



**PRIMETALS**  
TECHNOLOGIES

# Mill Safety - Production

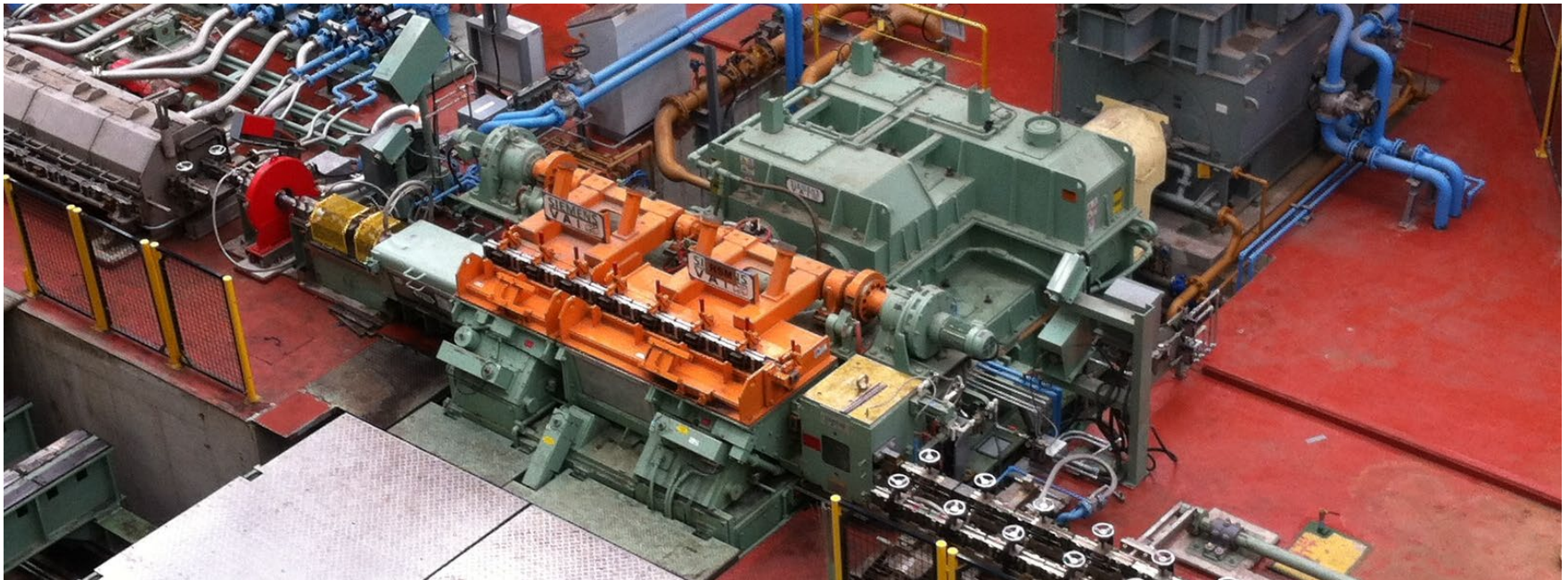
## Long Product Rolling Mills



## Primetals Mill Safety Layout

Mill Safety documentation is supplied for every project.

The Long Product Rolling Mill Safety Instructions contain general information for specific equipment per industry specification EN 15949.



## Hazards:

### Understanding & Avoiding Common Hazards

- **Product Cobbles**
  - Installing Adequate Guarding
  - Ensure Visibility and Communication
  - Audible Tones
  - Utilizing Safety Stops
- **Impact Hazards**
- **Crushing Hazards**
- **Shearing Hazards**
- **Entanglement (Wrap Point) Hazards**
- **Drawing In or Trapping (Pinch Point) Hazards**



## Understanding & Avoiding Common Hazards (cont.)

- **Stabbing or Puncture Hazards**
- **Electrical Hazards**
- **Heat-Related Hazards**
- **Falling Hazards**
- **Noise Hazards**
- **Vibration Hazards**
- **Material and Substance Generated (Environmental) Hazards**
- **Ergonomic Hazards**











## Modes of Operation:

- Production
- Inspection (under load)
- Adjusting
- Immobilization
- Maintenance








| Modes of Operation      |     | Machine operating status | Access to Danger Zones | EN 15949 clause    |
|-------------------------|-----|--------------------------|------------------------|--------------------|
| Production              | P   | Normal production        | denied                 | 5.1.6.8            |
| Inspection (under load) | IUL | Controlled production    | with conditions        | 5.1.6.4<br>5.1.6.7 |
| Adjusting               | A   | jog mode                 | with conditions        | 5.1.6.3<br>5.1.6.7 |
| Immobilization          | I   | No movements possible    | with conditions        | 5.1.6.3<br>5.1.6.7 |
| Maintenance             | M   | Off (LOTO)               | allowed                | 5.1.6.8            |

## Access Matrix:

- Rolling Mill Working Places
- Inspection (under load)
- Adjustment Access
- Immobilization Access
- Maintenance Access Only










| Access Matrix  |   | Operating Mode |     |   |   |   |
|--|---|----------------|-----|---|---|---|
| Rolling Mill Areas: Authorized Personnel Only and access to areas per Operating Mode                                     |   | P              | IUL | A | I | M |
|   | 1 : Rolling Mill Working Places   | ✓              | ✓   | ✓ | ✓ | ✓ |
|   | 2 : Inspection Under Load - Segregated Area   | X              | ✓   | ✓ | ✓ | ✓ |
|   | 3 : Adjustment Access   | X              | X   | ✓ | ✓ | ✓ |
|                                       | 4 : Immobilization Access   | X              | X   | X | ✓ | ✓ |
|                                       | 5 : Maintenance Access Only   | X              | X   | X | X | ✓ |
|  rolling mill areas, X is numeric id. |  : requires presence sensing in pulpit | ✓: allowed     |     |   |   |   |
|  |  : presence sensing not required       | X: not allowed |     |   |   |   |

## Local Station Safety Equipment

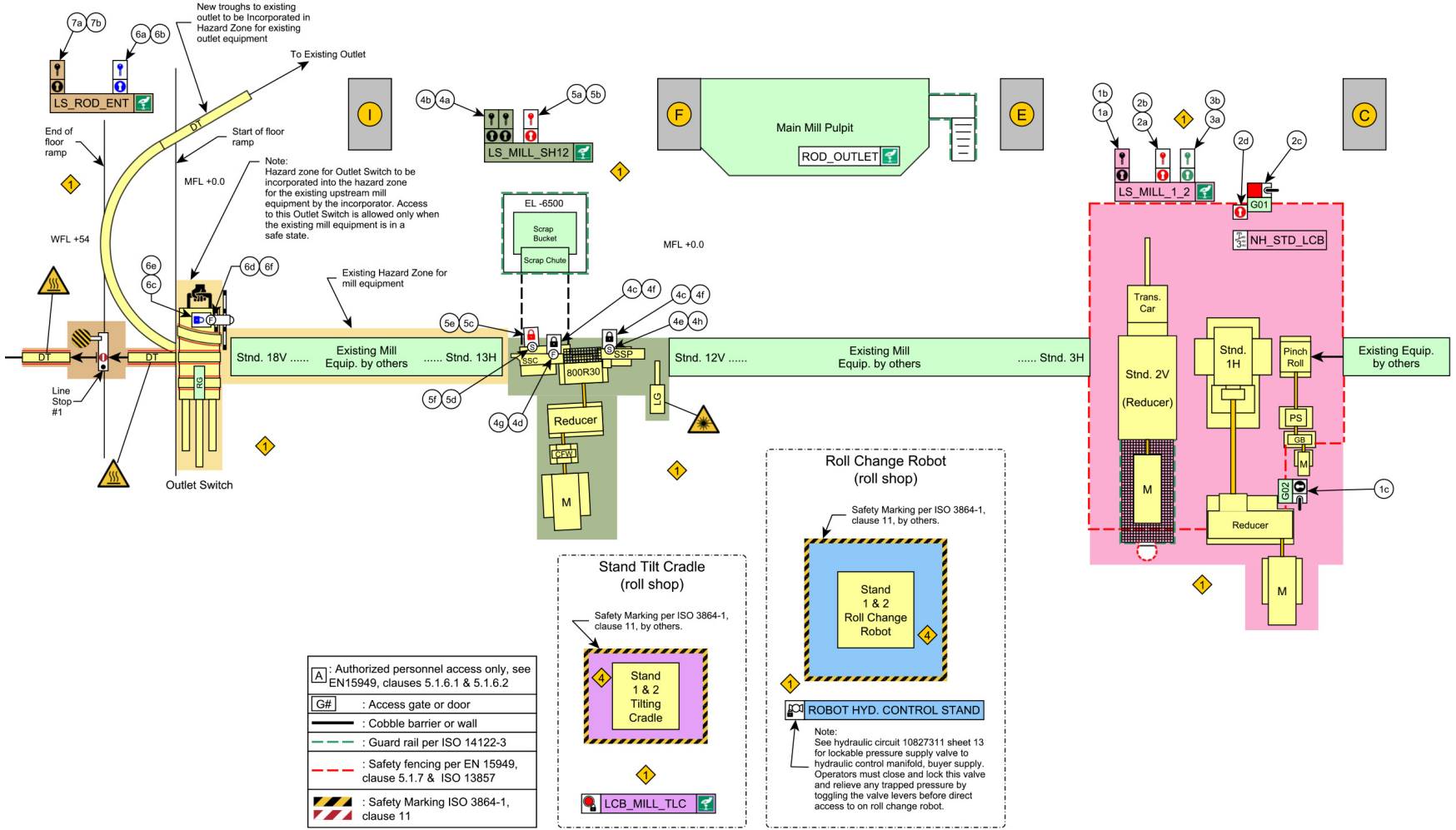
| LOCAL STATION SAFETY EQUIPMENT  |   |   |
|---|---|---|
| Icon / Symbol Part #  | Name  | Description   |
|    | Hazard Zone                                       | Hazard zones and their related Local Station are identified by the hazard zone background color, each hazard zone has its own background color which shows the extent of the zone and the equipment it contains.  |
| XXX   | ID  | Unique name identifier for the local station.   |
|    | E-Stop  | Each Local Station is to have an E-Stop control. In some cases an LCB should have an E-Stop, refer to the ECS.  |
|    | Solonoid Controlled Key Switch for Immobilization | The electromechanical key switch permits the release of a key when hazards in the hazard zone have been eliminated. On this layout, the lock is color coded to the Primary key for Immobilization with its background color matching that of the hazard zone. A lockable cover is provided for the operators personal lock. |
|    | Immobilization Key                                | The Primary key for hazard zone immobilization. When released this key can be used to release Secondary access keys from a key exchange or may function as an access key depending on the size of the hazard zones.   |
|    | Mechanical Key Exchange Module                    | A key exchange may be used to release the indicated number of Secondary keys. On this layout the lock is color coded to the Primary Key and the releasable Secondary Access keys are color coded to a corresponding number of access controls within the hazard zone.   |
|  | Solonoid Controlled Key Switch or Option Pod      | An electromechanical key switch that does not have the background color of its hazard zone is used to control keys for operating modes other than immobilization. On this layout, the lock is color coded to the key.   |
|  | Adjustment Key                                    | A type of Secondary key that permits access to the equipment within a hazard zone when that equipment requires manual intervention with power assisted adjustments. The key can be used for access controls or a control transfer key switch.   |



