

CoreTools(TM) User Guide

Quality Tools Management

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Introduction

CoreTools(TM) is a desktop application that unifies Product Trees, Process Trees, DFMEA, PFMEA, and Control Plans in one place. It supports engineering and quality teams with structure and function analysis, action tracking, document control, and traceability aligned with AIAG/VDA.

This guide covers every current feature, including the import/export options, exchange tools, search and editing helpers, and export customizations.

Working With Projects

The main window shows your project tree on the left and a details table on the right. Sections group Product Trees, Process Trees, DFMEAs, PFMEAs, and Control Plans. Double-click any document to open

its dedicated window.

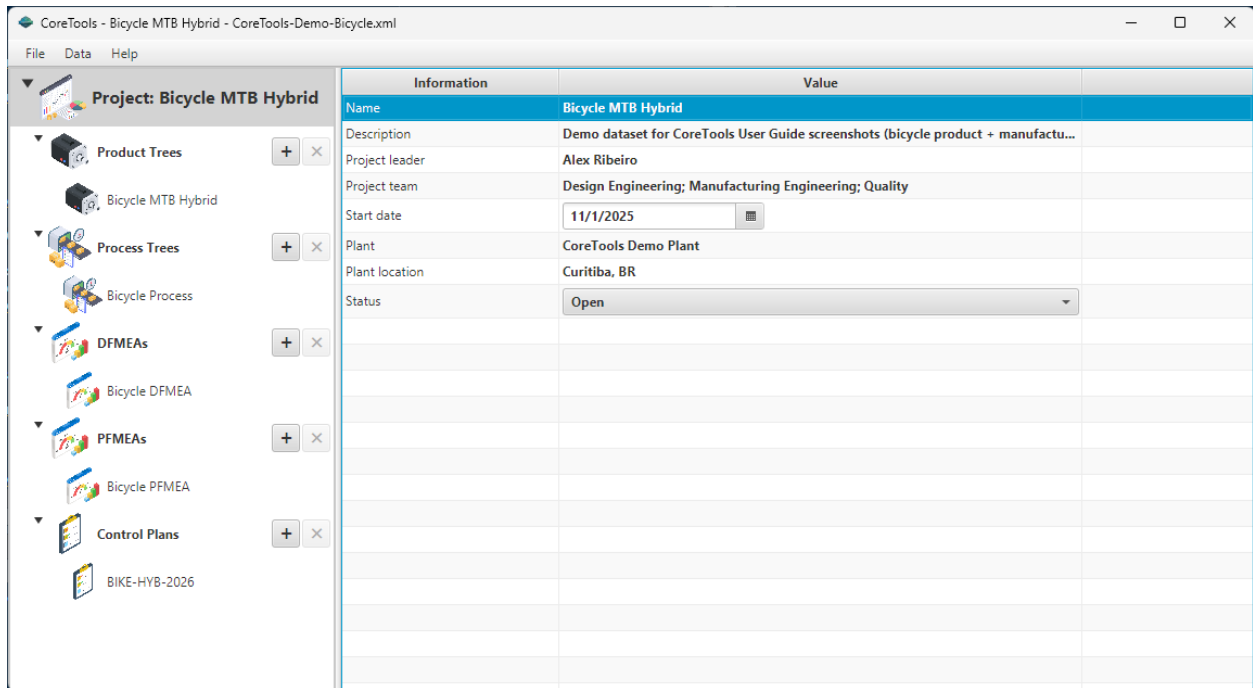


Figure 1: The Main Window

- **Add/duplicate/delete items:** Use the plus and X icons beside each section header or right-click any document for insert, duplicate, and delete.
- **Details table:** Select the project or a document to edit its header fields directly in the table (project owner, confidentiality, dates, etc.).
- **Unsaved changes:** An asterisk in the window title indicates pending changes. A lock file prevents two users from editing the same project simultaneously.

File Menu

- **New/Open/Save/Save As/Close/Quit:** Standard project lifecycle actions (XML files).
- **Export logo...**: Set a default or custom logo (PNG/JPG) reused by all PDF/Excel exports.
- **Quit** prompts to save if there are pending changes.

Data Menu

- **Import from Excel...**: Reads a multi-sheet workbook (ProductTree, ProcessTree, DFMEA, PFMEA, ControlPlan). Rows are created or updated using natural keys; a `.import-report.txt` is saved beside the workbook.
- **Export import template:** Generates a ready-to-fill Excel template with the expected sheet names and columns.
- **Import documents...**: Opens a drag-and-drop window to copy entire Product Trees, Process Trees, DFMEAs, PFMEAs, and Control Plans from another project file into the current one.

Help Menu

- **Help (F1)**: Opens this guide.
- **About (F10)**: Version, credits, and website links.

Product Trees

Double-click a Product Tree to open the Product Tree Manager. The left pane is the structure; the right pane edits properties. The bottom status bar shows the path to the selected node.

