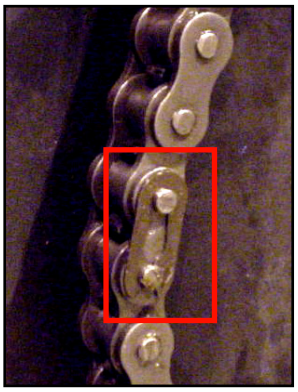
1. Loosen the mounting bolts on the motor mount plate.
2. Tighten the tension bolt to push the tension sprocket forward and increase tension or back-out the tension screws to decrease the tension. Chain play should be approximately 1/8-in. deflection to both sides of center.
3. Re-tighten the mounting bolts on the motor mount plate.
4. Remove the lockout/tagout devices and restart the machine.

Replacing a Chain

Replace the chain can be replaced using the following procedure.

1. Loosen the tension sprocket.
2. Remove the master link on the chain by pulling out the two (2) pins using pliers. The master link is shown in Figure 1-10. The chain will come apart and can be removed from the sprockets.
3. Thread the new chain around the sprockets.
4. Connect the chain to itself by placing the master link between two links and pressing together with pliers.
5. Adjust the tension. The chain should have approximately 1/8- in. deflection to either side of the center.
6. Remove the lockout/tagout devices and restart the machine.

Figure 6-10: Master Link on a Chain



Pneumatic System

	CAUTION
	**HIGH PRESSURE HAZARD.** **To avoid injury, bleed all pressure from the lines before performing any maintenance on the pneumatic components!**

Overview

The pneumatic system controls the clamps and the finger cylinders. The gripping of the pneumatic cylinders compensates for imperfections in the boards or the panel.

Adjustments

Adjusting the Finger Cylinder Pressure

The finger cylinder pressure should be between 60 and 70 psi. The pressure adjustment knob controls the finger cylinder pressure.

To adjust the finger cylinder pressure to between 60 and 70 psi:

1. Unlock the regulator adjustment knob on the control panel door by pulling it straight up.
2. Turn the knob clockwise to increase pressure or counterclockwise to decrease pressure.
3. Once a pressure of between 60 and 70 psi is achieved, push the knob down to lock it in place.

Adjusting Brake Pressure

The brake pressure should be between 40 and 60 psi.

To adjust the brake pressure to between 40 and 60 psi:

1. Unlock the regulator adjustment knob on the control panel door by pulling it straight up.
2. Turn the knob clockwise to increase pressure or counterclockwise to decrease pressure.
3. Once a pressure of between 40 and 60 psi is achieved, push the knob down to lock it in place.

Regulator

The regulator can be purchased directly from MiTek. Refer to the Replacement Parts appendix for the part number.

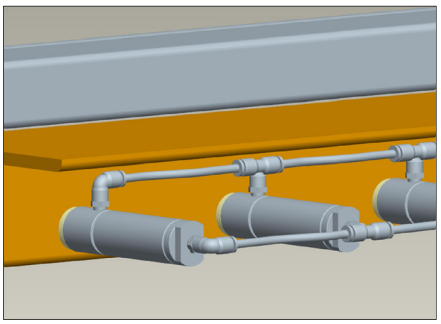
	CAUTION
⚠	**HIGH PRESSURE HAZARD.** **To avoid injury, bleed all pressure from the lines before removing the filter guard.** **Ensure that the filter guard is securely attached to the regulator body before returning pressure to the lines.**

If a regulator is not operating at its optimum capacity, cleaning the regulator and replacing the O-rings, gaskets, diaphragm, and valve assembly is recommended. You can order a service kit including these preventive maintenance parts from the manufacturer.

Cylinders

There are pneumatic cylinders on one side of the gripper assembly, opposite the hydraulic oil (long) cylinders. They are used to grip the panel and compensate for irregularities in the boards or the panel.

Figure 6-11: Pneumatic Cylinder



Replacing Pneumatic Components

Replacing Finger Cylinders

1. Shut off the air.
2. Unscrew the cylinder from the angle.
3. Remove the cylinder.
4. Replace the cylinder and screw it into the angle.
5. Turn on the air.
6. Remove the lockout/tagout devices and restart the machine.

