HEXAGON

HxGN EAM Equipment Revisions

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HxGN EAM Equipment Revisions

This brief provides conceptual information on equipment revisions in HxGN EAM. It includes general information about features in this edition. This brief is intended to supplement the documentation of this feature. It is not comprehensive and may not include all details about this functionality.

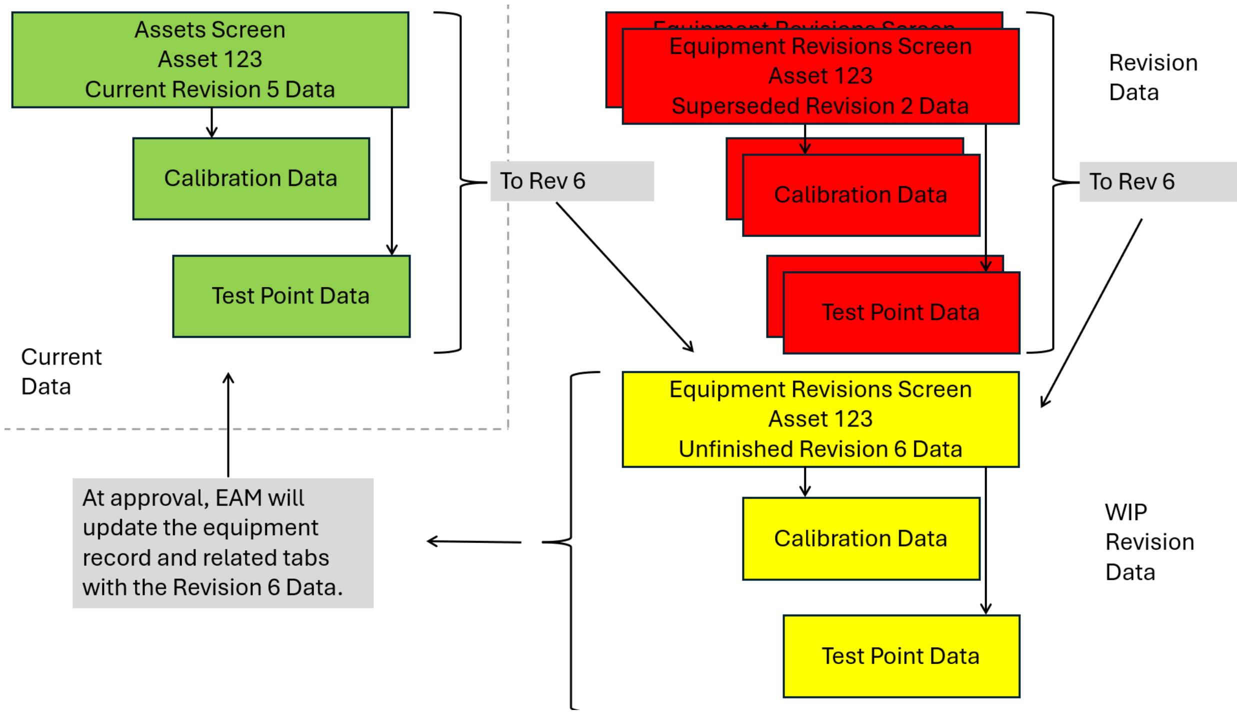
Table of Contents

Equipment Revisions Overview

Equipment revision control is very similar to PM Revision Control in HxGN EAM. It prevents users from making unauthorized changes to equipment data. The only way to make changes to equipment data is via the creation and approval of a new revision of that equipment data.

However, unlike PM Revision Control, the different equipment revisions are not displayed on the equipment screens themselves, but on a dedicated equipment revisions screen instead. There is also no need to set an install parameter or an organization option. Equipment revision control can be activated directly from the equipment screens and is available for any selected equipment.

The overview chart below shows the current equipment data on the left (revision 5 in green) on the equipment screens. Most of the data will be protected, but you can exempt fields from this protection if revision control is activated for the equipment. The previous (superseded) and current (approved) equipment revision data are located on the right (in red) on the **Equipment Revisions** screen. This data is protected. The overview chart also shows an unfinished new revision (revision 6 in yellow). This new revision can be started with data from the current equipment, or with data from any previous revision of the equipment data, for example, in case revision 2 is a better starting point. At approval of this new revision, the new data will be copied back to the current equipment data. Note that not all data under revision control is included on the overview. For example, comments, documents, and translations are included in the revisions, but are omitted from the overview for clarity.



Activating Revision Control

In this section, we describe how revision control can be activated for the equipment.

On the **Assets**, **Positions**, and **Systems** screen, select the checkbox called **Revision Control** and save the update. Once saved, revision control for the selected equipment is activated. The **Revision Control** checkbox and most fields on the screen become protected. Protection is also applied to the tabs that are under revision control.

Note that the Revision Control checkbox is likely hidden. Use the screen designer to unhide it for your implementation.

The protection of equipment data depends on the selections you make on the **Equipment** tab of the **Revision Control Setup** screen. Fields listed on that screen where **Protect** is selected will be protected. Fields listed on that screen where that checkbox is unselected are considered exempt and will remain unprotected. See below for more details on the **Revision Control Setup** screen. The protection of the **Revision Control** checkbox itself, once selected and saved, cannot be exempted.

It is essential to note that once an equipment record is saved with the **Revision Control** checkbox selected, the equipment remains under revision control, without exception, until a new revision for the equipment is created and approved with the **Revision Control** checkbox unselected. After this approval, revision control will no longer be enforced on the record. At that point, data can be directly updated on the equipment screens once again.

Not all fields and tabs on the equipment screens are included in the revision control. Refer to the section on the **Revision Control Setup** screen below for a list of fields and tabs that are included or excluded. Tabs and fields that are excluded can still be updated when required if the equipment is under revision control.

If you select the **Revision Control** checkbox and save the update, the system will take the following actions:

1. Create a new equipment revision record on the **Equipment Revisions** screen.
    a. This record holds a copy of all current data from the equipment record and includes:
        i. Record View data
        ii. Custom Field values
        iii. Comments
        iv. Documents
        v. Translations
        vi. Calibration tab data
        vii. Test Points tab data
        viii. Parts Associated tab data
        ix. Structure tab data (parent equipment only)
    b. Automatically assign the next higher revision number to this new equipment revision record or, if this is the first time revision control is activated for this equipment, assign revision 0 (zero).
    c. Approve this new equipment revision record and automatically supersede the previous revision, if this is not the first time revision control is activated for this equipment.
2. Populate the **Equipment Revision** field on the **Assets**, **Positions**, or **Systems** screen with the primary key of the newly created equipment revision record. You can use this field to hyperlink to the Equipment Revisions screen.
3. Protect the **Revision Control** checkbox on the equipment record.
4. Protect all relevant fields on the equipment record for which revision control was just activated.
5. Protect the data on the following tabs of the equipment screens currently included in revision control:
    a. Comments
    b. Documents
    c. Translations
    d. Calibration
    e. Test Points
    f. Parts Associated
    g. Structure tab - Protection is limited to the parent data of the equipment. Children can be added, updated, or removed from equipment that is under revision control whenever required, provided the child itself does not have revision control activated. If the child has revision control activated, then parent changes are not allowed, whether the parent is under revision control or not.