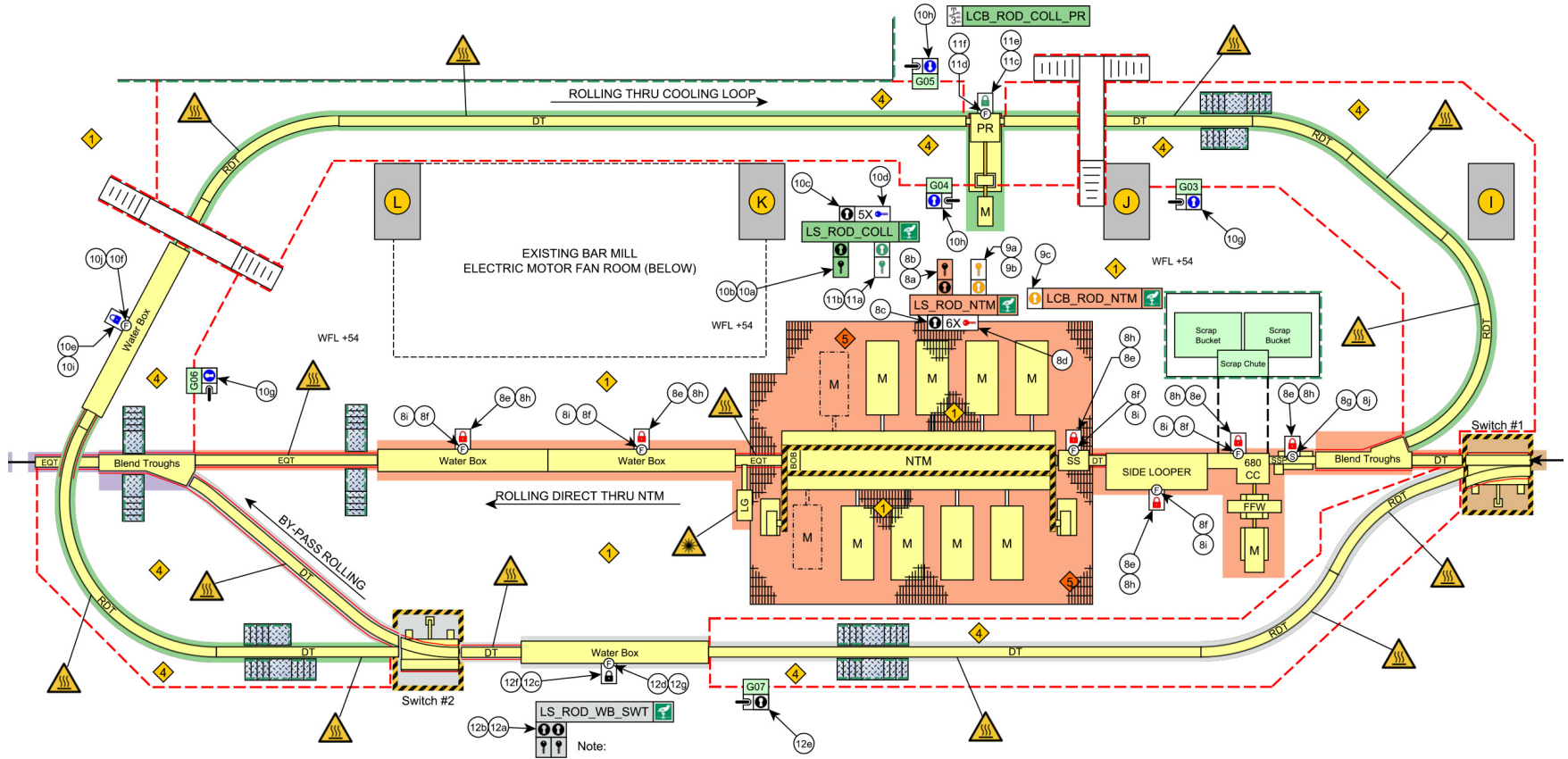
## Equipment Access Safety Equipment

| EQUIPMENT ACCESS SAFETY EQUIPMENT   |                       |  |
|---|-----------------------|--|
| Icon / Symbol<br>Part #   | Name                  | Description  |
|    | Access Key            | Used to gain access to hazard zones with mechanical access controls, i.e. single door interlocks or interlocked handles for access gates to safety fenced areas. This key can be a Primary or a Secondary key depending on the hazard zone.  |
|    | Single Door Interlock | Mechanical interlock used to lock manually operated, on equipment, guards against unintended access. On the Safety Layout and within a hazard zone these are color coded to the key used for access. Mounts using 2X - 10664072  |
| <br>10664465   | Fixed Actuator        | Used with single door interlock. Mounts using 2X - 10664545  |
| <br>10663915   | Spring Actuator       | Used with single door interlock 10663914. Mounts using 2X - 10664071   |
| <br>Left Hand (LH)<br><br>Right Hand (RH)     | Gate Interlock        | Mechanical left or right handed safety gate interlock. Prevents access to equipment within safety fenced areas during its hazardous operation. On the Safety Layout and within a hazard zone these are color coded to the key used for access. Includes a lock-out facility for the operators personal lock.       |
| <br>LH: 10679610<br>RH: 10667578   | Gate Interlock        | Electric, push button, left or right handed safety gate access control. Used for access to equipment in safety fenced areas. Includes a lock-out facility for the operators personal lock.   |
| <br>Left Hand (LH)<br><br>Right Hand (RH) | Gate Interlock        | Electric left or right handed safety gate access control. Used for access to equipment in safety fenced areas for inspection under load operating conditions. Access is remotely controlled by the main mill operating pulpit. Includes a lock-out facility to be used by the operators during other access modes. |

# Mill Safety – Customer Safety Layout



# Mill Safety – Customer Safety Layout



- Note:
- 1.) Within a hazard zone the safety equipment; keys, locks, switches, etc. are associated by color. Keys from one hazard zone will not open locks in another hazard zone. The mill owner must establish a procedure to ensure all personnel working in a hazard zone have applied their personal lock to the zones lockable key switch or lockable control isolation valve as appropriate. The hazard zone area must be clear and all locks removed and keys returned before starting the equipment.
  - 2.) Any enclosed safety area must be exited via the door entered. The mill owner must establish a procedure to ensure all personnel have applied their personal lock to the door. The area must be clear and locked before starting the equipment.
  - 3.) Existing building authorized access and evacuation routes responsibility of customer. A

| Immobilization Access with Switch Positions |           |           |                       |
|---|-----------|-----------|-----------------------|
| ROD STOP                                    | SWITCH #1 | SWITCH #2 | HZ can be Immobilized |
| OPEN  | BY-PASS   | COOL-LOOP | NONE                  |
| OPEN  | BY-PASS   | BY-PASS   | NTM COOL_LOOP         |
| OPEN  | DIRECT    | n/a       | BY-PASS COOL_LOOP     |
| BLOCKING                                    | n/a       | n/a       | POST LINE STOP ONLY   |



# Mill Safety – Customer Safety Layout

**DANGER**

STAY CLEAR.  
This machine starts automatically.  
Please do not proceed  
without warning.