Replacing Valves

1. Turn off the air source and bleed the pneumatic lines.
2. Disconnect the air fittings and the electrical cord.
3. Unbolt and remove the valve.
4. Replace the valve and tighten the bolts.
5. Plug in the electrical cord and reconnect the air fittings.
6. Turn on the air source.
7. Remove the lockout/tagout devices and restart the machine.

VFD

Understanding VFDs

A VFD (variable frequency drive) is part of the communication loop between the PLC and electrical components that require variable speed control. Each variable speed electrical component has its own VFD.

A VFDs display window is helpful when troubleshooting. The following scenarios may exist in the display window:

- When a VFD is powered but is not accepting any commands at that moment, “-000” flashes.
- When a VFD is receiving an input, the run light comes on and a speed command shows.
- If a VFD experiences a fault, refer to the VFD manual to correct the fault.

A VFD is one of the first links in the electrical circuit, so verifying voltage in and out of the affected VFD is always a good first step in an electrical troubleshooting process.

Replacing a VFD (Variable Frequency Drive)

Refer to your electrical drawings and schematic to determine what each VFD controls and the replacement part number.

Figure 6-12: VFD

All VFDs must be ordered through MiTek because they must be programmed before they can be used.

1. Remove the two (2) covers labeled in Figure 1-12.
2. Ensure all wires entering the VFD have wire labels. If not, refer to your electrical drawings and adhere wire labels before disconnecting anything.
3. Remove all wires from the VFD. They will need to be connected to the new VFD in the same way that they were connected to the VFD in need of repair.
4. Remove the four (4) mounting screws.
5. Install the new or repaired VFD by reversing the procedure above.

If you receive the new VFD directly from the manufacturer, your electrical schematic shows the parameter settings needed. Program the VFD according to these settings. If the new VFD is made by a different manufacturer than the original VFD, call MiTek Machinery Division Customer Service for the new settings. MiTek will only provide support for VFDs purchased through MiTek.

Electrical Components

Replacing Light Bulbs

To remove the light cover, simply unscrew it. To replace the light bulb under the light cover, gently push in and turn the light bulb counterclockwise. It will come loose within 1/2 turn.

Replacing the Sounding Device

For safety reasons, the sounding device must be kept in working order. To replace the sounding device, refer to your electrical schematic.

Circuit Breaker

Circuit breakers are used for certain components as a safety switch.

Using the Handle

Manually operate the circuit breaker using the handle and the PUSH-TO-TRIP button on the circuit breaker. The handle has three (3) positions: on, trip, and off.

Manually Tripping the Circuit Breaker to Test

Manually trip the circuit breaker by pushing the PUSH-TO-TRIP button.

Resetting a Tripped Circuit Breaker

Reset the circuit breaker after it has been tripped by moving the handle to the off position, then back to the on position.

Motor Starters and Overloads

Motor starters turn motors on and off. Overloads are usually mounted to the output side of the motor starter and act as safety switches.

Motor Thermal Overload Alarm

If an overload trips, reset it by pressing the red button located on the overload. An alarm should indicate when this condition occurs.

Motor Starter Safety Fault

A motor starter safety fault occurs when the normally open contact connected to the PLC detects voltage on any of the inputs while that axis should not be moving. Press the reset button on the computer screen to clear the fault. If problem has not been corrected, the alarm will trip again after 2 seconds.

Cleaning Contacts

To clean the motor starter contacts:

CAUTION
Never use pneumatic air inside electrical cabinets. It will force dust and particles into electrical components causing them to fail.

1. Activate an E-stop. The starter will release (open) and the dust may be forced out.
2. If the problem continues, activate an E-stop again.
3. Lockout/tagout at the wall before opening the enclosure.
4. Use canned air to blow dust from contacts. DO NOT USE PNEUMATIC AIR FROM YOUR PLANT!
5. Cycle the contacts up and down with a small screwdriver.
6. Vacuum the enclosure.

Environmental Temperature

The air temperature around the *SmartCrane* should never exceed 110°F. In high ambient temperatures, the motors are unable to dissipate heat effectively. When the temperature of the motor windings exceeds a preset value, the motor overload will automatically shutdown the motor to prevent it from burning up.

Appendix 7

Navigating the Troubleshooting Appendix

Refer to...