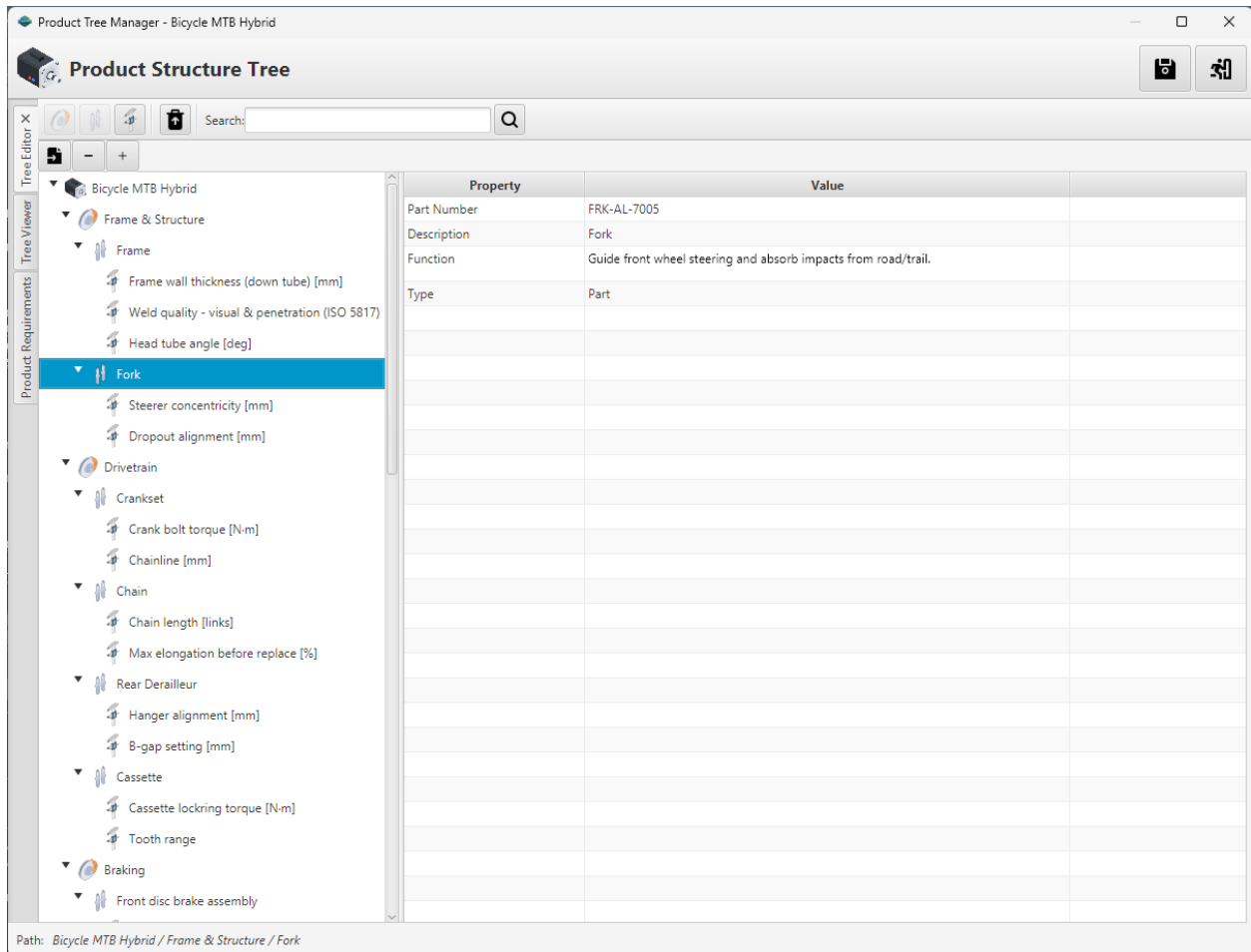


Figure 2: Product Tree editor

Tree Editor

- **Add System/Part/Characteristic:** Toolbar buttons create children that respect structural rules (products/systems host systems or parts; any can host characteristics).
- **Drag-and-drop:** Reorder or re-parent nodes (systems/parts/characteristics) within allowed hierarchies. Invalid targets are blocked.
- **Search and navigate:** Type in the search box and use **Next** to jump through matches.
- **Collapse/Expand:** One-click controls expand or collapse the entire tree.
- **Context menu:** Right-click nodes to insert siblings, duplicate, or delete.

Structure Exchange

Use **Structure Exchange** to copy systems, parts, or characteristics from any product in the project into the current one via drag-and-drop between two trees.