Revision Control does not further affect the way the system handles equipment. Creating work orders, attaching equipment to PM Schedules, purchasing and receiving assets, issuing and returning assets from and to the storerooms, and other similar transactions can be executed with or without revision control active for the selected equipment.

However, for linear segments and routes, when revision control is active and the Organization Option ‘SRSTSYNC’ is set to I or ID, the system may prevent the creation of equipment structure records when segments are added to routes and routes are added to right-of-ways.

Revision Control Setup

In this section, we describe the setup for revision control. On the **Equipment** tab of the **Revision Control Setup** screen, all fields that can be protected on the equipment screens are listed.

Fields are included for all three equipment screens separately. The following screens are included:

- Assets
- Positions
- Systems

And for each of these screens, fields from the following tabs are included as part of the revision control:

- Record View
- Calibration
- Test Points

The **Protect** checkbox on this screen determines whether the field is protected or unprotected (exempt) on the corresponding screen and tab, provided that the selected equipment has revision control activated. Since all three screens are listed separately, it is possible to have the Description field protected on the Assets screen and unprotected on the Positions and Systems screen, for example. Note that in this case, the Description will also be protected on any clones of the Assets screen.

Protecting Custom Fields on the Record View is also possible, but requires an extra step:

1. Make sure the Custom Fields field on the revision control setup screen has **Protect** selected.
2. Then on the Classes screen, select any equipment class, and then on the Custom Fields tab, select the **Revision Control** checkbox for each Custom Field you would like to protect. Without this checkbox selected, the Custom Field remains unprotected for the selected class.

Note that the value of a protected Custom Field on the record view cannot be updated directly and can also not be deleted by changing the Class field on the equipment. However, if you remove the Custom Field from the class, the system will remove all values for that field from all equipment with that class without raising an error for the revision-controlled equipment.

Protecting the Structure is done via the hierarchy fields found on the Record View. This means the following fields per screen:

Equipment Screen	Hierarchy Fields
Assets	Parent Asset
	Position
	Primary System
	Location
Positions	Asset

Equipment Screen	Hierarchy Fields
	Parent Position
	Primary System
	Location
Systems	Primary System
	Location

If **Protect** is selected for any of these hierarchy fields, the related **Dependent** and **Cost Roll-up** checkboxes are also protected.

IMPORTANT: If the **Primary System** is protected, this means that any parent system is protected from changes, not just the primary system. In essence, the system protects parents by their type, meaning you may protect parent assets, parent positions, parent systems, parent locations, or any combination thereof. And you can set this combination for each type of equipment differently. For example, protect the parent position for assets, but not for positions. Note that error messages will reference the field that is protected. Try to add a system parent on the Structure tab of the Assets screen. Even if this is not the primary system, you will still receive an error indicating that the primary system is protected. Do not let that confuse you, as that is how the field is configured on the Record View and Revision Control Setup screens.

Note that the Parts Associated tab is not listed in the Revision Control Setup screen, even though the tab is under revision control. Parts Associated is a generic tab that can be found on various screens. The page layout for this tab is therefore shared, and consequently, it is not possible to allow individual fields to be protected or unprotected. No exemptions can be made for this tab, and all fields will always be protected once revision control is activated.

Revision Control Setup Exclusions

Not all fields are included in the equipment revision control setup. Following is a list of fields that are excluded and that can still be updated if the equipment is under revision control:

- Linear equipment related fields, including Equipment Length, Equipment Length UOM, Linear Reference UOM, Linear Reference Precision, Geographical Reference, Inspection Direction, Flow, From Point, To Point, Linear Equipment Type, Direction, Equipment Length Override, and Linear Cost Weight.
- System Level, Assembly Level, and Component Level.
- Change notice related fields, including State and Change Notice number.
- Track Resources.
- Transportation related fields, including Set and Set Position.
- Fleet billing related fields, including Vehicle, Fleet Customer, Billing Code, Markup Code, and Vehicle Status.
- Facility (Note that this checkbox is only available on the Positions screen).
- Lock Reliability Ranking Values.

Also excluded from revision control are all tabs that are not listed above. For example, the Meters tab, the Rankings tab, and the Safety tab, among others, are all excluded and will still behave the same as if revision control were not activated for the equipment.

IMPORTANT: The PM Schedules tab is also unaffected by the Revision Control checkbox of the equipment. However, that tab still follows the settings of the PMRVCTRL installation parameter.

Equipment Revisions

On the **Equipment Revisions** screen, you can view the current revision and all previous revisions of the equipment data for all equipment currently under revision control, as well as any equipment that has been under revision control at some point in the past. For equipment that has never been under revision control, no data is available on this screen.

Department Security (DEPTSEC), if activated, plays no role on this screen, because equipment records could disappear (if the Department is missing from your profile) or could be protected (if the Department is flagged as read-only). This means that while working on a new revision for the equipment, you may not be able to see the complete revision history of the equipment, or worse, may not be able to update the equipment data for the new revision.

Equipment Revisions screen

The **Equipment Revisions** screen has the following important attributes:

1. **Organization**: Select the Organization of the Equipment you want to revise. All lookups on this screen, such as Department, Class, Cost Code, etc., must also work for the equipment on the native equipment screens (Assets, Positions, and Systems). This means that a common asset should never be associated with a specific department. By ensuring the Organization of the revision is the same as that of the selected Equipment, this is automatically guaranteed.
2. **Description**: You must enter a description on this revision record, but note that this value is not used for the translation tab. Instead, the **Equipment Description** will be used for translations.
3. **Equipment**: The lookup displays equipment of all three types (assets, positions, and systems), but only those that have the Revision Control checkbox selected. This screen handles all three types of equipment.
4. **Equipment Description**: The equipment description defaults from the selected equipment but can be changed as part of the revisions process. This description serves as the basis for the translation records on the Equipment Translations tab.
5. **Status**: On the **System Codes** screen, use the status entity Equipment Revision Status (ORST). The following status codes are available:
    a. Unfinished – The revision data is unprotected in this status and changes can be made.

b Request Approval – In this status, the revision data is protected, and approval is requested. As part of the status change, the system will perform various checks to determine if the new revision data can be applied to the current equipment. If any of these checks fail, the status change will not be allowed.
These approval checks are performed now, because with this status, no updates to the revision record are allowed. Any errors at this moment will likely also prevent the later approval step, assuming the data on the equipment remains unchanged in the meantime.