HEARING EYE HAND FOOT  
**PROTECTION  
MUST BE WORN**

**WARNING**

Projectile  
Hazard.  
Stay clear  
during  
machine  
operation.

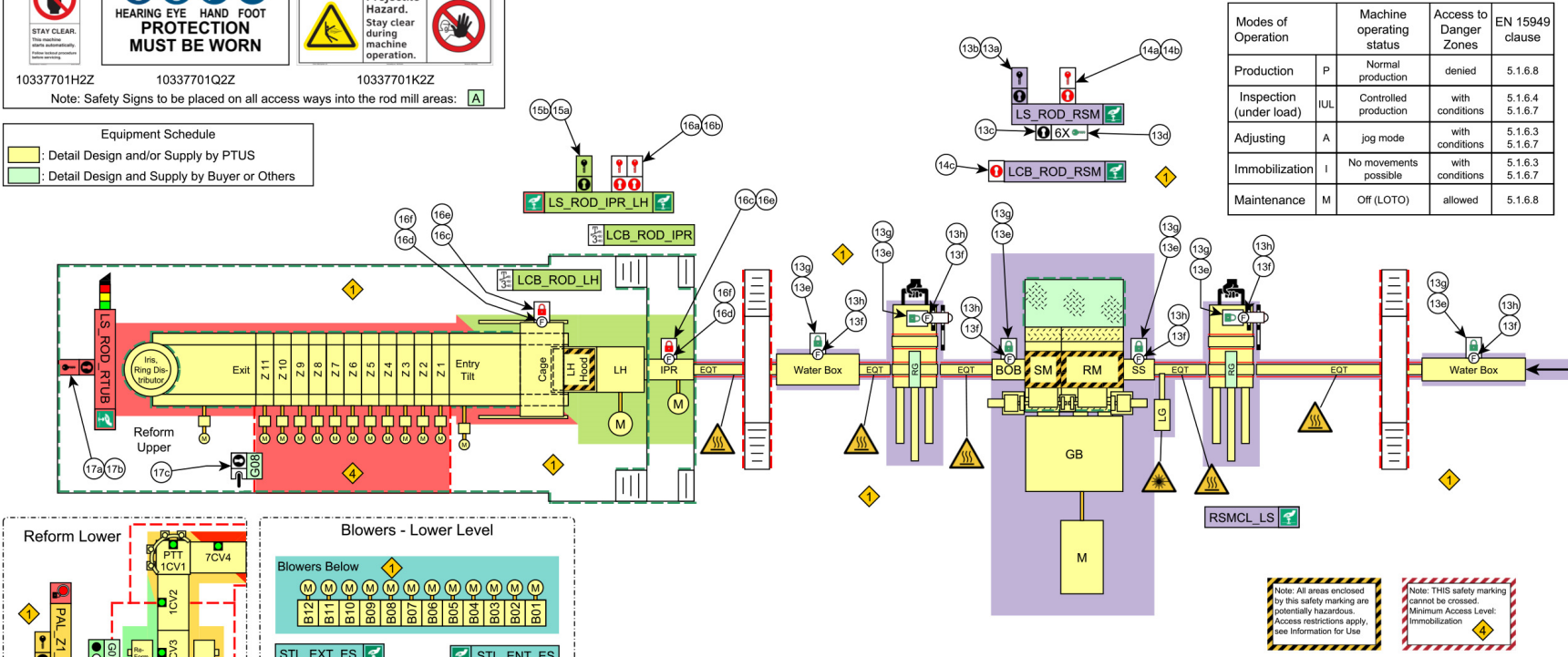
10337701H2Z                      10337701Q2Z                      10337701K2Z

Note: Safety Signs to be placed on all access ways into the rod mill areas: **A**

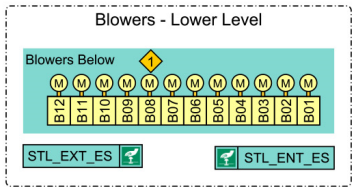
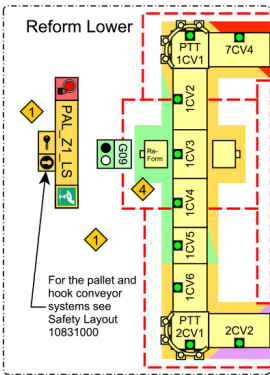
**Equipment Schedule**

: Detail Design and/or Supply by PTUS

: Detail Design and Supply by Buyer or Others



| Modes of Operation      | Machine operating status  | Access to Danger Zones | EN 15949 clause    |
|-------------------------|---------------------------|------------------------|--------------------|
| Production              | P Normal production       | denied                 | 5.1.6.8            |
| Inspection (under load) | IUL Controlled production | with conditions        | 5.1.6.4<br>5.1.6.7 |
| Adjusting               | A jog mode                | with conditions        | 5.1.6.3<br>5.1.6.7 |
| Immobilization          | I No movements possible   | with conditions        | 5.1.6.3<br>5.1.6.7 |
| Maintenance             | M Off (LOTO)              | allowed                | 5.1.6.8            |

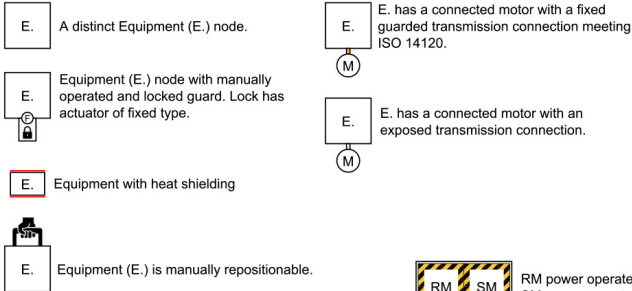


| Access Matrix  | Operating Mode |     |   |                |   |
|--|----------------|-----|---|----------------|---|
|  | P              | IUL | A | I              | M |
| Rolling Mill Areas: Authorized Personnel Only and access to areas per Operating Mode |                |     |   |                |   |
| Rolling Mill Working Places  | ✓              | ✓   | ✓ | ✓              | ✓ |
| Inspection Under Load - Segregated Area  | X              | ✓   | ✓ | ✓              | ✓ |
| Adjustment Access  | X              | X   | ✓ | ✓              | ✓ |
| Immobilization Access  | X              | X   | X | ✓              | ✓ |
| Maintenance Access Only  | X              | X   | X | X              | ✓ |
| rolling mill areas, X is numeric id.   |                |     |   | ✓: allowed     |   |
|  |                |     |   | X: not allowed |   |

Note: All areas enclosed by this safety marking are potentially hazardous. Access restrictions apply, see Information for Use

Note: This safety marking cannot be crossed. Minimum Access Level: Immobilization

# Mill Safety – Customer Safety Layout



Note:  
Limited scope e-stop matrix and does not include hazard zones associated with equipment provided by others. Incorporation of this equipment into the final process line e-stop matrix by the Process Incorporator to align with the safety procedures for the process and the local safety regulations.

