



DFMA Culture Shock at Kohler

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KOHLER



Agenda

- Kohler Overview
- Early DFMA Investigations
- Early DFMA Efforts
- Initial DFMA Project Examples
- Implementing DFMA
- DFMA Communication and Socialization
- Culture Shock
- Conclusion

**“When a great
adventure is offered,
you don't refuse it.”**

Amelia Earhart



A Tradition of Quality, Craftsmanship & Innovation



Founded in 1873 by Austrian immigrant John Michael Kohler, Kohler is one of America's oldest and largest privately-held companies

KOHLER History

Enameled version of cast-iron
hog scalding and water trough
sold as bathtub in 1883



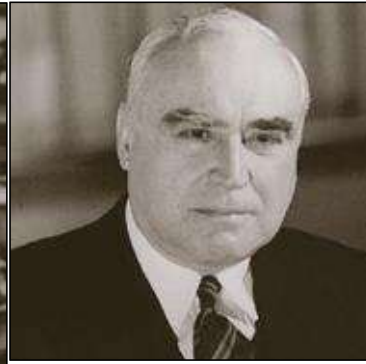
Since 1873



John Michael Kohler



Walter Kohler



Herbert V Kohler, Sr.



Herbert V Kohler, Jr.



David Kohler



*"Every day of our working lives, we seek **to improve the level of gracious living** for those people who are touched by our products and services."*

A Global Industry Leader



Kitchen & Bath



Power



Interiors



Hospitality

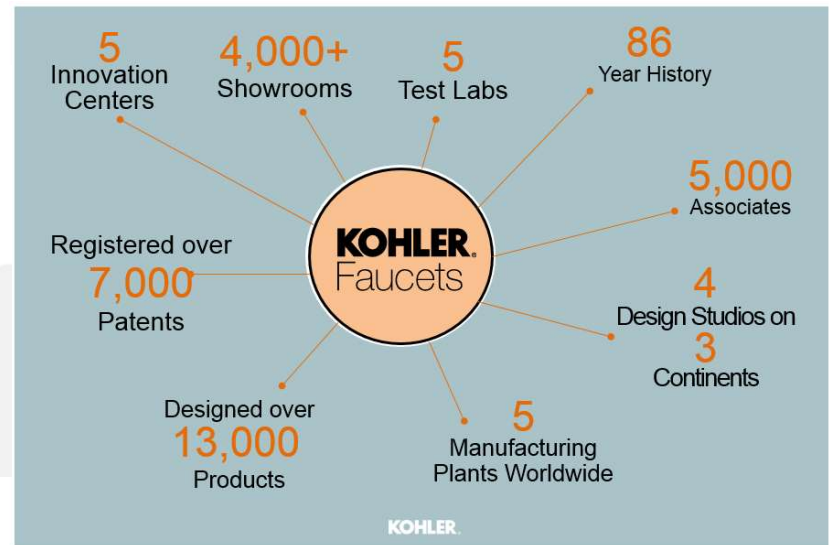


A reminder about Kohler

- Kohler Co. is a private company, headquartered in Kohler, WI
- Founded in 1873, the company includes Kitchen and Bath, Decorative Products, Power and Hospitality businesses.
- Our mission: Gracious Living. Gracious living is characterized by charm, good taste and generosity.
- Kohler is now a truly global company, with tens of thousands of associates located at more than 50 manufacturing locations globally.



A Bit About Global Faucets



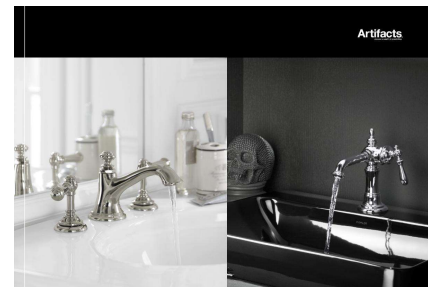
Technology Innovation



Material Innovation



Design Innovation



Quality Innovation



The NEED for Change in Global Faucets...



Landscape & Feedback

- Teams don't understand / communicate costs
- Team members communicate opinions as fact
- Team members are slow to answer questions
- Many Silos in Kohler
- Designs are inefficient
- Manufacturing Processes are not aligned with the product design needs

NPI Strategic Focus

Strategic Planning

Planning support for innovation and leading edge manufacturing technology.