The system will also populate the **Requested By** and **Date Requested** fields when the status changes to request approval.

c Approved – In this status, the revision data is protected and approved. As part of the status change, the system will:

i) Perform a variety of checks (same as above for the request approval status) to see if the new revision data can be applied to the current equipment. These checks are performed again because the equipment data may have changed between the request for approval and the actual approval. If any of these checks fail, the status change will not be allowed until the issue is resolved.

ii) Copy the revision data to the equipment, if no errors were found.

iii) Supersede the previous approved revision, if no errors were found.

The system will also populate the **Approved By** and **Date Approved** fields when the status changes to approved.

A word of caution. After the approval of a revision, all data of the revision and the equipment are the same. But this may not remain. For example, any exempt fields can be updated, so over time, the latest approved revision and the current equipment data may diverge.

d Superseded – In this status, the revision data is protected.

e Canceled – In this status, the revision data is protected.

Note: Manual status changes are allowed between unfinished and request approval. Once approved, superseded, or canceled, no further manual changes are permitted unless they are within the same system code.

6 **Revision**: Revision numbers are automatically assigned and are assigned per equipment.

7 **Source Revision**: You can use this field if you do not want to use the current equipment data as the starting point for your new revision. You can select any of the previous revisions of the same equipment if you think that would be a better starting point. For example, in case you want the equipment data to revert to the values of revision 2.

8 **Batch Update**: If you want to update multiple equipment instead of one, select this checkbox. The system will protect and clear the Equipment field. The equipment that needs to be updated can be chosen on the **Batch Update Equipment** tab. Refer to the section titled 'Equipment Revisions Batch Update' in this brief for details on this process, which differs from the update of individual equipment discussed here.

Once the primary data is entered and saved, the system will copy and refresh the remaining equipment data to the corresponding fields on this screen and its tabs. The data is copied from the current equipment data or, if a **Source Revision** is entered, from the selected revision record on this screen. The system will copy all the data from the following tabs:

- Record View (including Custom Fields)
- Comments
- Documents
- Translations
- Calibration
- Test Points
- Parts Associated
- Structure (parent equipment only)

Note that the Comments, Documents, and Translations tabs are called Equipment Comments, Equipment Documents, and Equipment Translations on the Equipment Revisions screen. All these tabs contain data related to the equipment and display the state of that data when the specific revision was in effect.

Additionally, regarding Custom Fields, note that the list of Custom Fields is derived from the equipment entity (OBJ) but that any entered values are stored as part of the equipment revisions entity (OBRV). The latter is to make sure they can always be uniquely identified and never get mixed up with those currently attached to the equipment. This mismatch in entities means that Custom Fields cannot be added to the Dataspy Layout and cannot be used in the Quick Filter on this screen.

Also, note that Classes cannot be defined for the equipment revisions entity. The Classes displayed on this screen are equipment classes.

The remaining fields on the screen are equipment fields, such as Department, Category, Cost Code, Manufacturer, Model, Serial Number, and Manufacturer Revision (referred to as Revision on the equipment screens), among others. Since these operate the same as on the equipment screens themselves, we will only discuss some noteworthy exceptions:

9 **Equipment Status**: The system displays the same status codes that you have configured for equipment. However, there is one extra option called ‘Keep Unchanged’. This is the default option chosen by the system, allowing you to simply keep the current equipment status unchanged at approval. This is a great option if you have assets returned to the storeroom and issued out again later. Rather than timing the approval perfectly, with this option, you do not have to worry about the equipment status at the time of approval.

If the equipment is an asset, the system will display additional status codes based on the equipment's current status on the Assets screen. As follows:

If the Current Status is	**Then show**
Awaiting Purchase	Awaiting Purchase
Purchased/In Store	In Store, Purchased/In Store, Installed, and Withdrawn
In Store	In Store, Purchased/In Store, Installed, and Withdrawn
To Be Repaired	To Be Repaired and Installed
In Repair	In Repair
Installed	Installed and Withdrawn
Withdrawn	Installed and Withdrawn

In Transit	In Transit

Otherwise, if the equipment is a position or a system, the system will only display the installed and withdrawn status codes.

Also important to note is that the system does not utilize the status authorization matrix for status selection, although it will be used upon approval of the new revision.

10 **Operational Status**: The system displays the same status codes that you have configured for equipment. However, there is an additional option called ‘Keep Unchanged’. This is the default option chosen by the system, allowing you to simply keep the current operational status unchanged at approval. The system does not utilize the status authorization matrix for status selection, although it will be used upon approval of the new revision.

11 **Availability Status**: The system displays the same status codes that you have configured for equipment. However, there is an additional option called ‘Keep Unchanged’. This is the default option chosen by the system, allowing you to simply keep the current availability status unchanged at approval. The system does not utilize the status authorization matrix for status selection, although it will be used upon approval of the new revision.

Equipment Revisions – Equipment Comments tab

The **Equipment Comments** tab functions similarly to the regular Comments tab, but instead of comments related to the revision record, they pertain to the equipment. Once approved, they will be copied to the equipment.

Equipment Revisions – Equipment Documents tab

The **Equipment Documents** tab functions similarly to the regular Documents tab, but instead of documents related to the revision record, they pertain to the equipment. Once approved, they will be copied to the equipment.

Equipment Revisions – Equipment Translations tab

The **Equipment Translations** tab functions similarly to the regular Translations tab, but instead of translations related to the revision record, they pertain to the equipment. Once approved, they will be copied to the equipment.

Equipment Revisions – Calibration tab

The **Calibration** tab on the **Equipment Revisions** screen functions similarly to the tab on the equipment screens. But there are some small differences:

- The **Next Calibration Due** date field is missing.
- **Updated** By and **Date Updated** are added fields. Note that since the calibration data is stored in the same table as the equipment data, changes made to the Record View on the screen are also reflected here. And vice versa.

Equipment Revisions – Test Points tab

The **Test Points** tab on the **Equipment Revisions** screen functions similarly to the tab on the equipment screens.