- *Maintenance* chapter for procedures and graphics
- *General Information* chapter for truss terminology
- Glossary for additional terminology
- Figure 1-1 to contact MiTek Machinery Division Customer Service

This appendix is divided into tables according to the system or components that are showing troublesome symptoms. The tables are presented in the order listed here.

If you continue to have problems after performing all applicable troubleshooting steps and reviewing the topic in the *Maintenance* chapter, call MiTek Machinery Division Customer Service for assistance.

Safety Notes for Troubleshooting

General Troubleshooting Safety Tips

	WARNING
	ELECTROCUTION, HIGH PRESSURE, CRUSH, CUT, AND CHEMICAL HAZARDS! **Read all notes in this section AND the safety section in the preliminary pages before operating or maintaining this equipment.** **Most solutions are described in more detail in the *Maintenance* chapter and may have more safety notes included there.**

- **Read all warnings** located in the safety section in the preliminary pages and adhere to them at all times.
- **When this graphic appears, lockout/tagout at the disconnect switch located on the equipment** using approved methods described in OSHA 29 CFR 1910.147 before continuing with the procedure or troubleshooting.
- If the lockout/tagout graphic does not appear, it is recommended that you still **de-energize the machine** unless energy is required for the troubleshooting process. If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.
- **All electrical work must be performed by a licensed electrician.**
- **Read this manual** for information and procedures related to the specific maintenance or troubleshooting issue before attempting any maintenance!
- **Safety goggles and a dust mask** must be worn for all cleaning steps outlined in this manual. When using cleaning and lubrication solutions, a respirator rated for use with those solutions must be worn as well as gloves resistant to the solution.

Electrical Troubleshooting Safety Tips

- **Make sure you have the proper tools needed for the job.** See *Tools Needed* on page 4.
- **Ensure the person performing the troubleshooting is qualified** from an electrical knowledge standpoint. If you feel uncertain about troubleshooting electrical power, remember, the cost of hiring an electrician far outweighs the cost of an injury.
- **Remove rings and watches that you are wearing.** They are extremely conductive material and may catch on small components.

- **Get a helper**. You are most likely going to need a third hand at some point, and you shouldn't perform electrical work without someone close by to help if you get hurt.
- **Be patient.** Take your time and stay alert. Never shortcut or become too confident in what you are doing; electrical power will always be stronger than you.
- **Take notes** recording what you have checked, and what the readings were. This is also a good way to check your work when you are finished. Sometimes, the machine won't work because a wire was removed for testing, and overlooked when cleaning up. Having proper notes will make the process go much more smoothly.
- **ALWAYS turn the power off** if you are checking for ohms or swapping PLC cards.
- **ALWAYS push an E-stop button** before approaching a machine for any reason, but if you are working with the encoders it is especially important. An interruption to a powered encoder may cause components to move without warning.
- **Wear appropriate personal protective equipment** (PPE) for working with live power.

Getting Started With Troubleshooting

Tools Needed

Gather these tools before beginning the troubleshooting process and before calling MiTek for technical assistance.

1. Slotted screwdriver, insulated
2. Phillips screwdriver, insulated
3. Equipment manual and drawings, specifically electrical schematics
4. Pen and paper to take notes and document settings
5. Multimeter

   A multimeter is an electronic measuring instrument. The analog versions were referred to as an analog volt-ohm-meter (VOM). A newer, digital model is called a digital-multi-meter (DMM). There are a large variety of volt-measuring devices available, but at a minimum, it should have these features:

   - Voltage (volts) measurement
   - Resistance (ohms) measurement
   - Ability to measure both AC and DC power
   - Autoranging feature
   - It is highly beneficial to also have the ability to measure current (amps)

6. Various additional tools depending on which parts are in question
7. Personal protective equipment as dictated by NFPA 70e

The First Steps

For Mechanical Troubleshooting

Always clean and lubricate the equipment as a first step in most troubleshooting processes. Most mechanical malfunctions are caused by inadequate preventive maintenance.