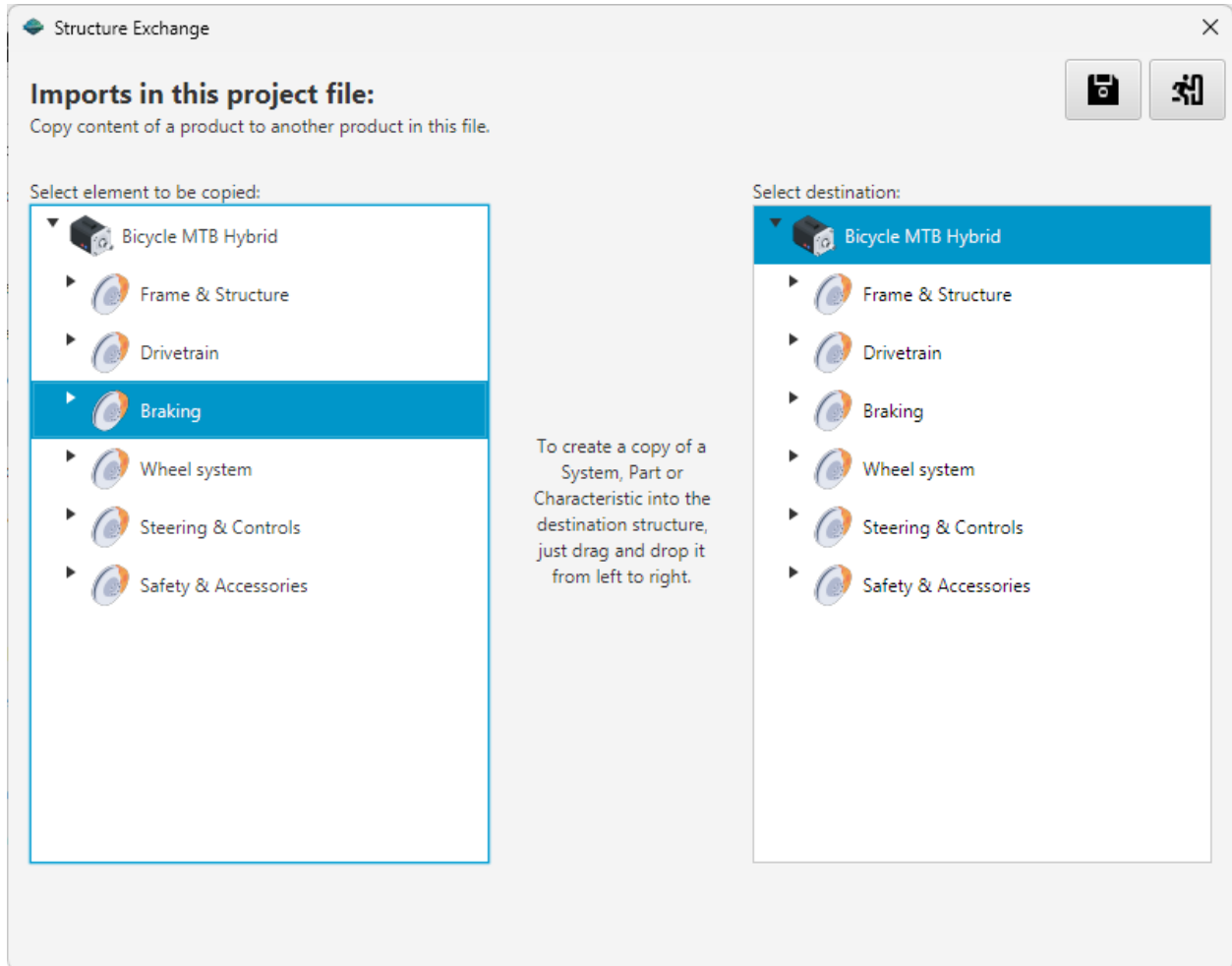


Figure 3: Structure Exchange drag-and-drop

Tree Viewer

An interactive viewer tab renders the product tree for quick exploration and presentations.

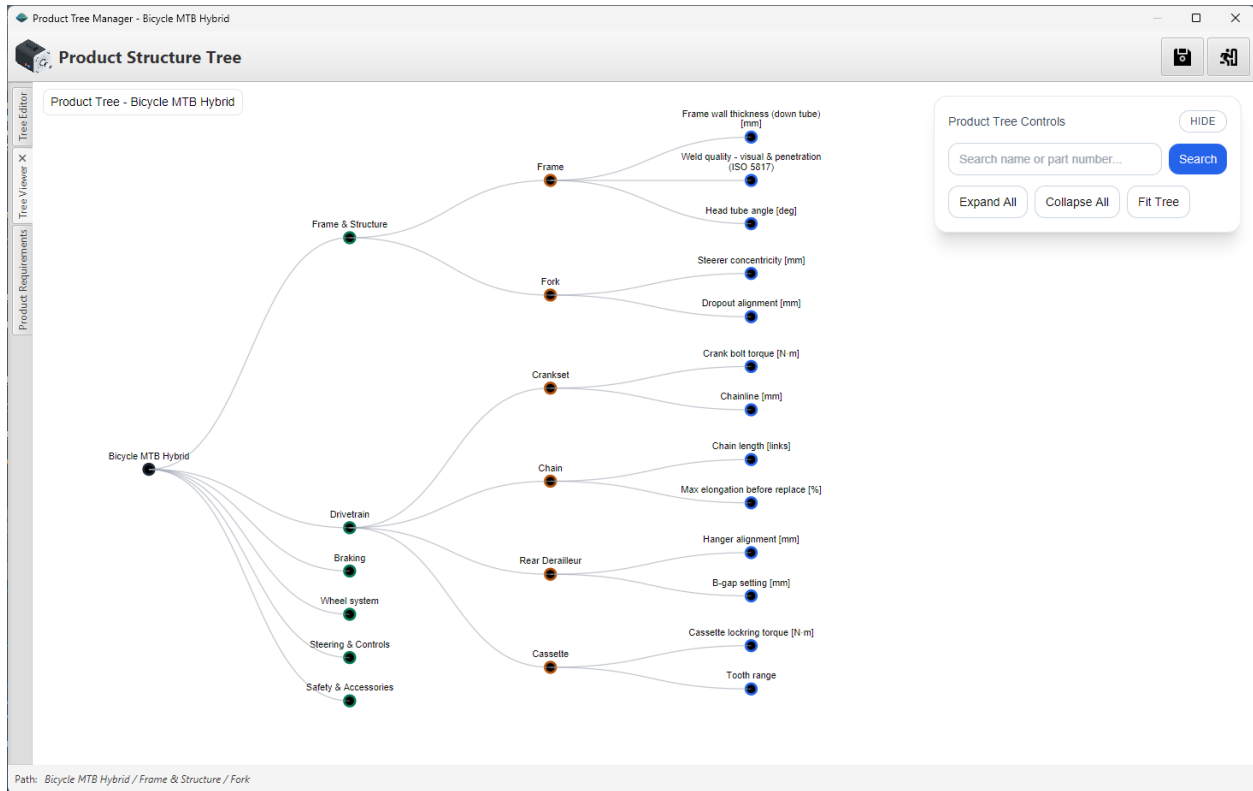


Figure 4: Product Tree viewer

Product Requirements

Track requirements per product/system/part:

- Editable columns for description, specification, tolerance, customer importance, and automatically normalized percentage weights.
- Add, remove, or duplicate requirements with toolbar buttons.
- Importance percentages recalculate when rows change.

Saving

Use **Save** to persist edits or **Save & Exit** to close the window after saving.

