Engineering change request and order (ECR and ECO)

Process Definition Document (PDD): template and worked example

Example company (fictional): Solvik Drives AS, a manufacturer of electric motors and gearboxes in Trondheim, Norway (about 280 employees, ISO 9001 certified).

Document control

Field	Value
Process name	Engineering change request and order (ECR and ECO)
Process owner	[Name, role]
Prepared by	[Name]
Reviewed by	[Names of the people who do the work]
Approved by	[Name, date]
Version	1.0 (as-is)
Status	Draft

How to use this template

This is a complete process definition document (PDD) for engineering change management, also called the ECR and ECO process, engineering change control or product change procedure. It describes how a fictional motor manufacturer raises an engineering change request, assesses its effect on the bill of material, routings, stock and suppliers, decides it at a change board, implements the engineering change order and closes it.

Use it as a starting point. Replace the company details, keep the sections, and walk through each step with the engineers, planners and buyers who actually carry a change through. Most companies change the cost threshold for the board, the list of assessors and the rule for what happens to existing stock. The structure stays the same.

- Replace the company, products and systems with yours. If your PLM and ERP are one system, merge steps 11 to 14 and remove the manual hand-offs.
- Set your own thresholds for who approves without the board. Cost, risk to the customer and number of affected assemblies are the usual criteria.
- Define the effectivity options you use: by date, by serial number, by order or by first use. The choice drives the stock disposition and the supplier notice.
- Check the percentages with real data. The share of ECRs rejected and the time suppliers need to reply show where the process is slow.
- Add customer-specific requirements, such as formal approval periods or a required notification form.
- Walk through the steps with a buyer and a warehouse operator, not only engineers. The old stock and the supplier notice are where the gaps are.

1. Purpose and scope

This procedure describes how Solvik Drives raises, assesses, approves, implements and closes changes to released product data: drawings, bills of material, routings and specifications. It gives engineering, production, purchasing, quality and the warehouse one shared description of who does what, so that a change reaches the shop floor on a known date, with the right stock used up or scrapped, and so that no one builds or buys to an old revision by mistake.

In scope

- Engineering change requests (ECR) for released products, from any department or from a customer

- Impact assessment on the BOM, routing, stock, open orders, suppliers, tooling and documents
- Change board decision
- Engineering change orders (ECO), with revised drawings, BOM and routing
- Effectivity date or serial number and the disposition of old stock
- Supplier and customer notification, and closing the ECO

Out of scope

- New product development before design release
- Changes to process parameters that do not change the released routing
- Tooling construction and supplier qualification
- Quality non-conformances and CAPA

2. Process at a glance

Item	Description
Trigger	A person finds a reason to change a released part, assembly, routing or specification.
Starts when	The requester raises an ECR in the PLM system.
Ends when	The engineering manager closes the ECO after the effectivity date has passed and the old revision is blocked.
Inputs	ECR with reason and proposed change, Released drawings, BOM and routing, Stock and open orders, Supplier quotes and lead times, Customer requirements
Outputs	Impact assessment, Board decision, ECO with revised drawings, BOM and routing, Effectivity date and stock disposition, Supplier and customer notifications, Closed ECO with evidence
Volume	About 240 ECRs a year, of which about 170 become an ECO; around 25 are urgent
Working hours	Monday to Friday, 07:30 to 16:30. The change board meets on Wednesdays at 10:00.

