Kennametal Inc.: Engineering Change Management with New Engineering Record

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LEARNING POINTS

- Find out how the Engineering Record is used for the end-to-end change process
- Learn how to utilize workflow to update Documents and Material Masters
- Hear how change events can trigger workflow to integrate the change process to ensure that the right information is provided at the right time
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Our Mission: Kennametal Delivers Productivity To Customers Seeking Peak Performance In Demanding Environments By Providing Innovative Custom And Standard Wear-resistant Solutions

Aerospace
Transportation
General Engineering
Earthworks
Energy & Process

Industrial ~60% Sales
Infrastructure ~40% Sales

- Metalworking Solutions
  - Holemaking
  - Turning
  - Milling
  - Systems Tools
- Thin and Thick Film Coatings
- Engineered Components

~$3B In Revenues
~13,000 Employees In More Than 60 Countries
Headquartered In Latrobe, Pennsylvania

Serving the World’s Largest Companies in Every Major Industry

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KENNAMETAL FEATURED END MARKETS

**Aerospace**

**Transportation**

**General Engineering**

**Earthworks**

**Energy & Process**

Serving Every Major Industry in Manufacturing
SAP HISTORY AT KENNAMETAL

1999 – 2006 Order Taker
- Highly customized SAP solution
- Manual Middleware
- Aging infrastructure
- Limited business engagement

<1999 Necessity
- Multiple ERP Systems
- “One off” SAP installs
- Keep the lights on
- No business engagement

First SAP software purchase (3.0C) 1995
Upgrade to 4.6C 1999

2006 – 2012 Collaborator
- IT Business Partner roles established
- IT Roadmap created
- “Rapid” Standard SAP implementation
- Global Process Owners alignment

Today & Beyond Change Agent
- Innovation driving value
- Enterprise Roadmap integrated
- HANA and analytics
- BPM Management culture
- Build upon new technology platform

PLM & HANA Go-Lives 2012
Re-implementation ECC6.0 + Business Suite 2011

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AUDIENCE POLL

Poll

Already Implemented
Currently Implementing
Planning to Implement
SAP Objects related to the Engineering Change Process at Kennametal Inc. include:
- Engineering Record
- Engineering Change Master (ECM)
- Documents
- Material Masters
- Specifications

The Engineering Change Process at Kennametal Inc.
- Supports the Design Anywhere, Build Anywhere Strategy
- Involves approximately 3,500 end-users in nearly 70 locations around the world
- Does not include a formal approval process
Engineering Record (introduced in EhP5) is a flexible object used to control the planning and execution of changes and contains the following sections:

- Header data
  - Description, Reason for Change, Priority, Status, etc.
  - Auto-generated Change Master number with hyperlink

- Change Item data
  - Change Items tab
  - Process Route tab
  - Notes tab
  - Attachments tab
  - Administrative Data tab

- Change Items include:
  - Document, Material Master, Material BOM, Specification, and Recipe
SAP NetWeaver Business Client (NWBC)
Documents

- Engineering **Product Design Drawings**, CAD files, Hardware Components, and other supporting files
- Only one version of a Document is “Released” at one time
- Creating a new Document version requires an Engineering Record and Engineering Change Master (ECM)
Document Status Network

AA = Start of Work
AC = Accessible
IA = In Work
IC = In Check
IR = In Review
AP = Approval
FR = Final Release
PC = Pending Change
OV = Old Version
OB = Obsolete

NOTE: New Version can be Deleted prior to IC
Material Masters

Changes to Material Masters at Kennametal Inc. are not controlled with Engineering Change Management process.

Material Masters related to a product change can be added to an Engineering Record for reference.