But since there may be more than one test point record on this tab, some additional fields are available to better control the changes you want to apply to the new revision data of the equipment. The following important attributes were added:

1 **Action**: This dropdown displays the kind of update you want to apply.

   a **Insert**: This option is used for all new records you wish to add to the equipment, once the new revision is approved.

   b **Delete**: This option is used for all records currently attached to the equipment you wish to remove, once the new revision is approved.

   c **Update**: This option is used for all records that have one or more fields updated. These updates will be applied to the equipment at the time the new revision is approved.

   d **None**: This option is used for all records you do not wish to change at approval. Note that it is possible to make changes to the data on a record and still select None. The system will then ignore any changes to this record at approval.

   Note that an additional action is available to replace all existing records on the tab with any newly inserted records. However, this action is only available for batch update revisions and will be discussed separately in that section of the brief.

2 **Current Record**: This checkbox, if selected, indicates the record is currently attached to the equipment. This has the following implications:

   a The **Action** dropdown will only show the None, Update, and Delete option.

   b You are not allowed to delete these records directly. But you can opt for deletion via the **Action** field.

   Otherwise, if this checkbox is not selected, it indicates that the record is not yet attached to the equipment. This has the following implications:

   c The **Action** dropdown will only show the Insert option.

   d You are also allowed to delete these records directly.

3 **Calibration Update**: This checkbox, if selected, indicates the record has been updated by a change that was applied on the Calibration tab and that change also affected the data on this tab.

The remaining attributes on this tab are the same as on the Test Points tab of the equipment screens and will not be further discussed in this brief.

Equipment Revisions – Parts Associated tab

The **Parts Associated** tab on the **Equipment Revisions** screen functions similarly to the tab on the equipment screens.

Additionally, it includes the **Action** field and the **Current Record** checkbox, as described above on the Test Points tab, which function in the same way here.

The remaining attributes on this tab are the same as on the Parts Associated tab of the equipment screens and will not be further discussed in this brief.

Equipment Revisions – Structures tab

The **Structures** tab on the **Equipment Revisions** screen does not look like any of the structure tabs you are used to. Instead, it is a regular list/detail tab that allows the addition, update, and deletion of parent equipment.

The following essential attributes were added:

1 **Parent Equipment**: This lookup shows all equipment of the type asset, position, system, or location. Once selected, the system displays the description, location, type, and status of the equipment chosen.

2 **Dependent**: This optional checkbox identifies the parent that decides the location of the equipment under revision control. Only one record can be selected. Note that records where Action equals 'Delete' are excluded from the count, as these records will be deleted when the revision is approved.

3 **Cost Roll-up**: This optional checkbox identifies whether costs will roll up from the child to the parent.

4 **Primary System**: This optional checkbox identifies the primary system of the equipment under revision control. Only one record can be selected. Note that records where Action equals 'Delete' are excluded from the count, as these records will be deleted when the revision is approved.

5 **Sequence:** The sequence field is usually hidden from you on the regular structure tabs and is automatically set based on where you drop the equipment in the tree. For that reason, you may also choose to keep this field hidden here and have the system make the decision instead.

  But since there is no tree on this tab, the system offers this lookup and displays the sequence numbers of the current children of the selected parent equipment, allowing you to decide where to insert the equipment in that list. However, the system still adheres to its own rules and may modify the entered number as it sees fit. For example, it will renumber if there is no space between two sequence numbers or if a duplicate number is entered. The system may also try to maintain some space before and after the number when inserting between two parents, meaning Sequence 101 may become 150 if it is inserted between 100 and 200. Essentially, the Sequence you entered may or may not end up being the sequence on the structure record.

Additionally, it includes the **Action** field and the **Current Record** checkbox as described above on the Test Points tab, and they function the same way here.

The Structure tab further does minimal verification, but it does verify that you have no more than one parent asset, position, or location. Most verifications are performed later, at the request approval or approval stage. The reason for this is that, between entering the data and applying it to the equipment under revision control, the equipment data may have changed. This change could occur between the time the data is entered, the request for approval is made, and the actual approval is given. For example, checking the equipment status at data entry, to see if the structure change is allowed, has no purpose if that status may change tomorrow.

Equipment Revisions – View Changes tab

The **View Changes** tab shows the changes that you made. The tab always displays the data of the selected equipment revision record and compares this data with that of the current equipment or with that of a previous revision of the selected equipment. The tab will only display data that has been or will be changed. It will also show on which tab the change will be made, which field will be changed, the old value of the field, and the new value.

When you get to this tab, the system will assume you want to compare the selected revision with the current equipment data. The **Compare Revision** field on this tab will be blank. But comparison with the current equipment data is only relevant when the revision data has not yet been applied to that equipment. Therefore, the tab only displays this data if the selected equipment revision record is not yet approved, superseded, or cancelled.

Once the selected equipment revision record is approved, superseded, or canceled, the only way to display data on this tab is by comparing it with an earlier revision. That could be the previous revision, or any other earlier revision, as required. Enter the required revision number in the **Compare Revision** field. Note that comparison with an earlier revision is always possible, regardless of the status of the selected equipment revision record.

The tab has the following essential attributes:

1 **Type**: The tab on which the change was made. For example, Record View, Calibration, or Test Points.

2 **Record**: The key (identifier) of the record that was changed.

    a On the Record View and Calibration tab, this is always the Equipment Revision code that was generated for the record. For example, 10003.

b With the exception that for the Record View, it could also be the code of a Custom Field, if that was changed.

c On the tabs where multiple records can be recorded, this field helps you identify the record in question. For example, for changes on the Comments tab, it shows the language and the sequence number (the latter not visible on the comments tab), for the Documents tab, it shows the Document Code, for the Translations tab, the Language Code, and for the Test Points tab, it shows the Set and the Sequence.

3 **Action**: 'Insert' for new records, 'Update' for changes to existing records, or 'Delete' for deleted records.
Note that the system may display an action that differs from the selected action on the corresponding tab. This is possible if revision control was exempted for a field or if it was bypassed by the system due to a more prevalent function, such as equipment replacement on the work order screen. The system will automatically adjust the needed action. If the record already exists, an insert action becomes an update action. Or if the record is deleted on the equipment, an update action becomes an insert action.
For example, if the Primary System field is identified as unprotected on the Revision Control Setup screen and the field is cleared on the equipment after a new revision is started for that equipment, the structure record is deleted from the equipment. However, on the Structure tab of the equipment revision screen, this Primary System still shows as a current record with an Action equal to 'None'. The Primary System is still listed on the revision record but no longer exists on the equipment. This mismatch will be displayed here on the View Changes tab, indicating the Primary System will be inserted.
Another example worth mentioning is related to the parts associated with the equipment. If you have the installation parameter AUTOPART set to add parts automatically, the system will update the parts associated with the equipment whenever a part is issued to it. If this update occurs after a new revision has already been started for the equipment, the part is added to the equipment, but is obviously missing from the list of parts associated with the revision record. This mismatch will be displayed here on the View Changes tab, indicating that the newly added part will be deleted. If this is not desired, ensure that you manually add this part to the revision record.