Process Tree Manager - Bicycle Process

Process Structure Tree

Tree Editor X

Search:

Process Information								Parameter Information						
Description	Function	Type	Ishikawa	Category	Value-added?	Time (s)	Distance (m)	Target	Upper	Lower	Attribute	CTS	CTQ	CTP
Bicycle Process	Manufacture and assemble the bicycle ...	Process	Method	Operation	Value-added	174.0	0.0							
Tube cutting ...	Prepare frame tubes to length and geo...	Operation	Machine	Operation	Value-added	12.0	0.0							
Cut length ...								520	521	519				
Miter angle...								45	45.5	44.5				
Burr height...								0.05	0.1	0				
Cut tubes	Cut tubes to programmed length.	Activity	Machine	Operation	Value-added	5.0	0.0							
Miter tube ...	Create miter for correct fit-up geometry.	Activity	Machine	Operation	Value-added	4.0	0.0							
Deburr & cl...	Remove burrs to improve weld fit-up a...	Activity	Manpower	Operation	Non-value-ad...	3.0	0.0							
Welding	Join tubes into frame and ensure struct...	Operation	Method	Operation	Value-added	25.0	0.0							
Current [A]								130	140	120				
Travel spee...								3.5	4	3				
Shielding g...								12	14	10				
Bead profil...								Pass						
Fixture setup	Clamp tubes and verify alignment befo...	Activity	Method	Operation	Non-value-ad...	5.0	0.0							
Weld pass	Execute welding pass within qualified p...	Activity	Method	Operation	Value-added	15.0	0.0							
Visual weld...	Inspect bead profile and ensure no und...	Activity	Measurement	Inspection	Non-value-ad...	5.0	0.0							
Painting / po...	Apply corrosion protection and cosmet...	Operation	Material	Operation	Value-added	40.0	0.0							
Surface cle...								Pass						
Coating thi...								80	90	70				
Cure tempe...								180	185	175				
Cure time [...]								20	22	18				
Surface pre...	Clean and prepare surface for coating a...	Activity	Material	Operation	Non-value-ad...	10.0	0.0							
Apply pow...	Apply coating to target thickness and c...	Activity	Material	Operation	Value-added	15.0	0.0							