For Electrical Troubleshooting

1. Lockout/tagout at the disconnect switch located on the equipment.

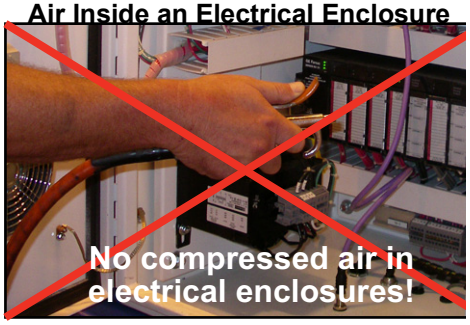
CAUTION
Do not use compressed air inside the electrical enclosures! It may force contaminates into the electrical connections. You may use canned air, which has a much lower compression than your plant air.

2. Vacuum and dust the electrical enclosure.

3. Remove the lockout/tagout equipment and attempt to run the machine again. If that didn't fix the problem, proceed with the next step.

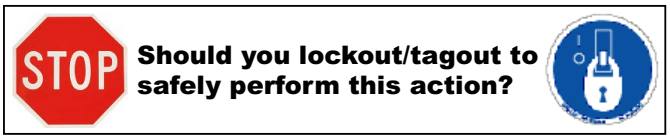
4. Adhere to all regulations and guidelines given in NFPA 70e and in your company's energy control program. Some important safety tips are also addressed on page 2.

Figure 7-1: Never Use Compressed Air Inside an Electrical Enclosure



	WARNING
	**ELECTROCUTION HAZARD!** **All electrical work must be performed by a licensed electrician.** **If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.**

5. Determine where the electrical problem begins. To do this, you need a multimeter. If you are unfamiliar with your multimeter, consult the manufacturer's manual.
   - Determine if you are working with AC (alternating current) or DC (direct current) before checking for voltage. Your multimeter should measure both, but you'll have to tell it which one to measure.
   - Measure incoming and outgoing voltage to specific components. Proceed along a logical order determined by your machine's specific problem, and write down the order that you check each item and the amount of voltage that it registers.



Symptoms and Solutions

Table 7-1: General Troubleshooting

Problem	Possible Cause	Possible Solution	See Page
Machine will not start	E-stop is triggered	Reset E-stops	4
	An E-stop is triggered on machinery connected to the *SmartCrane*	Refer to manual for other machinery	—
	Machine is in Manual Mode	Set machine to Auto Mode	7
	Air pressure is set too low	Set air pressure correctly	27
	Power is not properly connected to the machine	Connect power to the machine	6
	Ladder sensor on straps has been triggered	Tighten straps	11
	VFD has a fault	Reset fault	—
	Machine was in Manual Mode, and was not returned to the home position before the next cycle	Send the machine to the home position	—
		Check magnet locations	10
Panels swing excessively when picked up	Panels are being gripped too far toward one end	Grip panel in the middle	—

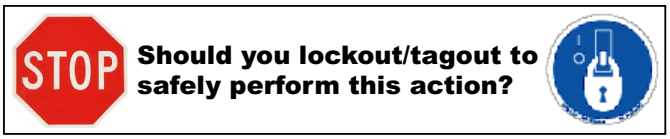


Table 7-2: Gripper Assembly Troubleshooting

Problem	Possible Cause	Possible Solution	See Page
Gripper is lower on one side than the other	Straps are tensioned unevenly	Re-tension straps	11
	Strap pulley is damaged	Replace pulley	—
	Strap is damaged	Replace strap	—
Gripper does not run smoothly	Gripper stop tubes are bent	Replace gripper stop tubes	—
Gripper is not square	Strap pulleys are improperly adjusted	Adjust strap pulleys	11
	Strap pulley is damaged	Replace strap pulley	—
Gripper assembly is lowered, but straps keep unwinding	Sensor is faulty	Replace sensor	—
	Sensor is out of position	Loosen the sensor and move it closer to the mount plate	—
Gripper does not open and close smoothly	Air in hydraulic lines	Bleed lines	—
	Air pressure is set incorrectly	Set air pressure correctly	27
	Hydraulic fluid level is too low	Add hydraulic fluid	14
Gripper does not clamp tightly or drops wall panel	Air pressure is set incorrectly	Set air pressure correctly	27
	Air in hydraulic lines	Bleed lines	—
	Pneumatic cylinder rod ends are bent or damaged	Replace cylinder	28
	Leaks in pneumatic or hydraulic lines or fittings	Replace leaky parts	28
	Wall panel is improperly assembled	Assemble wall panel properly	—
Gripper does not lower completely onto the stack, or does not lift up completely	Photo eye is faulty	Replace photo eye	—
	Chain is improperly tensioned	Re-tension chain	25
	Strap is torn	Replace strap	—
	Straps are incorrectly tensioned	Re-tension straps	11
	Brake is activated	Reset air pressure	27
		Check hoses and fittings for tightness and leaks	—
		Check solenoids	—