**E.** Equipment (E.) has a power operated guard

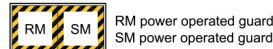
| Feature             | Proximity Sensor | Indication             |
|---------------------|------------------|------------------------|
| Power Cover         | Safety           | Fully Closed           |
|                     | Safety           | Fully Opened           |
| Locking -Cover Open | Safety           | Engaged - Latching     |
|                     | Normal           | Released - Not Locking |

**LH Hood** Laying Head power operated guard

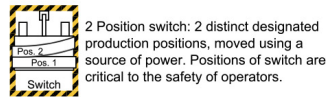
| Feature               | Proximity Sensor | Indication             |
|-----------------------|------------------|------------------------|
| Power Cover           | Safety           | Fully Closed           |
|                       | Safety           | Fully Opened           |
| Locking -Cover Open   | Safety           | Engaged - Latching     |
|                       | None             | Released - Not Locking |
| Locking -Cover Closed | Safety           | Engaged - Latching     |
|                       | None             | Released - Not Locking |

**Line Stop, power operated**

| Feature     | Proximity Sensor | Indication        |
|-------------|------------------|-------------------|
| Blocks Line | Safety           | Blocking Line     |
|             | Normal           | Not Blocking Line |



| Feature             | Proximity Sensor | Indication             |
|---------------------|------------------|------------------------|
| Power Cover         | Safety           | Fully Closed           |
|                     | Safety           | Fully Opened           |
| Locking -Cover Open | Safety           | Engaged - Latching     |
|                     | Normal           | Released - Not Locking |
| Cover               | Normal           | Dummy Trough Position  |



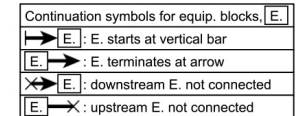
| Feature          | Proximity Sensor  | Indication             |
|------------------|-------------------|------------------------|
| Switch Position  | Normal            | Production Position 1  |
|                  | Normal            | Production Position 2  |
| Position Locking | Safety            | Engaged - Locking      |
|                  | <del>Normal</del> | Released - Not Locking |

safety








### Equipment Abbreviations

|                                  |                              |                              |
|----------------------------------|------------------------------|------------------------------|
| B : Blower                       | LH : Laying Head             | RG / LG : Rod / Laser Gauge  |
| BOB : Break Out Box              | LS : Local Control Station   | RM : Reducing Mill           |
| FFW : Fixed Fly Wheel            | LCB : Local Control Box      | RSM : Reducing-Sizing Mill   |
| 680 CC : 680 Crop & Cobble Shear | M : Motor                    | SB : Scrap Bucket            |
| DT : Delivery Troughs            | NTM : No-Twist Mill          | SC # : Stelmor Conveyor Zone |
| EQT : Equalization Troughs       | PR : Pinch Roll              | SL : Side Looper             |
| G : Gate                         | PS : Pinion Stand            | SM : Sizing Mill             |
| GB : Gear Box                    | SSP : Servo Switch Pipe      | SS : Snap Shear              |
| HZ : Hazard Zone                 | RDT : Roller Delivery Trough | SSC : Static Scrap Chute     |
| IPR : Intelligent Pinch Roll     | Rform : Reform Station       | WB : Water Box               |





| E-Stop Location<br>Hazard Zones | STNDS. 1 & 2_LS | 800R30 SHEAR_LCB | MILL_MP | ROD_ENTRY_MILL_MP | ROD_ENTRY_LCB | NTM_LS | NTM_LCB | COOL_LOOP_LCB | BY-PASS_LCB | RSM_LS | RSM_LCB | IPR/RYH_LS | RTUB_LS | STL_ENT_ES | STL_EXT_ES | PAL_Z1 |
|---------------------------------|-----------------|------------------|---------|-------------------|---------------|--------|---------|---------------|-------------|--------|---------|------------|---------|------------|------------|--------|
| HZ_EXISTING MILL                | X               | X                | X       |                   |               |        |         |               |             |        |         |            |         |            |            |        |
| HZ_STNDS. 1 & 2                 | X               | X                | X       |                   |               |        |         |               |             |        |         |            |         |            |            |        |
| HZ_800R30 SHEAR                 | X               | X                | X       |                   |               |        |         |               |             |        |         |            |         |            |            |        |
| HZ_OUTLET SWITCH                | X               | X                | X       |                   |               |        |         |               |             |        |         |            |         |            |            |        |
| HZ_ROD ENTRY                    |                 |                  |         | X                 | X             | X      | X       | X             | X           | X      | X       | X          | X       |            |            |        |
| HZ_NTM                          |                 |                  |         | X                 | X             | X      | X       | X             | X           | X      | X       | X          | X       |            |            |        |
| HZ_COOL LOOP                    |                 |                  |         | X                 | X             | X      | X       | X             | X           | X      | X       | X          | X       |            |            |        |
| HZ_BY-PASS                      |                 |                  |         | X                 | X             | X      | X       | X             | X           | X      | X       | X          | X       |            |            |        |
| HZ_RSM                          |                 |                  |         | X                 | X             | X      | X       | X             | X           | X      | X       | X          | X       |            |            |        |
| HZ_IPR/RYH                      |                 |                  |         | X                 | X             | X      | X       | X             | X           | X      | X       | X          | X       |            |            |        |
| HZ_RTUB                         |                 |                  |         |                   |               |        |         |               |             |        |         |            |         | X          |            |        |
| HZ_STLM_FAN                     |                 |                  |         |                   |               |        |         |               |             |        |         |            |         |            | X          | X      |
| HZ_COIL PLATE                   |                 |                  |         |                   |               |        |         |               |             |        |         |            |         | X          |            | X      |
| HZ_PAL_Z1                       |                 |                  |         |                   |               |        |         |               |             |        |         |            |         |            |            | X      |












# Mill Safety – Customer Safety Layout



| LOCAL STATION SAFETY EQUIPMENT  |   |   |
|---|---|---|
| Icon / Symbol Part #  | Name  | Description   |
|  | Hazard Zone                                       | Hazard zones and their related Local Station are identified by the hazard zone background color, each hazard zone has its own background color which shows the extent of the zone and the equipment it contains.  |
| XXX   | ID  | Unique name identifier for the local station.   |
|  | E-Stop  | Each Local Station is to have an E-Stop control. In some cases an LCB should have an E-Stop, refer to the ECS.  |
|  | Solenoid Controlled Key Switch for Immobilization | The electromechanical key switch permits the release of a key when hazards in the hazard zone have been eliminated. On this layout, the lock is color coded to the Primary key for Immobilization with its background color matching that of the hazard zone. A lockable cover is provided for the operators personal lock. |
|  | Immobilization Key                                | The Primary key for hazard zone immobilization. When released this key can be used to release Secondary access keys from a key exchange or may function as an access key depending on the size of the hazard zones.   |
|  | Mechanical Key Exchange Module                    | A key exchange may be used to release the indicated number of Secondary keys. On this layout the lock is color coded to the Primary Key and the releasable Secondary Access keys are color coded to a corresponding number of access controls within the hazard zone.   |
|  | Solenoid Controlled Key Switch or Option Pod      | An electromechanical key switch that does not have the background color of its hazard zone is used to control keys for operating modes other than immobilization. On this layout, the lock is color coded to the key.   |
|  | Adjustment Key                                    | A type of Secondary key that permits access to the equipment within a hazard zone when that equipment requires manual intervention with power assisted adjustments. The key can be used for access controls or a control transfer key switch.   |

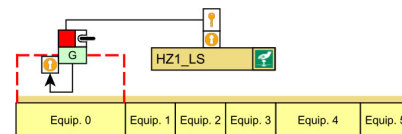
## HAZARD ZONE SIGNALING

-  Hazard Zone Active and Movements in Progress = SIREN ON
-  Hazard Zone Active = RED Steady light
-  Hazard Zone Active and Movements in Progress = YELLOW Blinking light
-  Hazard Zone in Safe State = GREEN Steady light

| EQUIPMENT ACCESS SAFETY EQUIPMENT  |                       |  |
|--|-----------------------|--|
| Icon / Symbol Part #   | Name                  | Description  |
|                               | Access Key            | Used to gain access to hazard zones with mechanical access controls, i.e. single door interlocks or interlocked handles for access gates to safety fenced areas. This key can be a Primary or a Secondary key depending on the hazard zone.  |
|                               | Single Door Interlock | Mechanical interlock used to lock manually operated, on equipment, guards against unintended access. On the Safety Layout and within a hazard zone these are color coded to the key used for access. Mounts using 2X - 10664072  |
|  10664465                     | Fixed Actuator        | Used with single door interlock. Mounts using 2X - 10664545  |
|  10663915                     | Spring Actuator       | Used with single door interlock 10663914. Mounts using 2X - 10664071   |
|  Left Hand (LH)               | Gate Interlock        | Mechanical left or right handed safety gate interlock. Prevents access to equipment within safety fenced areas during its hazardous operation. On the Safety Layout and within a hazard zone these are color coded to the key used for access. Includes a lock-out facility for the operators personal lock.       |
|  Right Hand (RH)              |                       |  |
|  LH: 10679610<br>RH: 10667578 | Gate Interlock        | Electric, push button, left or right handed safety gate access control. Used for access to equipment in safety fenced areas. Includes a lock-out facility for the operators personal lock.   |
|  Left Hand (LH)               | Gate Interlock        | Electric left or right handed safety gate access control. Used for access to equipment in safety fenced areas for inspection under load operating conditions. Access is remotely controlled by the main mill operating pulpit. Includes a lock-out facility to be used by the operators during other access modes. |
|  Right Hand (RH)              |                       |  |

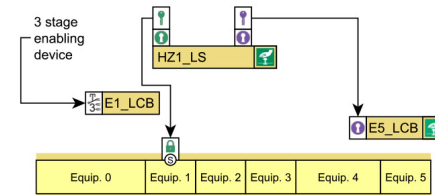
## KEY EXCHANGE DIAGRAM: ACCESS HEIRARCHY

-  :MILL WORKING AREAS  
Equipment is not accessible during NORMAL PRODUCTION. Mill working areas outside of designated hazard zones are accessible.
-  :INSPECTION UNDER LOAD  
Few types of equipment are accessible for Inspection Under Load and only during a CONTROLLED PRODUCTION operating condition.