Path: Bicycle Process

Figure 6: Process Tree editor

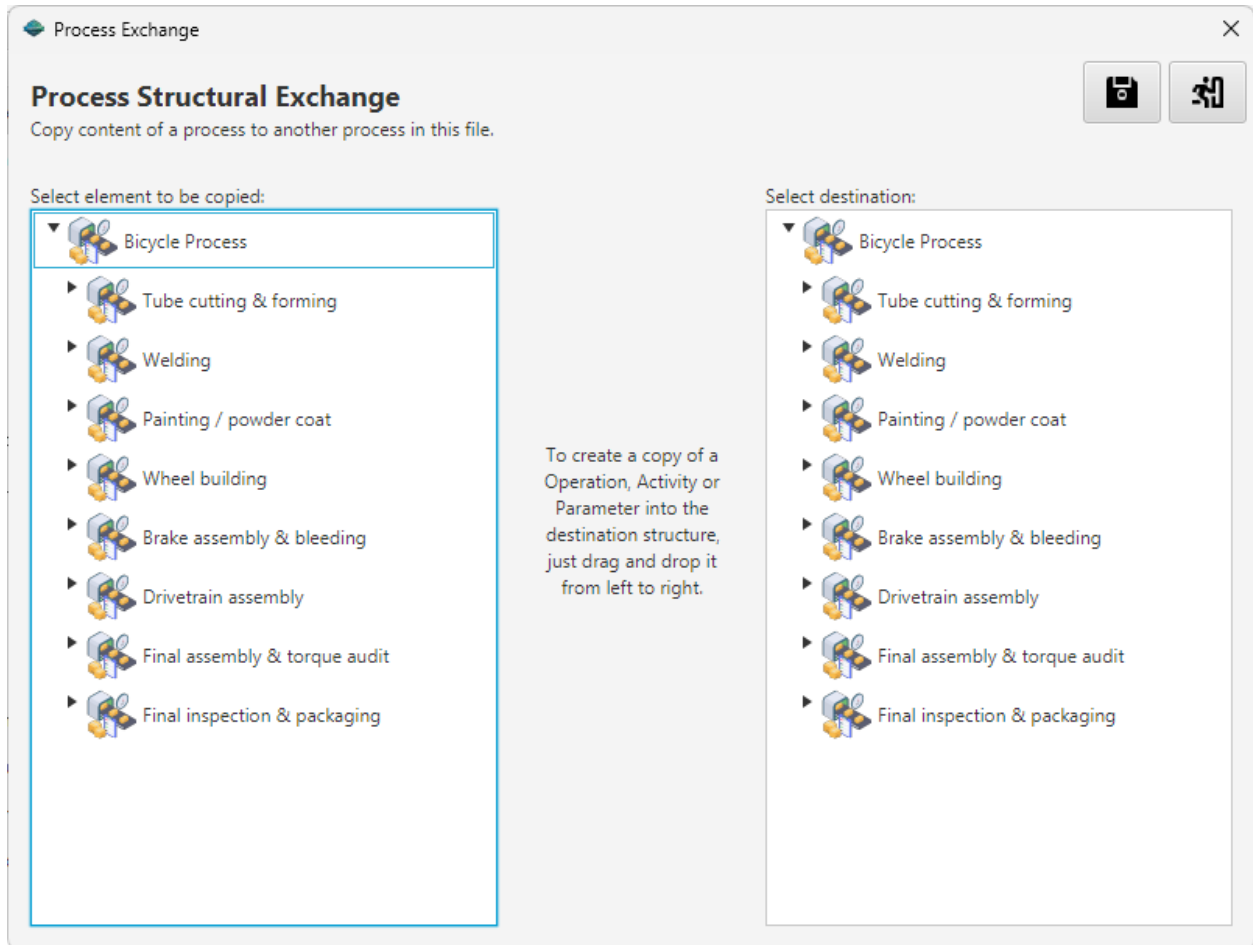


Figure 7: Process Exchange

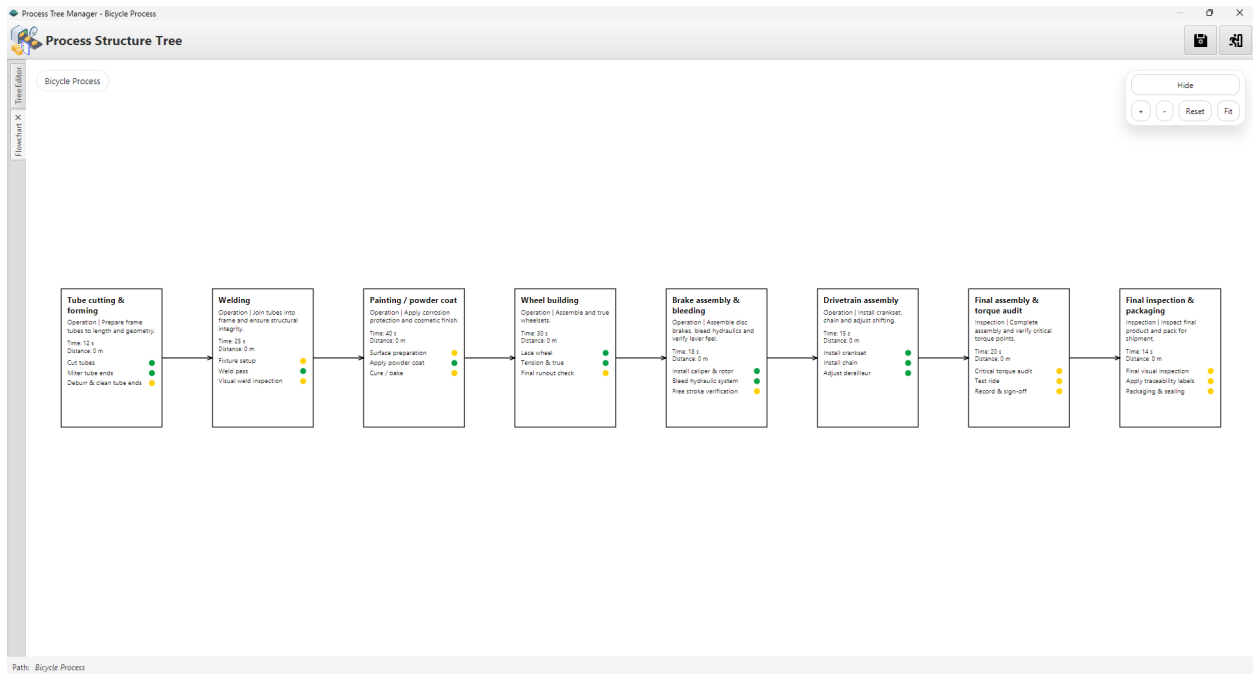


Figure 8: Process flowchart

Saving

Save changes or Save & Exit from the toolbar.

DFMEA

Open a DFMEA from the project tree. A left-side tab bar separates Header, Failure Chains, Summary, Tree Chart, and Revision Control.

The screenshot shows a software window titled "DFMEA - Bicycle DFMEA" with a subtitle "Design Failure Modes and Effects Analysis". On the left is a vertical tab bar with options: "DFMEA Header" (selected), "Failure Chains", "DFMEA Summary", "DFMEA Tree Chart", and "Revision Control". The main area displays the "DFMEA Header Information" form with the following fields:

Company Name:	Qualidade & Produtividade - Demo	DFMEA Subject:	Bicycle DFMEA	DFMEA ID Number:	DFMEA-BIKE-2026-01
Engineering Location:	Curitiba Engineering Center	DFMEA Start Date:	11/5/2025	Design Responsibility:	CoreTools Demo Design Team
Customer Name:	Bicycle - City/MTB Hybrid	DFMEA Revision Date:	12/10/2025	Confidentiality Level:	Internal
Model Year / Platform:	2026 / City-MTB Hybrid Platform	Cross-Functional Team:	Design Eng; Manufacturing Eng; Quality; Supplier		

Figure 9: DFMEA window

Header

Edit company, engineering location, customer/product, model year/platform, subject, dates, team, ID number, design responsibility, and confidentiality level. Fields are bound to the project details table as well.

Failure Chains

The table follows the AIAG/VDA 7-step layout with these capabilities:

- **Columns:** Change Authorization, Structure Analysis (Higher/Focus/Lower), Function Analysis, Failure Effect/Mode/Cause, Prevention & Detection controls, Severity/Occurrence/Detection, Action Priority (auto from S/O/D), RPN, Filter Code, Preventive/Detection actions, Responsible, Target/Completion dates, Status, Action Taken evidence, Current S/O/D and AP, and Remarks.
- **Add/Delete/Insert/Duplicate** rows via toolbar or right-click.
- **Keyboard:** Enter to edit, Ctrl+Enter to commit, Insert to add, Delete to clear cells, Ctrl+Z to undo (per-table undo stack).
- **Search:** Search box with **Next** highlights matching rows; selected hits are styled.
- **@mentions:** Type @ in structure/function columns to pull names/functions from the Product Tree.
- **Copy/Paste:** Table clipboard helper supports pasting blocks from spreadsheets and clears cells with Delete.
- **Automatic calculations:** Action Priority recalculates when Severity/Occurrence/Detection change; RPN multiplies S/O/D. Current S/O/D/AP track post-action risk.
- **DFMEA Tables:** Quick access to severity/occurrence/detection reference tables.
- **Path-aware suggestions:** Mention menu groups higher/focus/lower elements to keep structure consistent.
- **Saved state:** Save or Save & Exit from the top toolbar.