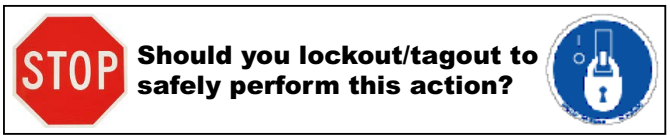


Table 7-3: Cart Assembly Troubleshooting

Problem	Possible Cause	Possible Solution	See Page
Cart assembly is vibrating	Check wheels and wheel paths for foreign objects	Remove foreign objects	—
	Drive wheels are worn or damaged	Replace drive wheels	22
	Idler wheels are worn or damaged	Replace idler wheels	24
	Guide wheels are worn or damaged	Replace guide wheels	22
Cart does not stop where it should	Magnets are out of position	Reposition magnets	10
	Stop sensors are improperly positioned	Adjust sensor locations	—
Cart moves in the opposite direction of what is expected	Motors are wired incorrectly and are rotating backward	Reverse motor rotation	18

Appendix A

Navigating the Parts List Appendix

Finding the Part Number

The tables that make up this appendix are divided into sections which are presented in the order listed here. Parts are presented in alphabetical order by part name. The far right column indicates if the part should be kept in stock to minimize downtime.

Ordering the Parts With Your Part Number

There are several easy ways to order your part after you determine the part number. Each column in Table 2-1 describes one method.

Table A-1: How to Order Your Part Using the Part Number

Using Our *eStore*™ (an account is required)	Using E-Mail	Using the Phone
Access our on-line *eStore* using one of the following methods: Click the *eStore* link from the Web site **OR** Click the *eStore* link from the Parts Guide **OR** Type http://estore.mii.com into your web browser	Send an e-mail to mitekparts@mii.com with all relevant information, including the part number.	Call 1-800-523-3380 and select “Parts Orders”.

Safety Notes for Replacing Parts

CAUTION
Only use the exact replacement parts that are specified by MiTek. Substitutions may harm your equipment.

	WARNING
	CRUSH AND CUT HAZARD. Perform the safety tests described in the *Safety Tests* section on 2 before operating the equipment at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.

	WARNING
	ELECTRICAL HAZARD! All electrical work must be performed by a licensed electrician. Follow approved lockout/tagout procedures (OSHA 29 CFR 1910.147).

	WARNING
	ELECTROCUTION AND HIGH PRESSURE HAZARDS. Always turn the power off by activating an E-stop when the equipment is not in operation. Always verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures (OSHA 29 CFR 1910.147) before performing any maintenance on this equipment. Turn off the air switch or shutoff valve if appropriate. Bleed pneumatic and hydraulic lines if appropriate.

Part Numbers

Replacement Parts

Table A-2: Replacement Parts

MiTek Part #	Part Description	Keep in Stock
515867	Cable, sensor, 7M, 90-degree	1
515866	Cable, sensor, 7M, axial	1
423003	Cylinder, pneumatic, 122-d	2
480228	Gear motor, 3-hp	—
779119	Hose, 1"	—
779035	Hose, 1/2"	—
22300255	Linear transducer	1
515892	Photo eye, 18mm, NO	1
515862	Prox, 18mm, PNP, 3-wire	1
515893	Reflector, 90x44 mm	1
589002	Lift strap	4
779126	Tubing, black, 1/4"	—
580127	Drive wheel	2
580128	Idler wheel (machines shipped before 1Jan. 2008)	2
580127	Idler wheel (machines shipped after 1 Jan. 2008)	2
580129	Guide wheel, side	2
60445-501	Oil cylinder, clamp, front	—
60446-501	Oil cylinder, clamp, rear	—
480302	Brake repair kit	1
480301	Brake facing kit	1

Documentation Part Numbers

Table A-3: Documentation

Documentation	Qty	MiTek Part Number
Manual	1	001101

Appendix B

Navigating the Maintenance Checklists

These checklists guide you through all preventive maintenance tasks required to keep this equipment in top working condition.