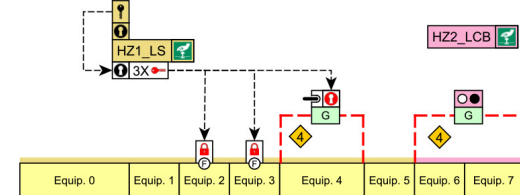
## :ADJUSTMENT ACCESS

Equipment adjustment tasks that involve direct access by operators and require powered assisted machine movements. Power assisted adjustments may require a 3 stage enabling device.



## :IMMOBILIZATION ACCESS

No movements are possible for Immobilized Equipment. Equipment is put in a safe state with hazards removed. Access to equipment for checking and cobble removal is allowed.



## :MAINTENANCE ACCESS

Equipment brought to a pre-defined Lock Out Tag Out state (LOTO) is accessible. See maintenance manual for any special requirements.



# Mill Safety – Customer Safety Layout



| HAZARD ZONE   | Ref. No. | QTY.     | PART NO.                            | DESCRIPTION                         | FORTRESS PART NO.                | SAFETY FUNCTION     | STANDARD DIFFER   | LASER ENGRAVING |           |            |
|---------------|----------|----------|-------------------------------------|-------------------------------------|----------------------------------|---------------------|-------------------|-----------------|-----------|------------|
|               |          |          |                                     |                                     |                                  |                     |                   | LINE 1          | LINE 2    | LINE 3     |
| STNDS. 1 & 2  | 1a       | 1        | 10666232A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 2321110           |                 |           |            |
|               | 1b       | 1        | 10664140F                           | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 2321110           | STND 1 & 2      | PRIM KEY  | IMMOB      |
|               | 1c       | 1        | 10788123                            | SAFETY DOOR HANDLE, LEFT HAND       | EN2-T6-AKL71-FT0                 | ACCESS (PRIMARY)    | 2321110           |                 |           |            |
| STNDS. 1 & 2  | 2a       | 1        | 10681990A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | IUL                 | 3322032           |                 |           |            |
|               | 2b       | 1        | 10664140C                           | KEY, STANDARD (RED SEAL)            | MLK-SUCS-R                       | PRIMARY KEY         | 3322032           | STND 1 & 2      | PRIM KEY  | IUL        |
|               | 2c       | 1        | 10804020                            | SAFETY DOOR HANDLE, LEFT HAND       | EJ2-A6-SR411-T411D7D700          | ACCESS              |                   |                 |           |            |
|               | 2d       | 1        | 10804051                            | KEY SWITCH OPTION POD               | BK07-T03843-D700                 | CONFIRM (PRIMARY)   | 3322032           |                 |           |            |
| STNDS. 1 & 2  | 3a       | 1        | 10681990A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | ADJUSTMENT          | 0404414           |                 |           |            |
|               | 3b       | 1        | 10664140D                           | KEY, STANDARD (GREEN SEAL)          | MLK-SUCS-L                       | PRIMARY KEY         | 0404414           | STND 1 & 2      | PRIM KEY  | ADJ ACCESS |
|               | 4a       | 1        | 10666232B                           | SOLENOID KEY SWITCH - 2 LOCKS       | SS2-2-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 3202041           |                 |           |            |
| 800R30 SHEAR  | 4b       | 2        | 10664140F                           | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 3202041           | 800 SHEAR       | PRIM KEY  | IMMOB      |
|               | 4c       | 2        | 10663914                            | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (PRIMARY)    | 3202041           |                 |           |            |
|               | 4d       | 1        | 10664465                            | ACTUATOR, FIXED                     | DM-F                             |                     |                   |                 |           |            |
|               | 4e       | 1        | 10663915                            | ACTUATOR, SPRING LOADED             | DM-A                             |                     |                   |                 |           |            |
|               | 4f       | 4        | 10664072                            | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
|               | 4g       | 2        | 10664545                            | SCREW FLAT HEAD TAMPER PROOF M5 X20 |                                  |                     |                   |                 |           |            |
|               | 4h       | 2        | 10664071                            | SCREW, FLAT HD TAMPER PROOF M6X20LG |                                  |                     |                   |                 |           |            |
|               | 5a       | 1        | 10681990A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | ADJUSTMENT          | 0004041           |                 |           |            |
| 800R30 SHEAR  | 5b       | 1        | 10684140C                           | KEY, STANDARD (RED SEAL)            | MLK-SUCS-R                       | PRIMARY KEY         | 0004041           | 800 SHEAR       | SAMPLE    | ACCESS     |
|               | 5c       | 1        | 10663914                            | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (PRIMARY)    | 0004041           |                 |           |            |
|               | 5d       | 1        | 10663915                            | ACTUATOR, SPRING LOADED             | DM-A                             |                     |                   |                 |           |            |
|               | 5e       | 2        | 10664072                            | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
|               | 5f       | 2        | 10664071                            | SCREW, FLAT HD TAMPER PROOF M6X20LG |                                  |                     |                   |                 |           |            |
| OUTLET SWITCH | 6a       | 1        | 10681990A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | ADJUSTMENT          | 3203121           |                 |           |            |
|               | 6b       | 1        | 10664140E                           | KEY, STANDARD (BLUE SEAL)           | MLK-SUCS-B                       | PRIMARY KEY         | 3203121           | OUTLET          | SWITCH    | ADJ ACCESS |
|               | 6c       | 1        | 10663914                            | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (PRIMARY)    | 3203121           |                 |           |            |
|               | 6d       | 1        | 10664465                            | ACTUATOR, FIXED                     | DM-F                             |                     |                   |                 |           |            |
| ROD ENTRY     | 6e       | 2        | 10664072                            | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
|               | 6f       | 2        | 10664545                            | SCREW FLAT HEAD TAMPER PROOF M5 X20 |                                  |                     |                   |                 |           |            |
| NTM           | 7a       | 1        | 10666232A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 3032311           |                 |           |            |
|               | 7b       | 1        | 10664140F                           | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 3032311           | ROD ENTRY       | PRIM KEY  | IMMOB      |
|               | 7c       | 1        | 10686232A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 0242020           |                 |           |            |
|               | 7d       | 1        | 10684140F                           | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 0242020           | NTM             | PRIM KEY  | IMMOB      |
|               | 7e       | 1        | 10666233F                           | KEY EXCHANGE MODULE (7 LOCKS)       | XM7-1-6-MLIN                     | PRIM / 6X SECONDARY | 0242020 / 1243240 |                 |           |            |
|               | 7f       | 6        | 10664140C                           | KEY, STANDARD (RED SEAL)            | MLK-SUCS-R                       | SECONDARY KEYS      | 1243240           | NTM             | SECND KEY | ACCESS     |
|               | 7g       | 6        | 10663914                            | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (SECONDARY)  | 1243240           |                 |           |            |
|               | 7h       | 5        | 10664465                            | ACTUATOR, FIXED                     | DM-F                             |                     |                   |                 |           |            |
|               | 7i       | 1        | 10663915                            | ACTUATOR, SPRING LOADED             | DM-A                             |                     |                   |                 |           |            |
|               | 7j       | 12       | 10664072                            | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
| NTM           | 8a       | 10       | 10664545                            | SCREW FLAT HEAD TAMPER PROOF M5 X20 |                                  |                     |                   |                 |           |            |
|               | 8b       | 2        | 10664071                            | SCREW, FLAT HD TAMPER PROOF M6X20LG |                                  |                     |                   |                 |           |            |
|               | 9a       | 1        | 10681990A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | ADJUSTMENT          | 2140424           |                 |           |            |
|               | 9b       | 1        | 10664140B                           | KEY, STANDARD (YELLOW SEAL)         | MLK-SUCS-Y                       | PRIMARY KEY         | 2140424           | NTM             | PRIM KEY  | ADJ ACCESS |
| COOL LOOP     | 9c       | 1        | 10827814                            | SWITCH, FORTRESS INTERLOCKS         | S-MLIS-A02022                    | ADJUSTMENT          | 2140424           |                 |           |            |
|               | 10a      | 1        | 10666232A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 0330200           |                 |           |            |
|               | 10b      | 1        | 10664140F                           | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 0330200           | COOL LOOP       | PRIM KEY  | IMMOB      |
|               | 10c      | 1        | 10666233E                           | KEY EXCHANGE MODULE (6 LOCKS)       | XM6-1-5-MLIN                     | PRIM / 5X SECONDARY | 0330200 / 1404211 |                 |           |            |
|               | 10d      | 5        | 10664140E                           | KEY, STANDARD (BLUE SEAL)           | MLK-SUCS-B                       | SECONDARY KEYS      | 1404211           | COOL LOOP       | SECND KEY | ACCESS     |
|               | 10e      | 1        | 10663914                            | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (SECONDARY)  | 1404211           |                 |           |            |
|               | 10f      | 1        | 10664465                            | ACTUATOR, FIXED                     | DM-F                             |                     |                   |                 |           |            |
|               | 10g      | 2        | 10788123                            | SAFETY DOOR HANDLE, LEFT HAND       | EN2-T6-AKL71-FT0                 | ACCESS (SECONDARY)  | 1404211           |                 |           |            |
|               | 10h      | 2        | 10788132                            | SAFETY DOOR HANDLE, RIGHT HAND      | EN4-T6-AKL71-FT0                 | ACCESS (SECONDARY)  | 1404211           |                 |           |            |
|               | 10i      | 2        | 10664072                            | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
| COOL LOOP     | 10j      | 2        | 10664545                            | SCREW FLAT HEAD TAMPER PROOF M5 X20 |                                  |                     |                   |                 |           |            |
|               | 11a      | 1        | 10681990A                           | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | ADJUSTMENT          | 4012142           |                 |           |            |
|               | 11b      | 1        | 10664140D                           | KEY, STANDARD (GREEN SEAL)          | MLK-SUCS-L                       | PRIMARY KEY         | 4012142           | PR_LOOP         | PRIM KEY  | ADJ ACCESS |
|               | 11c      | 1        | 10663914                            | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (PRIMARY)    | 4012142           |                 |           |            |
| 11d           | 1        | 10664465 | ACTUATOR, FIXED                     | DM-F                                |                                  |                     |                   |                 |           |            |
| 11e           | 2        | 10664072 | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                     |                                  |                     |                   |                 |           |            |
| 11f           | 2        | 10664545 | SCREW FLAT HEAD TAMPER PROOF M5 X20 |                                     |                                  |                     |                   |                 |           |            |