Material Master Statuses related to the Change Process:

- Cross Distribution Chain Status (X-distr.chain status)
  - AH (Active/Hold)
  - AN (Active/New)

- Plant Specific Material Status (Plant-sp.matl status)
  - 32 (Engineering Revision PENDING)
  - 35 (Engineering Revision Change)
  - 40 (Active/New)
  - 50 (Active/Sustain)
Specifications (PLM Recipe Development)

- Changes to Specifications that are Released to Production require an Engineering Record and Engineering Change Master (ECM).
First (6) months with SAP PLM:

- Volume of Engineering Records
  - 3,000 Created/month
  - 2,500 Completed/month

- Volume of New Document Versions
  - 8,333/month

New Version every 3 - 4 min.

**Engineering Records**

- Created: 18k
- Completed: 15k

**New Document Versions**

- Created: 50k
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- End-to-End Change Process
  - Engineering Record Statuses

![Diagram showing the change process with statuses: Created (10), Requested (20), In Process (40), Cancelled (30), Complete (70), Closed with Reference (80), Rejected (25), On Hold (50).]
ENGINEERING CHANGE MANAGEMENT

Create the Engineering Change Request:

- Engineering Record Description

- Reason for Change:
  - Customer Request, Manufacturing Request, Engineering Request, Design Error, Product Management Request, Product Improvement

- Priority:
  - Urgent, Next Production Run, Other

- Change Coordinator or Team

- Change Items

- Notes

- Attachments

Created Requested In Process Complete

10 20 40 70

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Submit the Engineering Change Request:

- Change Coordinator or Team
- Change Items (Documents)
- Notes
- Attachments
Non-Engineering Change Request:

- The Engineering Record can also be used to request, process, and record Non-Engineering related Product Changes
  - Material Master
  - Material Master Classification
  - Catalog Number
  - Product Hierarchy
  - Catalog Artwork

- The embedded ad hoc workflow capability provided with the Process Route also supports this change process
Reject an Engineering Change Request:

- Change Coordinator evaluates the request and decides to accept or reject it.
- All Change Items must have Change Relevance = NCR (Not Change Relevant) prior to rejecting the request.
Process the Engineering Change:

- Change Request accepted by the Change Coordinator
- Engineering Change Master (ECM) automatically created
- Change Item required fields for Documents:
  - **Change Relevance**
    - CHG – Change
    - NCR – Not Change Relevant
  - **Manufacturing Option**
    - OK – OK to Mfg.
    - NM – Do NOT Mfg.

- Change Item Documents are limited by:
  - Document Type (NXD, NXA, NXM, DRW, etc.)
  - Status (FR, AP, PC)
- Engineering Record Save Event: Status = 40 (In Process)
  - Related Master Documents are added to Engineering Record
  - All Documents on the Engineering Record are added to Engineering Change Master (ECM)
  - Document Statuses are Changed to PC (Pending Change)
  - Linked Material Masters are updated: Plant Specific Material Status = 32 (Engineering Revision PENDING)
- Engineering Record Save Event: Status = 40 (In Process)
  - Document Statuses Changed to PC (Pending Change)
ENGINEERING CHANGE MANAGEMENT

- Document Status = PC (Pending Change)
- Three options to move forward:
  1. Create New Document Versions
  2. Obsolete the Document and reference a New Document
  3. Set the Document back to Released (undo)

FR = Final Release
PC = Pending Change
OB = Obsolete

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Option 1: New Document Versions created
Changes to Product Drawings and CAD file Documents are made using the CAD system
Required checks and approvals are performed to move the new Document Version through the Status Network
Data from the Engineering Record on the Drawing (Watermark and Revision Block)

- 2013-05-09 14:55:41  Status: Pending Change 1018154 DO NOT MANUFACTURE 60060696 NXD 000 02

- ER NUMBER 1018154
- ER DESCRIPTION Revise to correct Shim Pin Punch
- A WAS SHIM PIN PUNCH 515.018
- B ADDED MATERIAL CODE
- C WAS LOCTITE 243
- D ADDED DIMENSION
- E UPDATED WEIGHT NOTE
Let’s imagine that we Submitted a Change Request.

The Request has been Accepted.