DFMEA - Bicycle DFMEA											
Design Failure Modes and Effects Analysis											
Failure Chain	Failure Effect	Severity	Failure Analysis		Prevention Control	Risk Analysis			Action Priority	RPN	Filter Code
			Failure Mode	Failure Cause		Occurrence	Detection Control	Detection			
prevent	Frame deformation or buckling; loss of control; crash risk.	9	Down tube wall thickness below specification.	Incorrect tube specification, supplier variation, or forming reduction.	Material specification review; supplier PPAP; design FEA.	8	Incoming tube thickness measurement and receiving inspection.	5	High	360	
prevent	Structural joint failure; sudden loss of control; severe injury risk.	10	Incomplete weld penetration at head tube joint.	Incorrect welding parameters, poor fixturing, or operator technique variation.	Qualified weld procedure; fixture validation; welder training.	5	Non-destructive testing plan (sampled); weld visual inspection criteria.	7	High	350	
prevent	Wheel misalignment; brake rub; reduced control and potential wheel ejection.	7	Dropouts misaligned beyond spec.	Forming distortion, heat input, or fixture wear.	Controlled forming process; fixture maintenance schedule.	4	Go/no-go dropout alignment gauge at final inspection.	7	High	196	
prevent	Delayed brake engagement; longer stopping distance; customer dissatisfaction.	5	Lever free stroke out of specification.	Air in hydraulic system, improper bleed, or hose routing interference.	Assembly work instruction; standard bleed process.	6	End-of-line lever feel check with measurement.	2	Medium	60	
prevent	Wheel out-of-true; brake rub; vibration during riding.	6	Spoke tension imbalance causing lateral runout growth.	Incorrect lacing sequence or uneven tensioning.	Wheel build standard work; tension meter calibration.	4	Final truing stand verification of runout and tension.	4	Low	96	
prevent	Noise, poor shifting, hub spline wear; potential loss of drive.	6	Cassette locking torque below specification.	Incorrect torque tool setting or missed torque step.	Standard torque chart; calibrated wrench.	6	Torque audit sampling during final assembly.	3	Medium	108	
prevent	Loss of steering control; crash risk.	9	Stem steerer clamp torque out of spec (low).	Improper torque application, missing grease/assembly condition variance.	Torque spec in assembly instruction; tool calibration schedule.	5	Critical fasteners torque audit.	6	High	270	
prevent	Reduced visibility; non-compliance; increased accident likelihood at night.	3	Lights not functioning after assembly.	Incorrect wiring connection or damaged component.	Standard work and connector poka-yoke.	4	Functional test at final inspection.	2	Low	24	

Figure 10: DFMEA failure chains

Summary

Charts and a critical actions grid auto-refresh from the table:

- Action Priority (before/after) pie charts.
- Status counts bar chart.
- Severity, Occurrence, and Detection distributions.
- Critical Actions table filtered to open/pending items with focus element, failure mode, actions, status, responsible, and targets.

DFMEA Tree Chart

Interactive fault-tree-style view with color-coded Action Priority:

- Expand/collapse nodes, fit to window, and search to highlight nodes.
- Colors reflect the most critical AP category in each branch.

Revision Control

Track revisions with number, date, author, description, and approval status. Use Add/Edit/Approve/Delete controls; the latest approved revision is used on exports.

Export

- **PDF or Excel:** Choose the format when exporting. File names are suggested from the subject and last approved revision.
- **Custom logos:** Uses the logo set in File > Export logo.