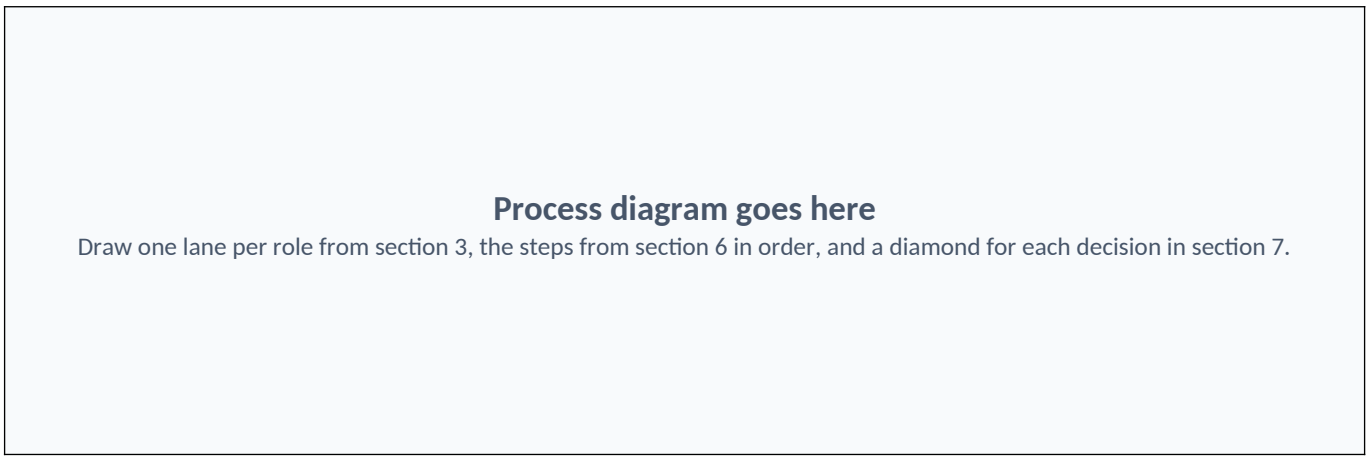
3. Roles and responsibilities

Role	Responsibilities
Requester	Anyone in engineering, production, purchasing, quality or service who sees the need for a change. Writes the ECR with reason, urgency and proposed solution.
Design Engineer	Owns the change technically: screens the ECR, proposes the design solution, prepares revised drawings and BOM, and answers questions from assessors.
Change Coordinator	Runs the process in the PLM system: assigns assessments, builds the board pack, records the decision, creates the ECO and tracks open tasks.
Production Planner	Assesses the effect on stock, open orders and schedules, and proposes the effectivity date.
Buyer	Assesses the effect on suppliers, lead times and open purchase orders, and informs suppliers of the new revision.
Quality Engineer	Assesses the effect on inspection plans, certifications and customer requirements, and checks the first article after the change.
Manufacturing Engineer	Assesses and updates the routing, work instructions, tooling and fixtures.
Warehouse Operator	Blocks, tags, returns or scraps old stock according to the ECO and books the movements.
Engineering Manager	Chairs the change board, makes the decision and closes the ECO. The finance manager or the sales director joins when the cost or customer effect is large.
Supplier (external)	Receives the change notice, confirms lead time, cost and the date they can supply the new revision.
Customer (external)	Approves changes that affect form, fit, function or documentation of a delivered product.

4. Systems

- Siemens Teamcenter: ECR and ECO records, drawings, BOM and revisions
- Microsoft Dynamics 365 Business Central: items, stock, purchase and production orders
- Network drive: routings, work instructions and inspection plans
- Email for supplier and customer notifications
- Excel: list of open ECOs reviewed at the board meeting