Simultaneous Engineering

The simultaneous collaboration of Product and Manufacturing Engineers to optimize the design for manufacturing and assembly.

Project Launch

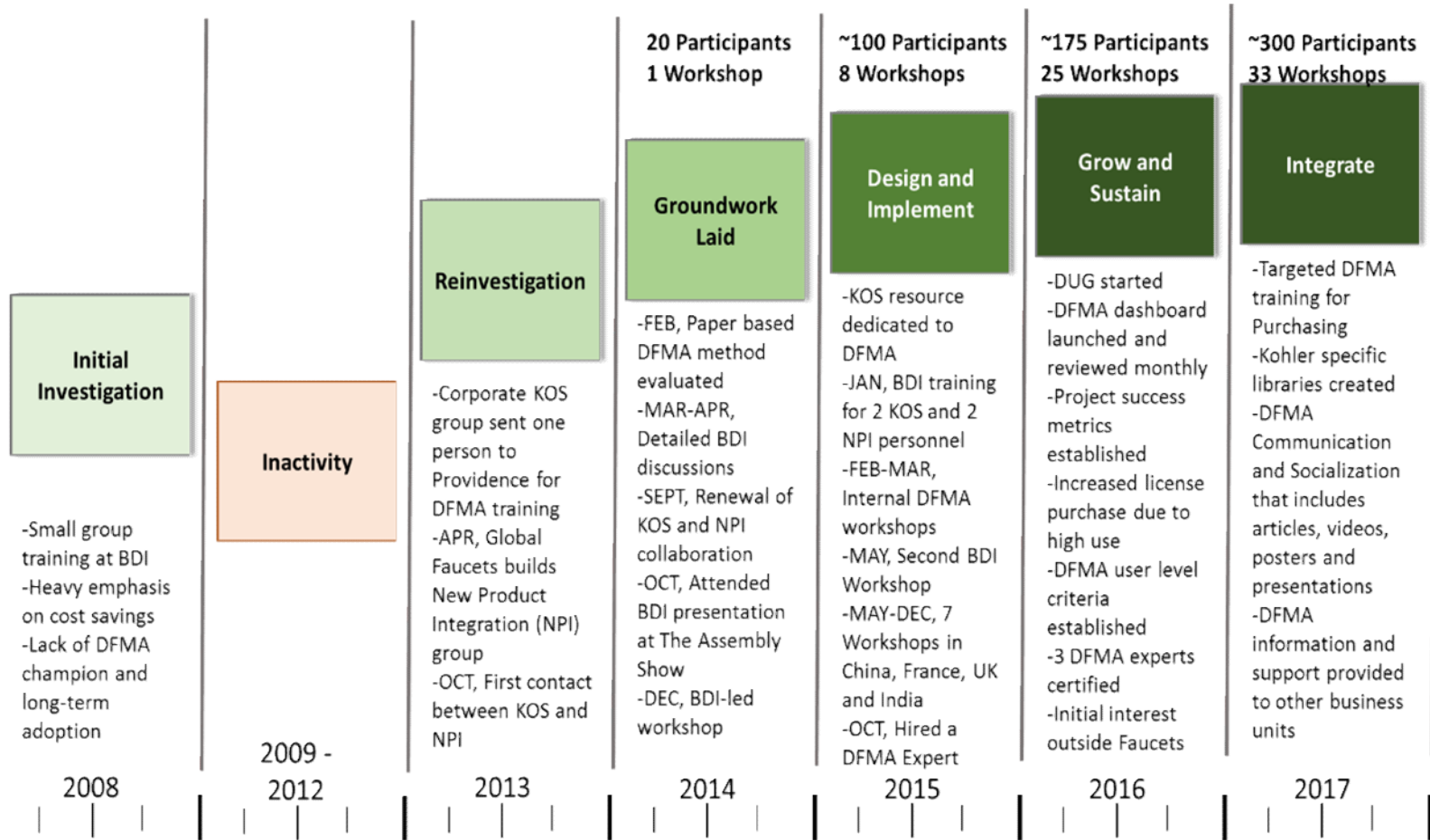
The detailed project management of time, cost and scope to deliver New Products to Market

Simultaneous Engineering

- Change "Us vs. Them" to "We"
- Create collaboration events to achieve "efficient and effective results"
- Quantify concept improvements through a credible tool