4 **Field Name**: A field name will only be displayed for updates. For inserts and deletes, it will be blank.

5 **New Value**: The new value of the field always comes from the selected equipment revision record. This is the value that will be applied to the equipment at approval.

6 **Old Value**: The old value comes from:

a The current equipment or

b An earlier revision of the selected equipment. The revision used depends on the selection you made for **Compare Revision**.

Example output:

Type	Record	Action	Field Name	Old Value	New Value
Calibration	10003	Update	S.O.P.	Old SOP	New SOP
Comments	EN 10	Delete	Comments	Here I was	
Comments	EN 30	Insert	Comments		Here I am
Comments	EN 20	Update	Comments	Hello	Hello world
Documents	DOC1	Delete			
Documents	DOC3	Insert			
Documents	DOC2	Update	Copy to Work Order	+	-
Record View	10003	Update	Department	MECH	ELEC
Record View	10003	Update	Cost Code	CC1	
Record View	CF001	Update	Registration		TRN-123
Record View	CF002	Update	Color	Red	Blue
Record View	CF003	Update	RPM	1200	
Test Points	* 1	Delete			
Test Points	* 3	Insert			
Test Points	* 2	Update	Device Tol. To	59	55
Test Points	* 2	Update	Device Tol. From	42	44

IMPORTANT: If the Action on a record with one or more field changes is set to 'None', the field changes will be displayed on this tab, even though these changes will not be included in the update of the equipment at approval of the revision record.

Requesting Approval of a new Revision

When requesting approval of a new revision, the system performs the following checks first. These checks are performed now because with this status, no further updates to the revision record are allowed. Any errors at this moment will likely also halt the approval step, which will follow later, assuming the data on the equipment remains unchanged in the meantime. If any of these checks fail, the system will raise an error and stop the request.

Request Approval Checks

- If the RCM Level has changed, the system will raise an error if the current data on the equipment record is not compatible with the new RCM Level.
- If the Equipment Status is set to a specific value (different from the current equipment status) and the ‘Keep Unchanged’ option is not selected, then the system will raise an error if:
    - The Equipment Status is ‘Withdrawn’, and the current equipment has one or more parents, or the commission date is in the future and the current equipment status is not the same.
    - The current equipment status is ‘To Be Repaired’, and the asset has one or more parents, and the Equipment Status on the revision record is not the same.
    - The current equipment status is ‘To Be Repaired’, and the asset is already assigned to a repair work order or an external repair, and the Equipment Status on the revision record is not the same.
    - The Equipment Status is ‘Awaiting Purchase’, or ‘In Repair’, or ‘In Transit’, and the current equipment status is not the same.
    - The Equipment Status is different from the current equipment status, and the change is not allowed based on the Equipment Status lookup. See earlier in this brief.
- If the Part on the equipment record is different from the Part of the equipment revision record, then the system will raise an error if:
    - The current equipment status is equal to ‘Awaiting Purchase’, and the selected equipment is already attached to a purchase order.
    - The current equipment status is equal to ‘Purchased/In Store’, ‘In Store’, ‘To Be Repaired‘, ‘In Repair’, or ‘In Transit’.
- If the Service Delivery Matrix checkbox is selected on the equipment revision record and the current equipment has more than one immediate parent with Service Delivery Matrix checked as well, the system will raise an error.
- If the Service Delivery Matrix checkbox is unselected on the equipment revision record, the system will raise an error if the current equipment record has:
    - One or more records on the Service Delivery Matrix tab.
    - Both a parent and a child with the Service Delivery Matrix checkbox selected.
- If Track GAS is unselected on the equipment revision record and the current equipment record has one or more records on the Design Consumption or the Actual Consumption tab, the system will raise an error.
- If Track Utility Bills is unselected on the equipment revision record and the current equipment record has one or more records on the Design Consumption tab where Utility Bill Source is blank, the system will raise an error.
- If the Operational Status on the equipment revision record is set to operational and if regulatory checklist items exist for the equipment that still need repair, the system will raise an error.

- If Lock Reliability Ranking Values is selected on the equipment record and the Reliability Ranking on the equipment record is different from the one on the equipment revision record, the system will raise an error.
- If Alias is entered, the system will raise an error if it is not unique.
- If the Reservable Equipment or the Contract Equipment checkbox is checked on the equipment revision record and the Availability Status on the equipment record is blank, the system will raise an error that an Availability Status must be provided.

Calibration tab related checks:

- The system will raise an error if the CALTZERO install parameter is C and data on this tab is not consistent with this setting (this is only possible if the parameter setting was changed after the data was entered).

Test Points tab related checks:

- The system will raise an error if the CALTZERO install parameter is C and data on this tab is not consistent with this setting.

Parts Associated tab related checks:

- The system will raise an error if the Component Location of a part on the equipment changes and part failure records already exist for this new component location. Note that this is only possible if the new component location has been used before, then removed, and is now reintroduced. Since part failures are used to calculate the part reliability number, these records would also become corrupted if the system does not prevent this update.

Structure tab related checks:

- If the status of the parent or the child is not equal to installed, the system will raise an error.
- If the new parent is already a child of the equipment under revision control (circular reference), the system will raise an error.
- If the structure is not allowed because of the equipment types, the system will raise an error. For example, a parent position cannot have a child system.
- If the new parent is a location, and the equipment under revision control is also dependent on other parent equipment, the system will raise an error.
- If the parent equipment is a position and the tag option is active, and this position already has an asset associated, then if the equipment under revision control is also an asset, the system will raise an error that too many child assets are installed.
- Some other checks performed that could raise errors are:
    - If the parent or the child has the Service Delivery Matrix checkbox checked, verify if the matrix is still intact.
    - Verify if the equipment under revision control has multiple parents with the Track Resources checkbox selected.
    - If the equipment under revision control is a linear segment or route, the structure change must be applied on the relevant tab instead.

Batch Update related checks:

If the equipment revision record is flagged as a batch update, then the system will raise an error and stop the request if:

- No equipment is selected on the Batch Update Equipment tab.
- A mismatch is found between the specified precision and the device tolerance and test point data of the equipment selected to be updated. In particular, the system will:
  - Prevent equipment from having test points added without precision, while the equipment itself does have a precision specified.
  - Prevent equipment from having a new precision assigned that does not match the device tolerance decimals if Absolute is selected on the Calibration tab.
  - Prevent equipment from having a new precision assigned while existing test points for this equipment do not have precision assigned, and therefore rely on the old precision.