5. Process map



6. Procedure, step by step

#	Step	Who	What happens	System	Output
1	Raise the ECR	Requester	Describes the problem or opportunity, the affected part numbers, the reason, the urgency and a proposed change. It takes 20 to 40 minutes.	Siemens Teamcenter	Draft ECR
2	Screen the ECR	Design Engineer	Within 2 working days, checks that the problem is clear and decides whether it is a design change, a documentation fix or not needed. About 15% of ECRs are rejected or returned at this point.	Siemens Teamcenter	Accepted, returned or rejected ECR
3	Define the proposed solution	Design Engineer	Sketches the solution in CAD, lists the affected assemblies using the where-used report and classifies the change as minor, major or urgent. It takes 2 to 8 hours.	Siemens Teamcenter, CAD	Solution outline and affected item list
4	Assign impact assessments	Change Coordinator	Creates assessment tasks for planning, purchasing, quality and manufacturing engineering, with a due date of 3 working days (1 day for urgent changes).	Siemens Teamcenter	Assessment tasks open
5	Assess stock and orders	Production Planner	Reports the stock of the old revision, the quantity on open purchase and production orders, the work in progress and the demand over the next 12 weeks. It takes 30 to 60 minutes.	Business Central	Stock and order impact
6	Assess supplier impact	Buyer	Checks which suppliers are affected, asks for cost and lead time of the new revision and finds out whether tooling must change. Supplier replies take 2 to 5 days, which is the usual cause of late assessments.	Business Central, email	Supplier impact, cost and lead time

#	Step	Who	What happens	System	Output
7	Assess routing and tooling	Manufacturing Engineer	Checks the effect on operations, fixtures, programmes, work instructions and cycle time, and estimates the effort to update them. It takes 1 to 3 hours.	Network drive, Teamcenter	Process impact and effort
8	Assess quality and compliance	Quality Engineer	Checks inspection plans, product certifications and customer requirements, and decides whether a first article inspection or customer approval is needed. About 20% of changes need customer approval.	Teamcenter, network drive	Quality impact and approval needs
9	Build the board pack	Change Coordinator	Collects the assessments, adds the total cost of the change (engineering hours, tooling, scrap of old stock) and sends the pack the day before the board. Chases open assessments. It takes about 30 minutes per change.	Siemens Teamcenter, Excel	Board pack
10	Decide at the change board	Engineering Manager	Approves, rejects or defers the change and sets the effectivity rule and priority. Changes below the cost threshold of 5,000 euros and classed minor can be approved by the manager without the board. About 10% of changes are rejected and 12% are deferred for more information.	Board meeting, Teamcenter	Board decision recorded
11	Create the ECO	Change Coordinator	Converts the approved ECR into an ECO, assigns the implementation tasks to engineering, manufacturing engineering, planning, purchasing and the warehouse, and sets due dates.	Siemens Teamcenter	ECO with tasks
12	Revise drawings and BOM	Design Engineer	Prepares the new drawing revision and BOM revision, with the change described in the revision block, and sends them for review and release. It takes 1 to 5 days.	Siemens Teamcenter, CAD	Released drawing and BOM revision
13	Update routing and instructions	Manufacturing Engineer	Revises the routing, work instructions and tooling to match the new revision and loads the new routing in the ERP, set to start on the effectivity date.	Network drive, Business Central	Updated routing and instructions
14	Set the effectivity date	Production Planner	Chooses the date or serial number from which the new revision is used. The aim is to use up old stock where it is safe, and the planner changes open production orders and the BOM version in the ERP to match.	Business Central	Effectivity date and updated orders
15	Notify suppliers and adjust orders	Buyer	Sends the new drawing revision to affected suppliers, changes open purchase orders and records each supplier's confirmation. About 25% of changes need a supplier call because confirmation is not returned within 5 days.	Business Central, email	Supplier confirmations and updated purchase orders
16	Handle old stock	Warehouse Operator	Blocks, tags, returns to supplier, reworks or scraps the old stock as the ECO says, and books the movements. Stock that reaches the effectivity date unnoticed is the usual way old parts end up in assemblies.	Business Central	Old stock dispositioned
17	Check the first article	Quality Engineer	Inspects the first parts or the first assembly built to the new revision against the drawing and records the result. If it fails (about 5% of changes), the ECO goes back to the design engineer.	Teamcenter, inspection plan	First article result
18	Review and	Engineering	Checks that all tasks are done, the old	Siemens	Closed ECO

#	Step	Who	What happens	System	Output
	close the ECO	Manager	revision is blocked in the ERP and the first article passed, then closes the ECO. The coordinator archives the pack with the board decision.	Teamcenter	