Timeline



Initial Investigation

- Kohler first explored DFMA (and other programs) in 2008
 - A small number of personnel were sent to training at Boothroyd-Dewhurst's facilities in Providence
 - Software was not purchased, and effort eventually ended
- In 2013, Kohler's Corporate Continuous Improvement group (KOS) reinitiated the effort as part of a broader focus on DFSS
 - One individual sent to train and socialize the method.
 - A fortuitous meeting (in the UK, where DFA was in use) led to introduction of the method to the Global Faucets New Product Integration (NPI) team



Reinvestigation: 2014

- Initial focus: understanding the method
- Early 2014: Webinar
 - Paper-based methodology
 - ~20 participants
 - Developed understanding of DFA method
 - No immediate demand
- Re-engagement with KOS
 - Commitment of a resource to drive DFMA effort in Global Faucets NPD
 - Further investigation at The Assembly Show seminar by BDI: October 2014
 - First BDI Workshop: December 2014
 - 20 participants



Real Rain



	Parts	Entries	DFA Index
Original	63	95	5.52
Safe	45	60	10.38
Reach	36	47	12.92
Stretch	34	43	12.42

First Year: 2015

- Initial Goals:
 - Acquire DFMA software and train NPI group as facilitators
 - Conduct workshops in Kohler, Mira (UK), Reims (EMEA), Beijing (CN) and Gurgaon (IN)
 - Drive usage to all NPD projects supported by NPI
- Initial training (4 personnel) in Providence Jan, 2015
- Workshops held in US, UK, CN, and EMEA created significant savings and drive for improvement
- Frequent management updates and dashboard conveyed successes and challenges
- Work reached “tipping point” of common use



Artifacts Bridge



RESULTS

Within 4% of est. Cost
Within 8% of est. Time

Baseline Design Concept (Unmanufacturable)

- DFA Index: 11.2
- Number of Parts: 37
- Assembly Time (min.): 8.6

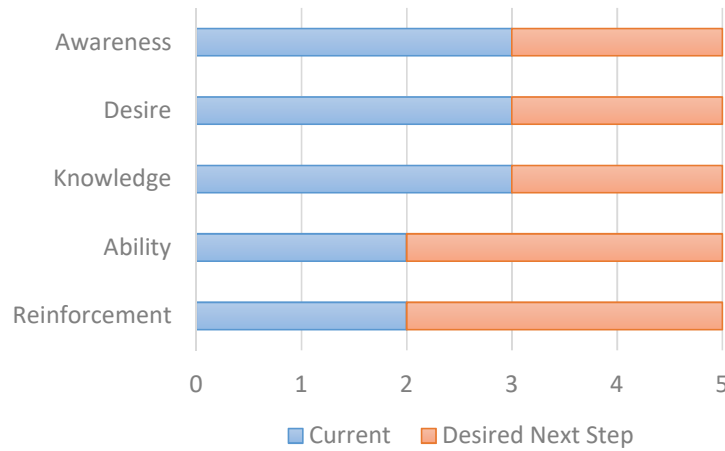
Next Design Concept (Complicated Assembly)

- DFA Index: 8.4
- Number of Parts: 61
- Assembly Time (min.): 12.8

Final Design Concept (Simplified Assembly)