NOTE: The Master Differ for all keys in this Safety Layout is: \_\_\_\_\_

NOTE:  
Keys from or within a Hazard zone with a particular function (Immobilization, Adjustment, Primary or Secondary) cannot be used in another hazard zone or mixed within the hazard zone. Keys are safety function specific and unique Fortress must assign differs accordingly.

Fortress to return list of final differs to Purchaser. This document will be updated by the Purchaser to serve as his record of Master and Standard Differs.

When ordering replacement or spare components reference to master and standard differs must be provided to Fortress.

# Mill Safety – Customer Safety Layout



| HAZARD ZONE | Ref. No. | QTY. | PART NO.  | DESCRIPTION                         | FORTRESS PART NO.                | SAFETY FUNCTION     | STANDARD DIFFER   | LASER ENGRAVING |           |            |
|-------------|----------|------|-----------|-------------------------------------|----------------------------------|---------------------|-------------------|-----------------|-----------|------------|
|             |          |      |           |                                     |                                  |                     |                   | LINE 1          | LINE 2    | LINE 3     |
| BY-PASS     | 12a      | 1    | 10666232B | SOLENOID KEY SWITCH - 2 LOCKS       | SS2-2-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 3434033           |                 |           |            |
|             | 12b      | 2    | 10664140F | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 3434033           | BY-PASS         | PRIM KEY  | IMMOB      |
|             | 12c      | 1    | 10663914  | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (PRIMARY)    | 3434033           |                 |           |            |
|             | 12d      | 1    | 10664465  | ACTUATOR, FIXED                     | DM-F                             |                     |                   |                 |           |            |
|             | 12e      | 1    | 10788123  | SAFETY DOOR HANDLE, LEFT HAND       | EN2-T6-AKL71-FT0                 | ACCESS (PRIMARY)    | 3434033           |                 |           |            |
|             | 12f      | 2    | 10664072  | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
|             | 12g      | 2    | 10664545  | SCREW FLAT HEAD TAMPER PROOF M5 X20 |                                  |                     |                   |                 |           |            |
| RSM         | 13a      | 1    | 10666232A | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 4011200           |                 |           |            |
|             | 13b      | 1    | 10664140F | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 4011200           | RSM             | PRIM KEY  | IMMOB      |
|             | 13c      | 1    | 10666233F | KEY EXCHANGE MODULE (7 LOCKS)       | XM7-1-6-MLIN                     | PRIM / 6X SECONDARY | 4011200 / 4010240 |                 |           |            |
|             | 13d      | 6    | 10664140D | KEY, STANDARD (GREEN SEAL)          | MLK-SUCS-L                       | SECONDARY KEYS      | 4010240           | RSM             | SECND KEY | ACCESS     |
|             | 13e      | 6    | 10663914  | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (SECONDARY)  | 4010240           |                 |           |            |
|             | 13f      | 6    | 10664465  | ACTUATOR, FIXED                     | DM-F                             |                     |                   |                 |           |            |
|             | 13g      | 12   | 10664072  | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
| RSM         | 14a      | 1    | 10681990A | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIN-A02022-D024PU-V01CB | ADJUSTMENT          | 2432100           |                 |           |            |
|             | 14b      | 1    | 10664140B | KEY, STANDARD (YELLOW SEAL)         | MLK-SUCS-Y                       | PRIMARY KEY         | 2432100           | RSM             | PRIM KEY  | ADJ ACCESS |
|             | 14c      | 1    | 10827614  | SWITCH, FORTRESS INTERLOCKS         | S-MLIS-A02022                    | ADJUSTMENT          | 2432100           |                 |           |            |
| IPR/LYH     | 15a      | 1    | 10666232A | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 0034432           |                 |           |            |
|             | 15b      | 1    | 10664140F | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 0034432           | IPR/LYH         | PRIM KEY  | IMMOB      |
| IPR/LYH     | 16a      | 1    | 10681990B | SOLENOID KEY SWITCH - 2 LOCKS       | SS2-2-0-MLIN-A02022-D024PU-V01CB | ADJUSTMENT          | 4024430           |                 |           |            |
|             | 16b      | 2    | 10664140C | KEY, STANDARD (RED SEAL)            | MLK-SUCS-R                       | PRIMARY KEY         | 4024430           | IPR/LYH         | PRIM KEY  | ADJ ACCESS |
|             | 16c      | 2    | 10663914  | SINGLE DOOR INTERLOCK               | DM1-0-1-MLIS                     | ACCESS (PRIMARY)    | 4024430           |                 |           |            |
|             | 16d      | 2    | 10664465  | ACTUATOR, FIXED                     | DM-F                             |                     |                   |                 |           |            |
|             | 16e      | 4    | 10664072  | SCREW, BUTTON HD TAMPER PROOF M6X30 |                                  |                     |                   |                 |           |            |
| RTUB        | 17a      | 1    | 10666232A | SOLENOID KEY SWITCH - 1 LOCK        | SS1-1-0-MLIL-A02022-D024PU-V01CB | IMMOBILIZE (PRIM)   | 4443110           |                 |           |            |
|             | 17b      | 1    | 10664140F | KEY, STANDARD (BLACK SEAL)          | MLK-SUCS-V                       | PRIMARY KEY         | 4443110           | RTUB            | PRIM KEY  | IMMOB      |
|             | 17c      | 1    | 10788132  | SAFETY DOOR HANDLE, RIGHT HAND      | EN4-T6-AKL71-FT0                 | ACCESS (PRIMARY)    | 4443110           |                 |           |            |

## Safety Signs

Safety Signs are used to identify potential safety hazards throughout the mill area.

- **Safety Signs**
- **Safety Signs Used to Indicate Obligations**  
Specific PPE
- **Signaling Used to Indicate Hazards**  
Signs depicting certain Dangers
- **Signaling Used to Indicate Prohibitions**  
No Access





## Training

Training and Qualification Programs covering  
Safety Practices, Operation Maintenance, Service of Mill Equipment

Safety Training Program should encompass:

- **Valves**
- **Electrical Controls**
- **Hydraulic Controls**
- **Air Cylinders**
- **Rotary Actuators**
- **Couplings**
- **Pumps**
- **Other vendor supplied equipment**

## Ergonomic Hazards

- **Understanding MSDs**  
**Musculoskeletal Disorders (MSDs)**
- **Process for Protecting Mill Workers**  
**Management Support. Implementing Solutions:**
  - Improved Lightening**
  - Standing Platforms**
  - Overhead Cranes**
  - Material/Equipment Handling**
  - Jib Cranes**
  - Turning and Rotating devices**
  - Power Tools, etc.**
- **Lifting And Rigging of Machinery**  
**Crane and Rigging Safety Rules**

## Personal Protection Equipment (PPE)

### Required:

- **Safety Hat**
- **Shoes**
- **Gloves**
- **Eye Protection**
- **Ear Protection**
- **Dust Mask**
- **Respirators**
- **Face Shields**
- **Coveralls**



## Fire Hazards

- Alarms
- Understanding Fire Triangle – Causes  
Gases, Liquids, Solids
- Firefighting Equipment  
Extinguishers - Foam, Dry
- General Fire Prevention
- Flammable Hazards  
Fuel, Oil, Electric, Welding, etc.
- Fire Drills