7. Decision points and business rules

- Is the ECR clear and needed? No: reject or return it to the requester (step 2).
- Is the change minor, major or urgent? Urgent changes get one day for assessments (steps 3 and 4).
- Does the change need customer approval? Yes: the quality engineer arranges it before implementation (step 8).
- Is it below the cost threshold and minor? Yes: the engineering manager may approve without the board (step 10).
- Approve, reject or defer? Deferred changes return with the missing information (step 10).
- From which date or serial number does the new revision apply, and what happens to old stock? (steps 14 and 16).
- Do suppliers confirm the new revision and the date? No: chase and keep the old revision open for them (step 15).
- Does the first article pass? No: return the ECO to the design engineer (step 17).

8. Exceptions

- Urgent change to stop a safety or quality problem (about 10% of ECRs): the engineering manager approves by email, the board is informed afterwards, and the assessments run in 1 day.
- Supplier cannot supply the new revision by the effectivity date (about 15% of changes): the effectivity date is moved or the supplier is asked to keep delivering the old revision for a set quantity.
- Old stock is too large to use up (about 20%): the board decides between rework, return to supplier, scrap and a delayed effectivity date.
- Change requested by a customer: the sales manager attends the board and the quote for the change is agreed before approval.
- Wrong revision found on the shop floor after the effectivity date: production stops the order, quality blocks the parts and the case is recorded as a non-conformance.

9. Controls

- Only released revisions can be used in production orders and purchase orders, and the ERP blocks the old revision after the effectivity date.
- The requester cannot approve their own ECR, and the person who revises the drawing does not release it.
- Every ECO has a record of the assessments, the board decision, the effectivity date and the stock disposition.
- Changes that affect form, fit, function or documentation of a delivered product are not implemented without customer approval.
- The coordinator reviews open ECOs weekly and the board reviews all ECOs older than 30 days.
- Records are kept for the life of the product plus 10 years, in line with customer agreements and ISO 9001 clause 8.5.6.

10. Known issues today

- Supplier impact is assessed by email, so one slow reply holds up the whole board pack.
- Stock and open orders are looked up by hand in the ERP and are out of date by the board meeting.
- Effectivity dates are agreed at the board but not always entered in the ERP, so old and new revisions get mixed.

- Old stock is forgotten after the change, and old parts show up months later.
- The Excel list of open ECOs and the PLM tasks do not match.

11. RACI matrix

R = responsible (does the work), A = accountable (owns the outcome), C = consulted, I = informed.

Activity	Requester	Design Engineer	Coordinator	Planner / Buyer	Eng. Manager
Raise and screen the ECR	R	A	I		
Define the solution and affected items	C	A/R	I		
Assess stock, orders and suppliers		C	A	R	
Build the board pack		C	A/R	C	
Decide the change	I	C	R	C	A
Revise drawings, BOM and routing		A/R	I	C	
Set effectivity and handle old stock		C	I	A/R	I
Notify suppliers and customers		C	I	A/R	I
Check first article and close the ECO	I	R	R	C	A

12. KPIs

KPI	Definition	Target
ECR to ECO cycle time	Average calendar days from ECR submission to ECO closure, split by minor, major and urgent.	[set]
Days to decision	Average calendar days between a complete ECR and the board decision. The target is 10 days.	[set]
Late assessments	Share of assessment tasks completed after their due date, by function.	[set]
Old revision found after effectivity	Number of cases a year where an old revision was found in production, in stock or on an order after the effectivity date.	[set]
Cost of obsolete stock from changes	Value of stock scrapped or reworked because of ECOs, per quarter.	[set]
Open ECOs older than 30 days	Count of ECOs not closed 30 days after approval. Today about 35.	[set]

13. Revision history

Version	Date	Author	Change
1.0	[date]	[name]	First as-is version

Free template from processfix.ai. You may copy and adapt it. The company in the example is fictional.