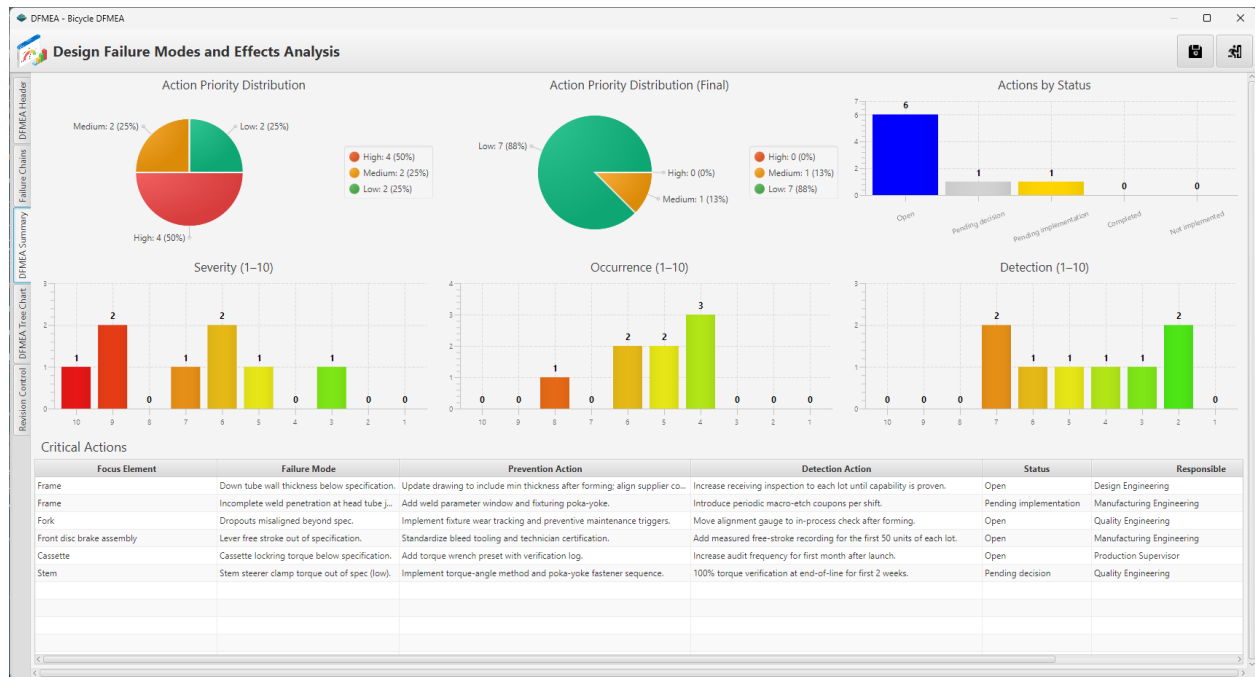


Figure 11: DFMEA summary charts

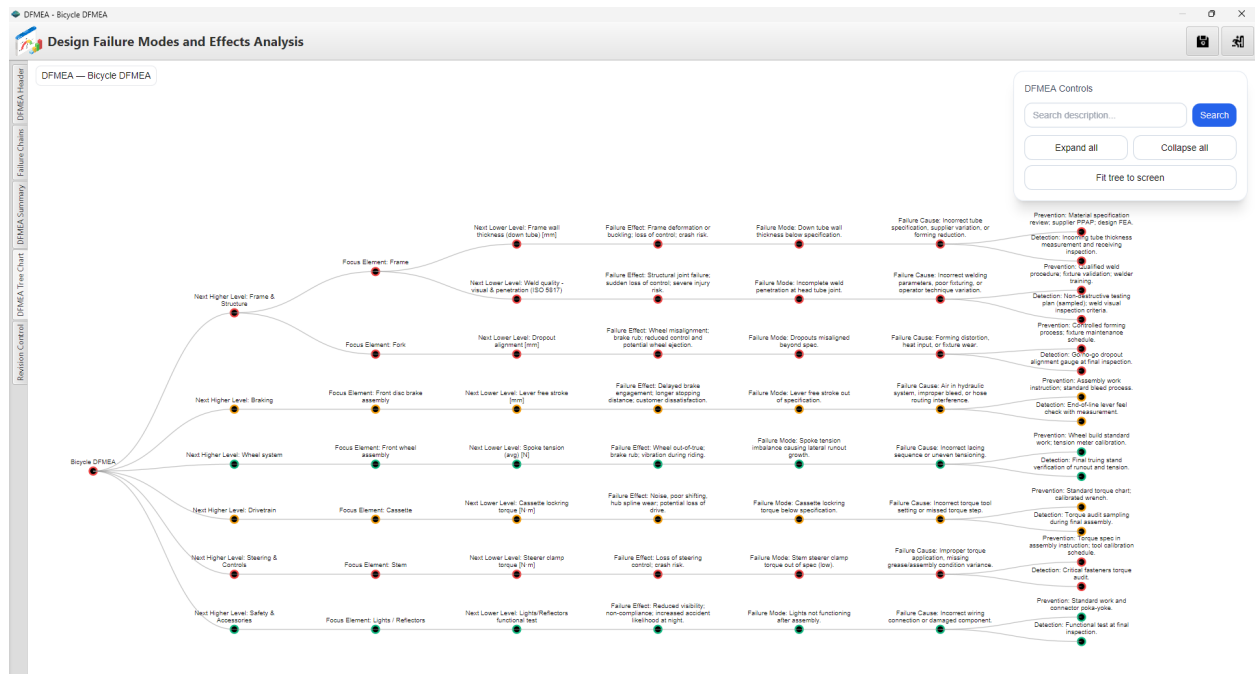


Figure 12: DFMEA tree chart

PFMEA

PFMEA mirrors DFMEA but references process structures.

PFMEA - Bicycle PFMEA

Process Failure Modes and Effects Analysis

Search: <Enter> to enter in cell edit mode. <Ctrl + Enter> to confirm edition.

Failure Analysis				Risk Analysis				Action Priority	RPN	Filter Code
Failure Effect	Severity	Failure Mode	Failure Cause	Prevention Control	Occurrence	Detection Control	Detection			
Frame geometry out of spec; assembly interference; poor ride handling.	6	Tube out length out of tolerance.	Incorrect CNC program, worn cutter, or incorrect datum setup.	Program version control; tool wear monitoring.	6	First-off inspection and periodic length checks.	3	Medium	108	
Poor fit-up; weld defects; rework and scrap increase.	3	Excessive burr height after cutting.	Dull blade, improper feed rate, or missing deburr step.	Deburr work instruction; blade replacement schedule.	5	Operator visual check and random tactile inspection.	4	Low	60	
Weak joint; potential frame failure; safety risk.	10	Weld lack-of-fusion due to low current.	Incorrect machine setup, power instability, or wrong WPS.	Qualified WPS; machine parameter lock.	5	Visual inspection with criteria; NDT sampling.	7	High	350	
Early corrosion, poor appearance, warranty claims.	5	Coating thickness below spec.	Poor gun setup, low powder feed, or inadequate surface prep.	Paint booth setup checklist; preventive maintenance.	6	Coating thickness gauge check per shift.	2	Medium	60	
Wheel out-of-true; brake rub; noise/vibration.	6	Uneven spoke tension leads to increasing runout.	Incorrect tensioning sequence or tension meter not used.	Standard work; mandatory tension meter step.	4	Final runout check on truing stand.	4	Low	96	
Soft lever, longer stopping distance, safety risk.	7	Air remains in hydraulic line after bleeding.	Incomplete bleed steps, trapped air, or incorrect tool use.	Bleed work instruction; technician training.	5	Measured lever free-stroke check at end-of-line.	8	High	280	
Chain drop, loss of drive, possible crash if chain jams.	8	Derailleur misadjusted (poor indexing / wrong limits).	Skipped adjustment step or insufficient technician training.	Standard work with visual aids; training certification.	6	Functional shift test across all gears.	4	High	192	
Loose fasteners; loss of steering/braking control; safety risk.	9	Critical fastener missed or under-torqued.	Checklist not followed or audit skipped due to time pressure.	Standard torque list; visual management.	8	Audit sampling and recorded torque verification.	5	High	360	
Loss of traceability; recall complexity; customer complaints.	3	Traceability label missing or incorrect.	Operator oversight or label printer error.	Label print automation and visual standard.	8	Final packaging checklist.	5	Medium	120	

Figure 15: PFMEA window

Header

Fields for company, plant location, customer, model year/platform, subject, dates, team, PFMEA ID, process responsibility, and confidentiality level.