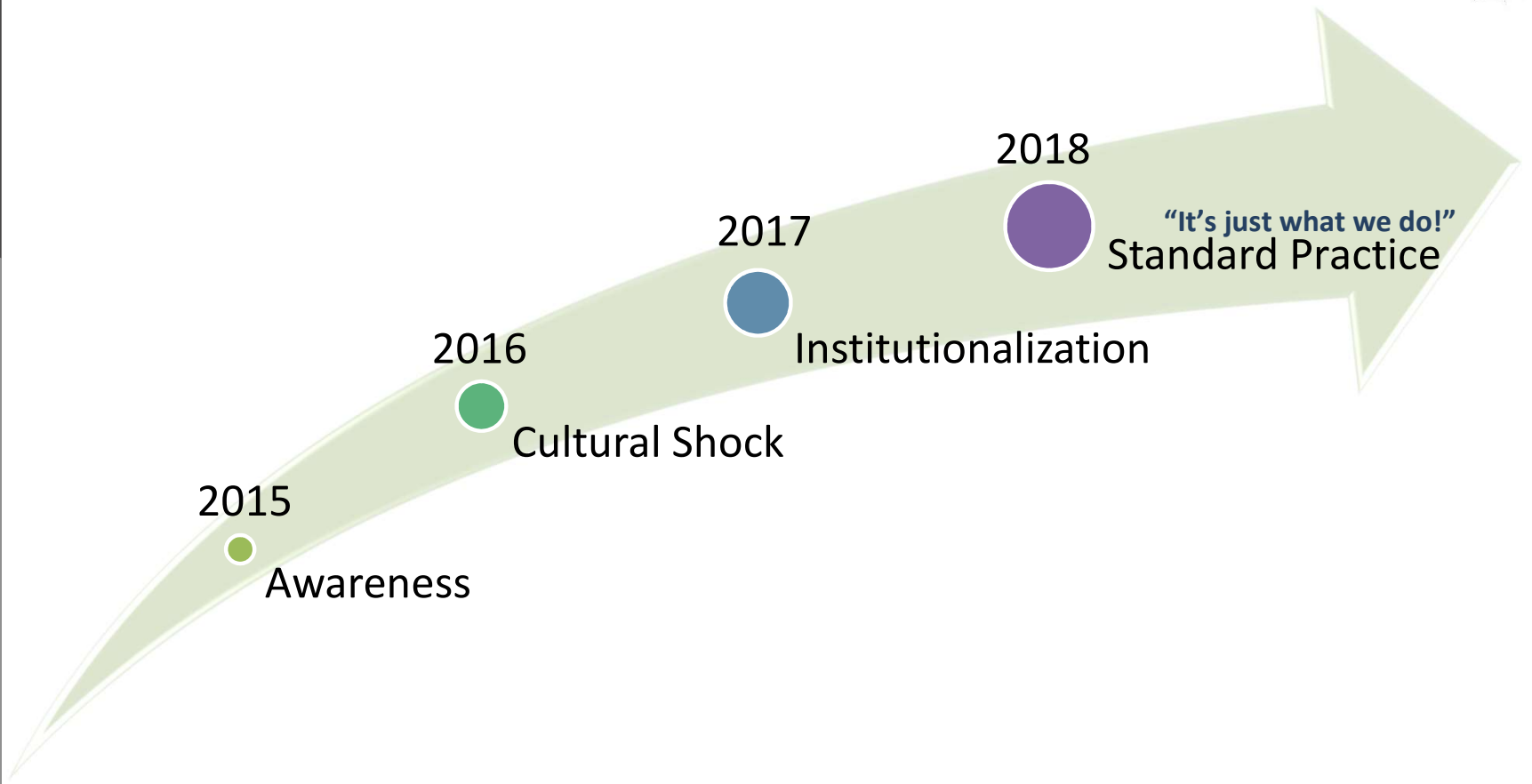
- DFA Index: 15.1
- Number of Parts: 60
- Assembly Time (min.): 8.2

Grow and Sustain



Internal Champion

Implementation Plan





Strategy

Integrate DFMA
within Projects

DFMA
Institutionalization

DFMA Communication
and Socialization

DFMA Tool
Management

DFMA User Group (DUG)

Our DFMA objective is to reduce development time, improve cost position, and foster early collaboration through rapid data driven design decisions.



- **What**

- A group of DFMA tool users who create best practices for DFMA tool use

- **Why**

- Continuously improve use of the DFMA tool
- Foster collaboration and camaraderie among the DFMA tool users

- **Who**

- Representatives from each location who regularly use the DFMA tool during the course of their work
- Charter Members: 10 people from 5 global locations

- **When**

- Regular, hands-on, working meetings are held every other Wednesday at 7:00 AM Central Time
- It is expected that the members will be allowed to devote 10% of their time to supporting the DUG activities