These pages are supplied with the intent that you will photocopy them and leave the original in the manual for future use. Space is provided in each chart to place the date that the work is done and the initials of the person performing the work.

Safety Notes For Maintenance Checklists

	WARNING
	**CUSH AND CUT HAZARD.** **Perform the safety tests described in the *Safety Tests* section on 2 before operating the equipment at the initial startup, after performing any maintenance, and in accordance with the maintenance schedule.**

	WARNING
	**ELECTROCUTION AND HIGH PRESSURE HAZARDS.** **Always turn the power off and activate an E-stop when the equipment is not in operation.** **Always verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures (OSHA 29 CFR 1910.147) before performing any maintenance on this equipment.** **Turn off the air switch or shutoff valve if appropriate.** **Bleed pneumatic and hydraulic lines if appropriate.**

SmartCrane™

Daily Checklist

Month and Year: _____ Week: _____

Action		See Page	Dates						
Check the straps for burs and wear along the seams	Shift 1								
	Shift 2								
	Shift 3								
Check the fluid level in the hydraulic oil tanks	Shift 1								
	Shift 2								
	Shift 3								
Make sure the area is free of obstructions	Shift 1								
	Shift 2								
	Shift 3								

Notes **Date**

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Weekly Checklist

Year: _____ Month: _____

Action	See Page	Dates				
Grease the drive shaft and split bearings						
Lubricate the chains						

Notes **Date**

SmartCrane™

Monthly Checklist

Year: _____

Action	Interval	JAN	FEB	MAR	APRIL	MAY	JUNE
Inspect/test the main panel and control station	1 month						
Inspect/test all breakers and controls for proper operation	1 month						
Check the drive shaft for cracks and abnormal wear	1 month						
Check the main frame I-beams and legs for cracks	1 month						
Check main frame weldments for cracks	1 month						
Check oil level in motors	1 month						
Check the hydraulic cylinder shaft to ensure it is fully seated in the rod eye clevis	1 month						
Check the chain tension on the lifting motor gearbox and drive shaft	1 month						
Tighten all bolts and screws	1 month						
Test the brakes	1 month						
Inspect cart and gripper assemblies, including rods and fasteners	6 months						
Remove excess grease	6 months						
Check shafts for unusual movement during cycling	6 months						
Check hydraulic cylinder mounts for signs of cracks	6 months						
Inspect clamping mufflers attached to hydraulic oil tanks	6 months						
Replace hydraulic fluid	12 months						

Action	Interval	JULY	AUG	SEPT	OCT	NOV	DEC
Inspect/test the main panel and control station	1 month						
Inspect/test all breakers and controls for proper operation	1 month						
Check the drive shaft for cracks and abnormal wear	1 month						
Check the main frame I-beams and legs for cracks	1 month						
Check main frame weldments for cracks	1 month						
Check hydraulic fluid level	1 month						
Check oil level in motors	1 month						
Check the hydraulic cylinder shaft to ensure it is fully seated in the rod eye clevis	1 month						
Check the chain tension on the lifting motor gearbox and drive shaft	1 month						
Tighten all bolts and screws	1 month						
Test the brakes	1 month						
Replace hydraulic fluid	6 months						
Inspect cart and gripper assemblies, including rods and fasteners	6 months						
Remove excess grease	6 months						
Check shafts for unusual movement during cycling	6 months						
Check hydraulic cylinder mounts for signs of cracks	6 months						
Inspect clamping mufflers attached to hydraulic tanks	6 months						

Appendix C

Drawings are inserted at the back of the manual.

Table C-1: Attached Drawings

Description	Drawing Number
Cart assembly	60302-501
Gripper assembly	60303-501
Pneumatic assembly	60305-501
Gripper main shaft assembly	60359-501
Electrical schematic	90564
Electrical assembly, left-hand crane	90564-501
Electrical controls, left-hand crane	90564-502
Electrical assembly, right-hand crane	90564-503
Electrical controls, right-hand crane	90564-504

Document Evaluation

Appendix D

A form is included in this appendix so you can provide MiTek with feedback on the usefulness of this manual. We make an ongoing effort to improve the value of our documentation, and your views are important to us.