Meanwhile, a Sales Order has been Created.

When Manufacturing Creates the Production Order, they find that the Product Drawing is Under Change and they have to Hold until the Change has been Completed.

Now, Engineering has Created the New Version with the Required Changes and the Drawing has been Checked, and Approved.

Are you Ready to Push the “Release” Button for this New Drawing to See What Happens Next?
Document “Release” (Status = FR) triggers Workflow to Update the linked Material Master:

- Set the Net Weight from Document (CAD model)
- Set the **Plant Specific Material Status** = 35 (Engineering Revision Change) and set the corresponding validity date
- Set the **Cross Distribution Status** = AN (Active/New)
ENGINEERING CHANGE MANAGEMENT

Criteria for Linked Material Master:

- Created: 10
- Requested: 20
- In Process: 40
- Complete: 70

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- System ID (WF-BATCH) Used to Update Material
Document “Release” (Status = FR) triggers workflow to Find Open Purchase Orders affected by the change and sends an email notification to the Buyer.

Status of Previous Document Version is Set = OV (Old Version)
Option 2: Obsolete Document (Status = OB) and reference New Document

The Engineering Record Change Items tab for Documents contains columns to reference the New Document:

- New Document
- New Document Type
- New Document Part
- New Document Version
Option 3: Undo Document Change (Status = FR)

- The Document Status can be changed from PC to FR.
- If a New Document Version was already created, it can be deleted prior to being “Released”
- Place the Engineering Change On Hold:
  - The Change Coordinator can place the Change “On Hold” at any time,
  - Then simply set the status back to “In Process” to resume
Complete the Engineering Change:

- All Changes must be completed prior to completing the Engineering Record
- The Engineering Change Master’s Valid From Date is set to the Engineering Record’s Target Run-In Date
- Workflow is triggered to send an email notification to the Global Classification Team when Product Drawing Documents are linked to Standard Material Masters (FERT)
Cancel the Engineering Change:

- Change Records cannot be deleted, but they can be Cancelled by the Change Coordinator
- All Change Items must be removed prior to being canceled
Close the Engineering Change with Reference:

- A change request can be closed with a reference to another Engineering Record.
- All Change Items must have Change Relevance = NCR (Not Change Relevant)
Enhancements

- **Simple Attachment**: "Add Attachment" button that automatically creates a new Document and checks the original into DMS
- **Additional Change Item column** to indicate Manufacturing Option (OK to Mfg. or Do NOT Mfg.). This is used to drive the Plant Specific Material Status Change (32)
- **Additional header field** used to capture a work center. This provides the ability to submit a request to a Team instead of an individual (Change Coordinator)
- **Additional header field** to capture a reference Engineering Record number. Used to close with reference
- **Synchronize Engineering Record** Description and Change Items with Engineering Change Master (ECM)
- **Automatically add Master Documents** (DSC ECTR Master Model Group)
NEXT STEPS

- Upgrades
  - ECTR 4.4 – July 2013
  - NWBC 4.0 – August 2013
  - SAP EhP6 – November 2013

- SAP Customer Connection Enhancements
  - PLM7 Web User Interface Improvement Requests

- Business Process Improvements
  - MDM – Use Change Management for Material Masters
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Implementation Partners

- LeverX
- DSC
  Fascination with Integration
- SEAL SYSTEMS
  THE DIGITAL PAPER FACTORY
- SAP
• Make use of standard functionality (process route, workflow, change events)
• Simply Hide the fields on the Engineering Record that do not apply to your change process (e.g. Change Item fields: Item Cost Change, Engineering Cost, Investment, Currency)
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The Engineering Record is used to initiate product related changes from anywhere within the global enterprise

The Engineering Record and Engineering Change Master (ECM) are used to capture affected items, and initiate Workflow

Utilize Workflow with Standard Change Events to automate updates to Documents and Material Masters to ensure that the Right Information is provided across the Global Enterprise Value Chain at the Right Time.
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