### Equipment Guarding





### Equipment Guarding

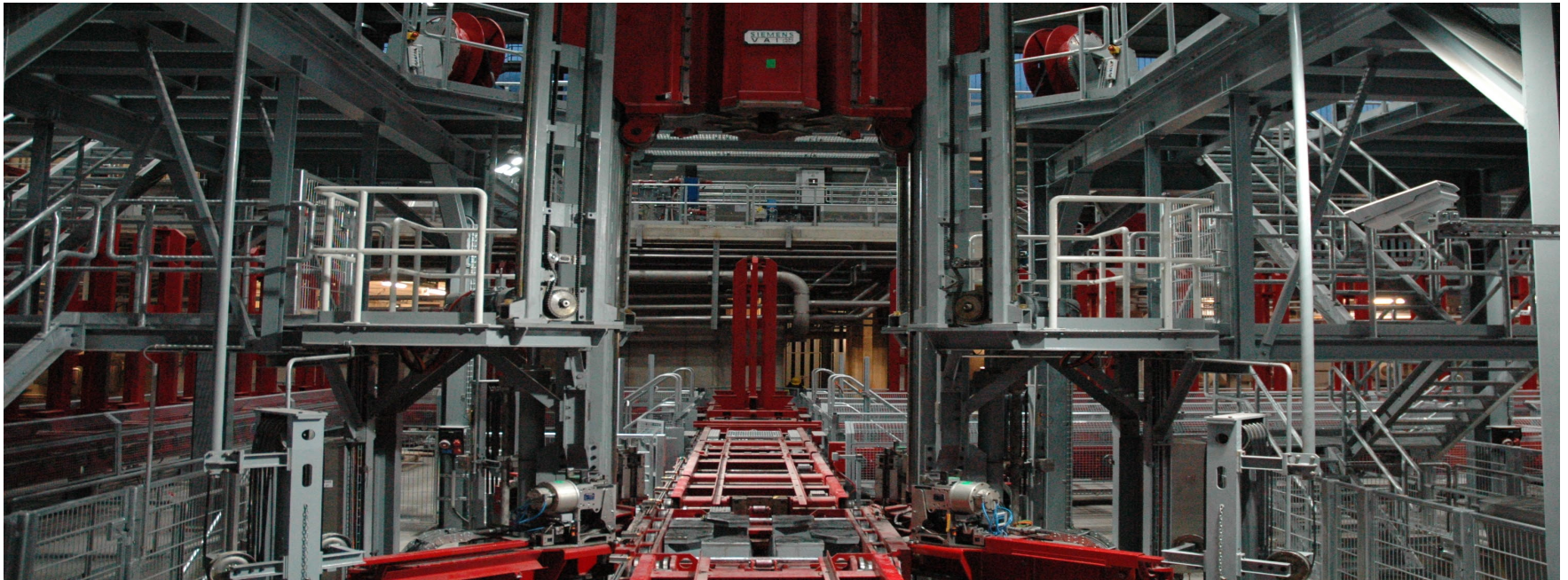






## Mill Safety – General Information

### Equipment Guarding





## Mill Safety – General Information

### Equipment Guarding





### Equipment Guarding





## Equipment Guarding





## Equipment Guarding





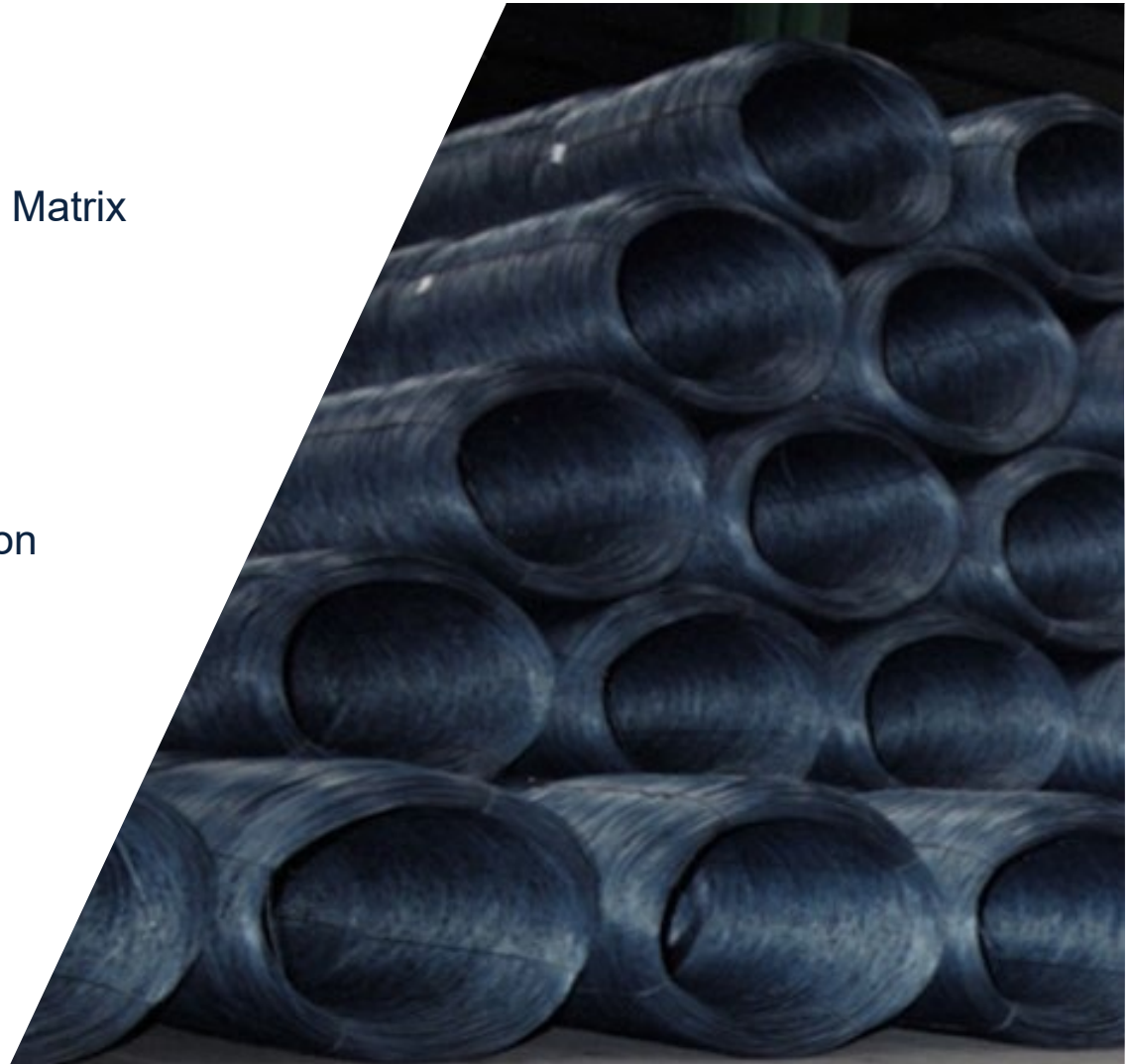
# “Off-Line” Safety

## Maintenance and Roll Shop



## Maintenance

- Mode of Operation
  - Listed as M on Access Matrix
  - Does not fall under:
    - Production
    - Inspection
    - Adjusting
    - Immobilization
- Machine Operating Status
  - Off (LOTO)
- Access to Danger Zones
  - Allowed
  - Presence sensing not required.