Please follow the instructions on the form to provide us with comments or suggestions that will help us improve the quality of our documentation services.

Document Evaluation Form

We appreciate your comments on how we can make this document more useful.

Document Identification:

SmartCrane™	Equipment Manual	001101

General Ratings:

	Poor	Fair	Good	Excellent
Content	❑	❑	❑	❑
Organization	❑	❑	❑	❑
Accuracy	❑	❑	❑	❑
Clarity	❑	❑	❑	❑
Completeness	❑	❑	❑	❑
Examples/Illustrations	❑	❑	❑	❑
Readability	❑	❑	❑	❑

Compared to other truss machinery manufacturers' documentation, how would you rate this document?

❑ Poor ❑ Fair ❑ Good ❑ Excellent

There is room for specific suggestions on the next page. Document general comments here.

Document Evaluation Form (cont'd)

Identify any inaccuracies in the document.	
What are the three best features of the document?	
What are the three worst features of the document?	
What did you like/dislike about the illustrations?	
Your Name:	Date:
Company Name:	Address:
Phone:	Email:
Please mail this form to: MiTek Machinery Operations 301 Fountain Lakes Industrial Drive St. Charles, MO 63301 Attn: Engineering Manager	***Or fax this form to:*** 636-328-9218 Attn: Engineering Manager

If you do not receive a reply within 45 days, please call our Customer Service Department and ask for the Documentation Specialist or Engineering Manager: 800-523-3380.

Glossary

actuate	to activate, put into action
amperage	the strength of an electric current, expressed in amperes
connector plate	the nail-plate that is embedded into the production material to hold it together
cushion	an attribute of a hydraulic cylinder that allows adjustment of the pressure in each cylinder
jigging	any of several devices used to hold the truss in place on the tables
layout	a scaled diagram of the location of components and the space that they occupy
limit switch	an electro-mechanical device that consists of an actuator mechanically linked to a set of contacts; when an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection
lockout/tagout	a means of isolating a piece of equipment from its energy source so maintenance can safely occur; guidelines provided in OSHA 29 CFR 1910.147
lubricator	a device that allows controlled amounts of lubricants into the pneumatic system
operator control interface	the method in which the operator controls the machine; it may be a touch screen, a control panel, etc.
plate	see *connector plate*
PLC	Programmable Logic Controller; a solid-state control device that can be programmed to control process or machine operations. It consists of five basic components: processor, memory, input/output module, the power supply, and the programming device.
port	a connection point for a peripheral device
potentiometer	a control knob that is a dial; allows a range of values to be set by turning the dial, commonly found on the PLC

Glossary

proximity switch	a switch that uses an electromagnetic field to detect when an object is near, there is no physical contact between the object and the switch; inductive proximity switches detect only metal objects, capacitive proximity switches can sense both metallic and non-metallic objects
qualified person	a person or persons who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training, or experience, has successfully demonstrated the ability to solve problems relating to the subject matter and work—ANSI B30.2-1983; one who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved—NEC2002 Handbook
regulator	a component of the pneumatic system that connects to the main air source and regulates the air pressure allowed into the system
setup valve	a component of the pneumatic system that control the flow of air to the rest of the setup
solenoid	an assembly used as a switch consisting of a coil and a metal core free to slide along the coil axis under the influence of the magnetic field
Stand-Alone Conveyor	the conveyor system that carries the truss from the tables to the Finish Roller and out to the stacker
torque	a turning or twisting force
transfer roller	a motorized roller sitting perpendicular to the tables on an auto-eject system; it automatically transfers the truss from the Ejectors to the stand-alone conveyors
transmitter bar	the light bar that transmits the signal to the receiver bar; every light bar set consists of a receiver bar and a transmitter bar
VFD	Variable Frequency Device; controls the speed of the cycle

Glossary

voltage	Equal to the difference of electric potential between two point on a conducting wire carrying a constant current of one ampere when the power between the points is one watt

Index

Index

Index

S

T

U

V

W

1” binder

SmartCrane™

Wall Panel Stacker
Equipment Manual

MiTek®

001101
Rev. A

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Wall Panel Stacker
Equipment Manual

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Wall Panel Stacker
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