Request Approval Actions

If no errors were found, the system will update the Status as requested and will further:

- Populate Date Requested with the system date.
- Populate Requested By with the logged-in username.
- Protect all data on the screen and all tabs.

Approving a new Revision

When approving a new revision, the system first performs the same checks already performed when approval is requested. These checks are performed again because the equipment data may have changed between the request for approval and the actual approval. For example, the request for approval was made when the asset was installed. On the revision record, one of the changes that was made to the asset data was the part number. Two days later, this asset is returned to the store for repair. And another day later, the approver tries to approve the new revision. Obviously, the part number change cannot be executed now, with the asset in the store room. If any of these checks fail, the system will raise an error and will stop the approval.

Approval Checks

The system performs the same checks as described earlier when requesting approval for the new revision. See earlier in this brief.

IMPORTANT: Equipment status changes initiated via the Equipment Revisions screen will be verified in the status authorization matrix at approval of the revision. Only the approver needs the authorization, because the lookup does not use the matrix. The same applies to the Operational Status and the Availability Status.

Approval Actions

If no errors were found, the system will update Status as requested and will further:

- Populate Date Approved with the system date.
- Populate Approved By with the logged in username.
- Update the current approved equipment revision record for the same equipment and set the status to superseded.
- Protect all data on the screen and all tabs.
- Update Equipment Revision on the current equipment record with the code of the just approved revision record.
- Overwrite the current equipment data with the data from the approved revision. This includes:
    - All Record View data
    - Custom Field values
    - Comments
    - Documents
    - Translations
    - Calibration data
    - Test Point data
    - Parts Associated data
    - Structure data
- The system may perform the following additional actions:
    - If the Department is different, also update the department of any children based on the OBDPCASC install parameter. Awaiting release, PM work orders will also have their department updated, if no specific department is entered for the equipment on the PM Schedule. Similar for Maintenance Patterns.
    - If PM WO Department is different, this value will be used, instead of Department, to update the awaiting release PM and MP work orders.
    - If the Class is different and the equipment is linear and the new class has linear references associated, the system will not attempt to add linear reference records automatically. In comparison, on the equipment screens for this scenario, the system will ask whether these should be added, yes or no.
    - If the Cost Code is different on the current equipment record, the system may add a Fleet Customer to the asset and may also set the Vehicle Status if still blank. Additionally, the system may update awaiting release PM and MP work orders.
    - If the Equipment Status on the equipment revision record is not equal to ‘Keep Unchanged’, then perform the following if required:
        - If the Equipment Status on the revision record is ‘Installed’ or ‘Withdrawn’ and the current equipment record Status is ‘In Store’ or ‘Purchased/In Store’, then the system will issue the asset from the store and update the equipment status accordingly.

        - Otherwise, if the Equipment Status on the revision record is ‘Installed’ and the current equipment record Status is ‘To Be Repaired’, the system will issue the asset from the store and update the equipment status accordingly. However, the issue transaction in this case will be a Repair Return transaction (reversal).
        - Otherwise, if the Equipment Status on the revision record is ‘Installed’ and the current equipment record Status is ‘Withdrawn’, the system will update the equipment status accordingly.
        - Otherwise, if the Equipment Status on the revision record is ‘Withdrawn’, the system will set the withdrawal date and update the equipment status accordingly. Additionally, the system may deactivate related PMs and MPs. However, the system does not display the usual message indicating how many were deactivated.
    - If Reliability Ranking is different on the current equipment record, the system will replace the value, and on the Rankings tab, it will add the new ranking and delete the old ranking.
    - Create historical events for updates of the Department and the Status.

Note that copying test point data is based on the setting of the Action field on the test point records. As follows:

- If Action = ‘None’ (NONE), do nothing.
- If Action = ‘Update’ (UPD), update all fields of the corresponding record.
- If Action = ‘Delete’ (DEL), delete the corresponding record.
- If Action = ‘Insert’ (INS), add the record to the data already there.

The same applies to copying Parts Associated and Structure data.

Note that it is possible that a record to be deleted may already be deleted on the current equipment, or a record to be inserted may already be inserted. The system will automatically adjust the action needed in those scenarios. For a more detailed explanation, see the Action field on the View Changes tab in this brief.

Approval Workflow Setup

The equipment revisions entity is a supported entity for Approval Workflows. See the **HxGN EAM Approval Workflow** functional brief for more information.

On top of the columns from the equipment revisions table, two additional functions can be used as parameters for the approval workflow setup:

- **FUNC0123 (Department)**: This function retrieves the current Department of the equipment and may be relevant if the current department (old value) must be used instead of the new department that is selected on the equipment revision record (column OBV_MRC).
- **FUNC0124 (Criticality)**: This function retrieves the current Criticality of the equipment and may be relevant if the current criticality (old value) must be used instead of the new criticality that is selected on the equipment revision record (column OBV_CRITICALITY).

Equipment Revisions Batch Update

An equipment revision batch update allows you to update multiple pieces of equipment simultaneously and operates differently from updating a single piece of equipment. The following is a list of the essential differences when you select **Batch Update** on the Equipment Revisions screen:

- Since no equipment can be selected on the Record View, the system leaves all equipment fields blank. This is also true for all other tabs, such as Equipment Comments, Equipment Documents, and Test Points, among others. This means no data will be populated on the tabs when you save the equipment revision record.
- The equipment that requires an update must now be selected using the **Batch Update Equipment** tab. You can add or remove equipment here at any time, provided the **Status** of the revision record is still unfinished.
- On the Record View tab and the Calibration tab, only fill in the fields for which you want the value updated. For example, enter a new Cost Code and a new Manufacturer if you want to update these two fields on all selected equipment that requires an update.
- You can empty fields on these tabs as well. Select the fields you want to empty on the **Batch Clear Fields** tab. For example, select Record View and then Assigned To if you want to clear that field on all selected equipment that requires an update.
- On all other tabs, other than the Record View and the Calibration tab, you can either:
    - Replace all existing data currently present on the tab of the selected equipment that must be updated. If two assets are selected that require an update and you add three records to the Test Points tab of the Equipment Revisions screen, then the system will first clear the data from the Test Points tab of the two assets, i.e., delete all records currently there, and then insert the three new records on both assets. Note that this logic is communicated via the **Action** field. For batch updates, it will not use the ‘Insert’ option but instead will default to ‘Replace All Existing’.
    - Or you can leave all data for all equipment unchanged. In that case, do not enter any data on the Test Points tab of the Equipment Revisions screen, and neither asset will have any data on the Test Points tab updated.
    - Or you can clear all data from the tab. In that case, select the tabs you want to empty on the **Batch Clear Fields** tab. For example, select the Test Points and Equipment Comments tabs if you want to clear these two tabs on all the selected equipment that requires an update.
- At approval of the equipment revision record for a batch update, the system does not apply any updates to the selected equipment at that time. Instead, these updates are postponed until you click one of the Apply Update buttons on the **Batch Update Equipment** tab.