## Lock Out Tag Out (LOTO)

## Roll Shop Operation

### **Bearing Maintenance**

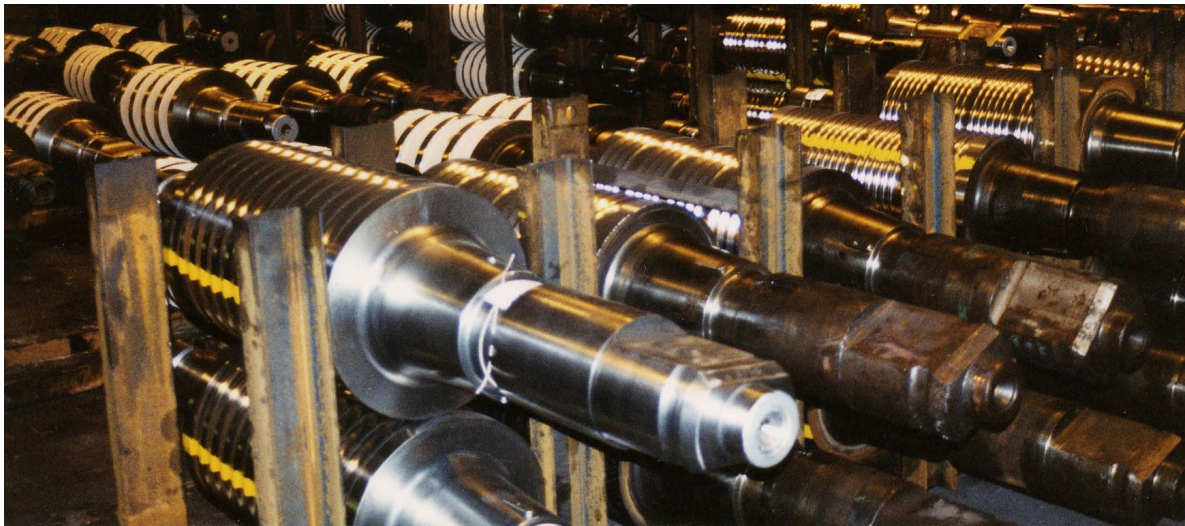
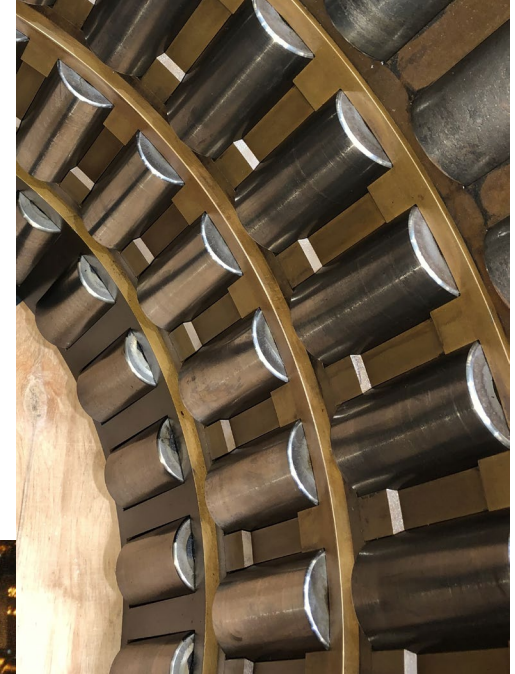
Chock Tilters

### **Roll and Chock Assemblies**

Chocking Stations

### **Roll Grinding**

Material Handling







## Off-Line Safety – Maintenance and Roll Shop

### Chocking Station





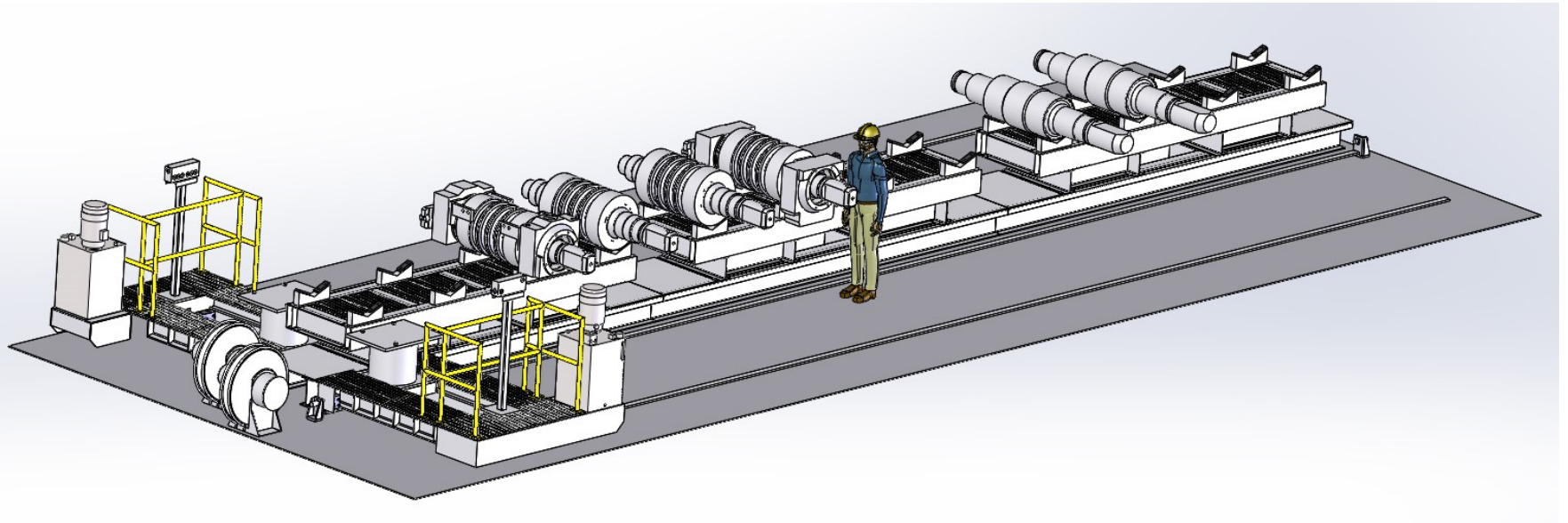
**PRIMETALS**  
TECHNOLOGIES

**Off-Line Safety – Maintenance and Roll Shop**

## Chocking Station



## Chocking Station





## Chocking Station

## Improved Working Environment





**PRIMETALS**  
TECHNOLOGIES

**Off-Line Safety – Maintenance and Roll Shop**

## Chocking Station





## Transfer Cars

## Custom Lifting Devices



## Chock Tilters





# “Hands Off” Safety

## New Technology – Rolling Mills





**Section Size Measuring Systems**







**.Adjustable Restbars**

**Hydraulic Adjustable Restbars**





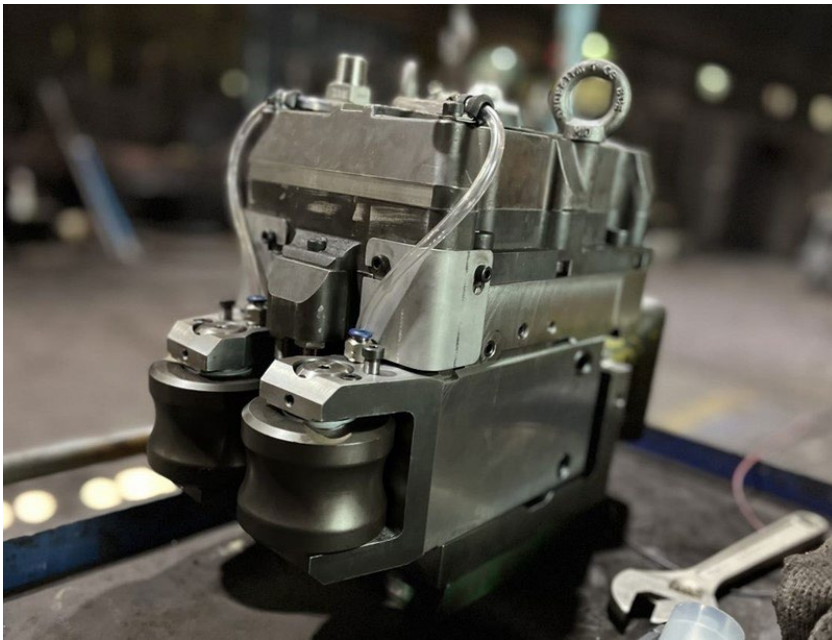


Hands Off Safety - New Technology

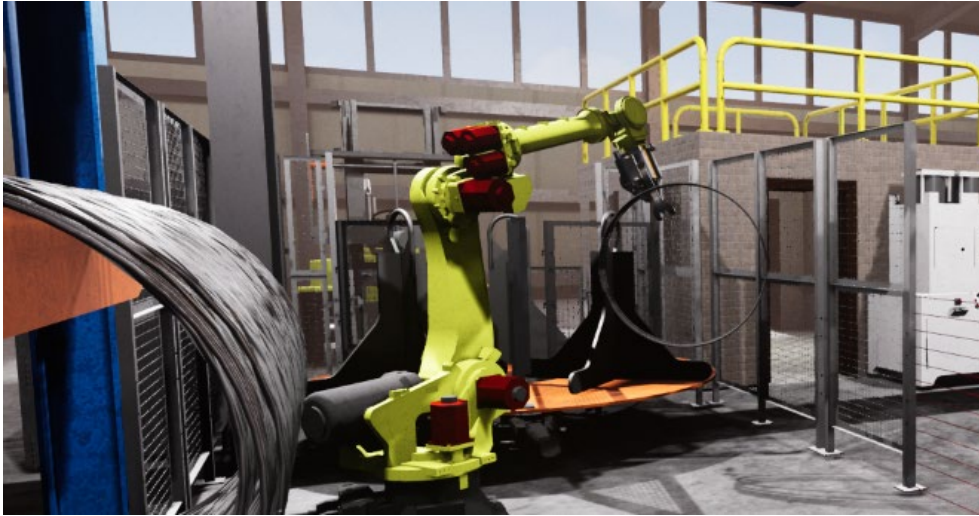
## Adjustable Loopers



## Advanced Guides







**TrimRob for Coil Handling Area**





**THANK YOU – Stay Safe**