Failure Chains

- Same editing tools as DFMEA: add/delete/duplicate, search with highlighting, @mentions (pulling process elements/parameters), copy/paste, undo, and keyboard shortcuts.
- Columns match the AIAG/VDA form, with structure/function/failure/risk/optimization sections, Action Priority, RPN, filter code, actions, responsibilities, dates, current S/O/D/AP, and remarks.
- Action Priority and RPN compute automatically from S/O/D.

Summary, Tree Chart, Revision Control, and Export

Identical to DFMEA: charts, critical actions list, interactive tree chart, revision tracking, and export to PDF or Excel with your preferred logo.

Control Plans

Open a Control Plan from the project tree to manage header data and control chains.

The screenshot shows the 'Control Plan' window for 'BIKE-HYB-2026'. The 'Control Plan Header' section contains the following fields:

- Control Plan Number: Bicycle Control Plan
- Part Number/Latest Change Level: BIKE-HYB-2026
- Part Name/Description: Bicycle - City/MTB Hybrid
- Organization/Plant: Curitiba Assembly Plant
- Organization Code: CF-DEMO-01
- Key Contact/Phone: Quality Engineering - Demo
- Core Team: Manufacturing Eng; Quality; Supplier
- Org./Plant Approval/Date: Q. Supervisor
- Supplier Approval/Date: Manufacturing Manager
- Date (Originated): 11/15/2025
- Date (Revision): 12/15/2025
- Customer Eng. Approval/Date: N/A
- Customer Quality Approval/Date: N/A

Below the header is a table with the following columns: Part/Process Number, Process Name/Operation Description, Machine, Device, Jig, Tools for Mfg., #, Product, Process, CTS, CTQ, CTP, Attribute, Lower Limit, Target Value, Upper Limit, Evaluation Measurement Technique, Sample Size, and Frequency.

Part/Process Number	Process Name/Operation Description	Machine, Device, Jig, Tools for Mfg.	#	Product	Process	CTS	CTQ	CTP	Attribute	Lower Limit	Target Value	Upper Limit	Evaluation Measurement Technique	Sample Size	Frequency
OP-10	Tube cutting & forming	CNC tube cutter	10	Frame geometry	Cut length	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	519	520	521	Calibrated caliper; first-off and hourly check	n=1	Hourly
OP-10	Tube cutting & forming	Deburr station	20		Burr height	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		0.10 max		Visual + tactile; periodic burr gauge	n=5	Each shift
OP-20	Welding	Welding fixture + TIG welder	30	Weld integrity	Weld current	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	120	130	140	Machine parameter log; daily verification	100%	Continuous
OP-20	Welding	Welding fixture	40	Weld quality	Visual bead profile	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		Pass		Visual inspection per ISO 5817 criteria	100%	Each frame
OP-30	Painting / powder coat	Powder coat booth	50	Corrosion protection	Coating thickness	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	70	80	90	Dry film thickness gauge	n=3	Each shift
OP-40	Wheel building	Truing stand + tension meter	60	Wheel performance	Radial runout	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		0.3	0.5	Dial indicator on truing stand	100%	Each wheel
OP-40	Wheel building	Tension meter	70		Spoke tension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1000	1100	1200	Calibrated tension meter	n=8 spokes	Each wheel

Figure 16: Control Plan window

Header

Enter control plan level, plan/part numbers, part name/description, organization/plant/code, key contact, core team, approvals (organization, supplier, customer engineering/quality), and originated/revision dates.

Control Chains

- **Columns:** Part/Process number, Process/Operation description, Machine/Tool, Product and Process characteristics, CTS/CTQ/CTP flags, Attribute flag, Limits and Target, Measurement technique, Sample size/frequency, Control method, Reaction plan, and an item number column.
- **Toolbar:** Add or delete rows, search with **Next**, keyboard hints (Enter to edit, Ctrl+Enter to commit).
- **Context menu:** Row-level actions mirror the toolbar.

Revision Control

Track revisions with add/edit/approve/delete controls; latest approved revision is used in exports.

Export

Export to PDF or Excel; logos follow the File > Export logo selection.

Importing and Exchanging Data

Excel Import

- Workbook sheets recognized by name: **ProductTree**, **ProcessTree**, **DFMEA**, **PFMEA**, **ControlPlan**.
- Natural keys avoid duplicates (e.g., part number/description for Product Tree, issue number or failure mode+cause for FMEAs, row number or process+characteristic for Control Plans).
- Dates and enums are parsed case-insensitively; missing fields use defaults where applicable.
- An import report (`<file>.import-report.txt`) lists created/updated rows and errors.
- Use **Data > Export import template** to generate a correctly structured workbook with sample rows.

Document Import

Data > Import documents... opens a two-pane drag-and-drop tool:

- Select a source project XML.
- Drag documents (Product/Process Trees, DFMEAs, PFMEAs, Control Plans) into the destination list.
- Save to commit copies into the current project.

Structure/Process Exchange

- **Product:** Copy systems, parts, or characteristics between products in the same project.
- **Process:** Copy operations, activities, or parameters between processes in the same project.
- Drag-and-drop between origin and destination trees; changes mark the project as dirty until saved.

Exporting

- Choose PDF or Excel when exporting DFMEA, PFMEA, or Control Plans.
- Suggested file names use the document subject and last approved revision.
- Logos follow the preference set via **File > Export logo...** (default CoreTools logo or your custom image).
- Exports include current header data, revision header, and tables, plus charts for FMEAs.

About CoreTools(TM)

CoreTools(TM) - Integrated Quality Tools for DFMEA / PFMEA / Control Plans

Version: 1.0.0

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System requirements

- Windows 10 or higher (64-bit)
- Bundled Java Runtime (no external JRE required)
- Minimum 4 GB RAM, ~170 MB disk space

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