  IMPORTANT:

    - There is no control over the order in which equipment, associated with the revision record, is processed, unless you click the Apply Update button for a specific piece of equipment, in which case you must select the equipment before activating the update.

- There is, however, control over the order in which different batch update equipment revision records are processed once approved. If you have two approved revision records that both share the same piece of equipment, you can control the sequence in which the updates are applied to the shared equipment using the Organization Option 'ERUPDSEQ'. The option offers the following settings:
    - ERROR: The system ensures that updates are applied in the sequence in which they were approved.
    - WARNING: The system will prompt you if the sequence is incorrect, after which you decide to continue or not.
    - OFF: The system will not check the sequence.

  Please note that these options verify the processing status of the shared equipment on the earlier approved revision record. If the status indicates that the equipment is still unprocessed or a processing error has occurred, an error or warning message will be raised. Equipment that is excluded from processing will be ignored. That means this sequence check can still be bypassed if the excluded equipment is included again later. To avoid this, it is recommended to hide or disable the Include All button on the Batch Update Equipment tab.

Equipment Revisions screen

If you want to update multiple equipment instead of one, select the **Batch Update** checkbox on this screen. The system will protect and clear the Equipment field. The equipment that needs to be updated can now be selected on the **Batch Update Equipment** tab.

The **Equipment Revisions** screen has the following essential attributes related to the batch update progress for the selected equipment.

1. **Active**: The equipment revision is active and waiting for asynchronous processing by the Equipment Revisions Batch Update job (Job Name is ERBUDRV). Make sure you have activated this job on the **Job Setup** screen. This checkbox is only used for asynchronous processing in the background.
2. **Processed**: The equipment revision is processed completely. This was either done asynchronously, by the Equipment Revisions Batch Update background job, or synchronously. Note that processed means there are no further actions that can be taken for this equipment revision record. In essence, it means that all equipment is either processed or excluded from processing (the latter, for example, because the system encountered an error that could not be corrected) or a combination of both.
3. **Process Error**: The equipment revision is not completely processed. At least one piece of equipment ran into an error during processing.
4. **Process Running**: The equipment revision is currently being processed asynchronously by the Equipment Revisions Batch Update job. This checkbox is only used for asynchronous processing.

5 **Process Last Updated**: When the equipment revision is currently being processed asynchronously by the Equipment Revisions Batch Update job, the system will update this value after each equipment it processes. This date field is only used for asynchronous processing.

Equipment Revisions - Batch Update Equipment tab

On the Batch Update Equipment tab, you select the equipment that must be updated as part of the batch update. You can only add or remove equipment here if the chosen equipment revision record has **Batch Update** selected and only as long as the **Status** is unfinished.

Once the selected revision record is approved, you can start updating equipment.

The **Batch Update Equipment** tab has the following essential attributes:

1 **Equipment**: Select the equipment that must be updated as part of the batch update. The lookup is multi-select.

2 **Processing Status**: The following status codes are available:

   a Unprocessed – The equipment is not yet updated.

   b Processed – The equipment has been updated successfully.

   c Excluded from processing – The equipment is excluded from processing. No updates will be applied in this status. Choose this status if you mistakenly selected the equipment for update, or if the update resulted in an error, and this error cannot be circumvented. For example, you attempted to update the equipment status from "purchased/in store" to "in store," but one of the selected equipment was a position. Since positions have no part number and cannot be in the store, this status change will never work for the position. In that case, you may decide to exclude it from further processing. Note that this means none of the other updates included in this batch update, such as new comments or documents, will be applied to that equipment either.

   d Processing Error – The system has tried to update the equipment, but during processing, an error was encountered, and the update was abandoned.

3 **Processing Date**: The date the process ran, and the equipment was updated.

4 **Error Message**: This field will be populated automatically if a processing error is encountered with the equipment.

And the following buttons:

5 **Apply Update**: When you select an equipment record and click this button, the system will update the selected equipment. The system will behave as described in the Batch Update Process section of this brief. The process is started synchronously because you opted to process only one piece of equipment, so you will immediately see the results.

6 **Apply Update to All**: When you click this button, the system will start the update process for all equipment not yet processed. It is evident that with a large amount of equipment, this may take some time. The system may decide it is better to start the update process in the background (asynchronous). This decision depends on the setting of the Organization Option ‘ERUPDMAX’.

The default setting for this option is 25 pieces of equipment. However, feel free to adjust it to a value that works for your environment. If there is less equipment, the system will start the process synchronously. The success message will inform you of the chosen option. It will either indicate that the process was completed (with or without errors) if it is synchronous or that it was queued for processing in the background. You can also see that it was queued on the Record View of the equipment revision record. The **Active** checkbox will be selected for an asynchronous run, indicating that it is waiting for the background job to process the record. During processing, the system will behave as described in the Batch Update Process section of this brief.

7 **Exclude from Processing**: When you select an equipment record and click this button, the system will set the Processing Status to exclude the selected equipment from further processing.

8 **Exclude All**: When you click this button, the system will set the Processing Status to exclude the equipment from further processing on all equipment that is still unprocessed or that has a processing error.

9 **Include All**: When you click this button, the system will set the Processing Status to unprocessed on all equipment that is currently excluded from processing.

Note regarding electronic signature: When either of the two Apply Update buttons is clicked and one or more status changes are applied to the selected equipment that require an electronic signature, the batch update process will skip these equipment records if the process runs asynchronously in the background. These skipped assets must be updated via the synchronous process. Either click the Apply Update button for individual handling, or if there are only a few pieces of equipment left, click the Apply Update to All button. The electronic signature pop-up will only show once, provided proper credentials are entered. If no proper credentials are entered or if you decide to click Cancel on the electronic signature pop-up, the system will stop the process at that point. The system will raise an error if improper credentials are entered, but will not display any additional errors or confirmation messages regarding the process being stopped. All equipment that was processed before the pop-up appeared will have been processed, and the Processing Status of that equipment should indicate whether it is processed or if there is a processing error.

Equipment Revisions - Batch Clear Fields tab

As described earlier, for a batch update, no data entered means the data does not change. That is applicable for all tabs. Data entered in any field on the Record View or Calibration tab, or on any of the tabs, indicates replacement of the data that is currently there. That still does not cover clearing an existing field or tab. Clearing data can be done via the Batch Clear Fields tab. This tab works very simply and only requires two fields.

1 **Clear Field/Tab**: Identify the tab on which you want to clear data. Options include Record View, Calibration, Equipment Comments, Equipment Documents, Test Points, and more. The list of tabs displayed depends on the privileges you have. You will always see the Record View option. To see the Calibration tab, you must have update privileges on that tab. And to see any of the other tabs, you must have the privilege to delete data on that tab.
There is also one option for Custom Fields. This is not a tab, obviously, but it was added to make

it easier to identify the custom fields to be cleared, rather than including them in the list of fields on the Record View.

2 **Field**: The list of fields varies based on the previous selection.

a If you selected the Record View or Calibration tab, the system shows the optional fields from these tabs. Required fields are excluded because they cannot be cleared. Note that fields set as optional but not displayed on the screen, because the block they are in is hidden, will show in this dropdown. This is because fields are in containers, and containers belong to blocks. However, the relationship between blocks and containers is not stored in the database. Instead, it is stored in a server file. If this situation applies to you, it is recommended that you hide these fields individually using the screen designer.

b If you selected Custom Fields, the system shows all custom fields displayed on the Record View.

c Otherwise, for any other selection, the only option available will be ‘All data’.

Note that the screen configuration and privileges may be different for clones of the Equipment Revisions screen. If you switch from one clone to another, you may notice different fields or tabs in the dropdown lists. This is not considered an issue because it is unlikely that any specific user has access to two clones of the Equipment Revisions screen for the same equipment revision record, as cloning is typically used to separate data.

Equipment Revisions – View Changes tab

The **View Changes** tab for a batch update is similar in that it shows the changes you made for the revision record, but there are some apparent differences worth mentioning:

- The **Compare Revision** field on this tab will remain hidden. Since there is likely more than one piece of equipment, it makes no sense to select the previous revision of any of these. Therefore, the system will always compare the selected revision data with the current equipment data.
- All changes that will be applied will be listed for each piece of equipment individually. For that purpose, the Equipment, Equipment Org., and Equipment Description fields are available in the grid.
- All changes that will be applied will also still show if the revision record is approved. Unlike a regular revision record for equipment, where changes are applied immediately upon approval, for a batch update, the changes are applied later when you click one of the Apply Update buttons on the Batch Update Equipment tab. Therefore, the expected changes will still be listed on this tab until that moment. Once equipment is processed or excluded from processing, that equipment will be removed from the list until there is no equipment left to process.

Batch Update Process

If started asynchronously (background job), the equipment revisions batch update process goes through the following steps:

3 The system selects all equipment revision records where Active is selected.

4 From this list, the lowest equipment revision number is selected for processing. Only one number is chosen to prevent running sessions in parallel when a session takes longer than the cycle time of the Equipment Revisions Batch Update driver. Essentially, the system will never initiate a new session if one is already in progress. For the selected record, the system will select the **Process Running** checkbox and populate the **Process Last Updated** date field. The latter is also updated after each equipment update.

5 The system then loops through all equipment attached to the equipment revision where the **Processing Status** is equal to unprocessed or processing error, and does the following for each equipment:

   a Flag the equipment with a processing error if an equipment revision (non-batch update) for this equipment also exists with status unfinished or request approval.

   b Flag the equipment with a processing error if the equipment status is going to be updated, and an electronic signature for that status change is required.

   Note that this check is not performed if the job runs synchronously, because you can then interact with the process and place the signature.

   c Possibly flag the equipment with a processing error if the same equipment is not yet processed on another batch update revision with an earlier approval date. This depends on the setting of the Organization Option 'ERUPDSEQ'. Both settings, ERROR and WARNING, will trigger this processing error since the asynchronous batch process cannot ask the question when the option is set to warn. With the option at OFF, this step will be skipped.

   d Update the equipment data on the Record View, the Calibration tab, and the Custom Fields block. Either:

      (1) Overwrite field values with the entered values of the corresponding fields of the Record View, the Calibration tab, and the Custom Fields block. Empty fields and unselected checkboxes will be ignored by this step (empty means no update is desired).

      (2) Clear field values or unselect checkboxes of corresponding fields found on the Batch Clear Fields tab for the Record View, the Calibration tab, and the Custom Fields block. Important: This means that if a field gets a value in the previous step and the same field is also selected to be cleared, clearing will take precedence.

   e Update the equipment tabs as follows:

      (1) Clear the tabs that are found on the Batch Clear Fields tab.

      (2) Otherwise, if not selected for clearing, replace all the records with the revision data found on the corresponding tab.

      (3) Otherwise, if no revision data is found on the tab (the tab is empty on the revision record), the data on that tab is left as is.

All tabs related to equipment data, except the Record View and Calibration tabs, go through this process. Examples are the Equipment Comments and the Test Points tab.
Note that all tabs that are not included in the revision control are never updated by this process.

f As part of the update, the system performs the same checks for each equipment that are also performed for a non-batch update revision. See the Request Approval Checks section in this brief. If errors are encountered during the update process, the system will roll back any updates applied to the equipment. However, the system will update the equipment record on the Batch Update Equipment tab, display the relevant error message, and set the status to processing error.

g Otherwise, if no error is encountered, the equipment updates will be saved to the database. The system will update the equipment record on the Batch Update Equipment tab. The error message will remain blank, the processing date will be entered, and the status will be updated to indicate that the equipment has been processed.
Note that the system will not update the **Equipment Revision** field for the equipment on the Assets, Positions, or Systems screen. This field is used for individual revision updates only. Instead, the system will fill in the **Batch Update Equipment Revision** field.

h The system will then continue with the following equipment until there are no more to process.

6 Once all equipment is processed, the system will:

a Set the **Active** and **Process Running** checkboxes to unselected.

b Set the **Processed** checkbox to selected if all equipment is processed or excluded from processing, and no errors were found during processing. Otherwise, if one or more errors were found, the **Process Error** checkbox will be selected instead.

If the process runs synchronously, the system behaves the same, but it will:

- Not raise the error when an electronic signature is required. It will bring up the electronic signature pop-up instead.
- Possibly ask a question if the same equipment is not yet processed on another batch update revision with an earlier approval date. This depends on the setting of the Organization Option 'ERUPDSEQ'.
- Leave the **Active**, **Process Running,** and **Process Last Updated** fields unselected or blank. These fields are exclusively reserved for session control by the Equipment Revisions Batch Update driver (asynchronous mode).

Status changes of the equipment will be verified against the Status Authorization Matrix. If the process runs asynchronously, the R5 user must have valid status authorizations. Otherwise, the user who clicked one of the Apply Update buttons must have the authorizations.