KOHLER DFMA EXPERT ASSESSMENT



CANDIDATE NAME:	DATE:
ASSESSMENT TEAM:	OVERALL ASSESSMENT RANKING AVERAGE:
	0.0
	RANK
DFA EXPERTISE	0.0
Perform many DFA Analyses for a variety of assemblies	0
Calculate & explain the DFA index	0
List & define the Minimum Part Criteria categories	0
Describe the various Handling & Insertion Difficulties	0
Explain the different Securing Processes	0
Import a Parts List/BOM	0
Generate Results & Reports	0
Compare DFA analysis results between design options	0
Create & test Kohler specific library Operations	0
DFM EXPERTISE	0.0
Perform many DFM analyses for a variety of parts	0
Demonstrate awareness of Automated Assembly	0
Use the Geometry Calculator to estimate Part Volume	0
Explain & estimate Surface Patches	0
Import a CAD model	0
Generate Graphs and Reports	0
Compare DFM analysis results for materials & processes	0
Create & test Kohler specific DFM library items	0
TECHNICAL KNOWLEDGE	0.0
Basic familiarity with part fabrication processes: Injection Molding, Casting, Machining, Forging, Hydroforming, Stamping & Forming	0
Competency with drawings, tolerances & CAD models	0
Proficient user of SAP & WindChill	0
Use DFMA to support competitor product analysis	0
FACILITATION SKILLS	0
Demonstrate competent training skills	0
Manage conflict resolution	0
Organize multiple DFMA workshops/events	0
Competently present training modules for DFMA Overview, DFA, Piston Exercise & DFM	0
Identify and resolve common DFMA beginner mistakes	0
DFMA ADVOCACY	0.0
Active involvement in the Kohler DFMA User Group	0
Attend & share BDI sponsored DFMA Webinars	0
Collaboration with BDI, & DFMA Forum contributions	0
Provide DFMA information to others	0

Overall assessment average must be 7 (out of 10) or higher

Each section must average 6 or higher

DFMA Expert Assessment

IMPROVEMENT PLAN



DFMA Expert Assessment

DFMA EXPERTISE

0.0

- Perform many DFA Analyses for a variety of assemblies
- Calculate & explain the DFA Index
- List & define the Minimum Part Criteria categories
- Describe the various Handling & Insertion Difficulties
- Explain the different Securing Processes
- Import a Parts List/BOM
- Generate Results & Reports
- Compare DFA analysis results between design options
- Create & test Kohler specific library Operations

0

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KOHLER DFMA EXPERT ASSESSMENT	
CANDIDATE NAME:	DATE:
ASSESSMENT ITEM:	OVERALL ASSESSMENT RANKING AVERAGE:
	RANK
DFA EXPERTISE	0.0
Perform many DFA Analyses for a variety of assemblies	0
Calculate & explain the DFA Index	0
List & define the Minimum Part Criteria categories	0
Describe the various Handling & Insertion Difficulties	0
Explain the different Securing Processes	0
Import a Parts List/BOM	0
Generate Results & Reports	0
Compare DFA analysis results between design options	0
Create & test Kohler specific library Operations	0
DFM EXPERTISE	0.0
Perform many DFM analyses for a variety of parts	0
Obtain a complete awareness of Automated Assembly	0
Use the Geometry Calculator to estimate Part Volume	0
Explain the various Surface Finishes	0
Import a CAD File	0
Generate Grouping Reports	0
Compare DFA analysis results for materials & processes	0
Create & test Kohler specific DFM library items	0
TECHNICAL KNOWLEDGE	0.0
Basic familiarity with part fabrication processes: Injection Molding, Casting, Machining, Forging, Hydroforming, Stamping & Forming	0
Competency with drawings, tolerances, & 3D models	0
Proficient user of SAP & Windchill	0
Use DFMA to support computer product analysis	0
FACILITATION SKILLS	0
Demonstrate competent training skills	0
Manage conflict resolution	0
Organize multiple DFMA workshops/events	0
Competently present training modules for DFMA Overview, DFA, Process Exercise & DFM	0
Identify and resolve common DFMA beginner mistakes	0
DFMA ADVOCACY	0.0
Active involvement in the Kohler DFMA User Group	0
Attend & share ROI sponsored DFMA Webinars	0
Collaboration with ROI & DFMA Forum contributions	0
Provide DFMA information to others	0
IMPROVEMENT PLAN	



DFMA Expert Assessment

DFM EXPERTISE

0.0

- Perform many DFM analyses for a variety of parts
- Demonstrate awareness of Automated Assembly
- Use the Geometry Calculator to estimate Part Volume
- Explain & estimate Surface Patches
- Import a CAD model
- Generate Graphs and Reports
- Compare DFM analysis results for materials & processes
- Create & test Kohler specific DFM library items

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KOHLER DFMA EXPERT ASSESSMENT	
CANDIDATE NAME:	DATE:
ASSESSMENT TEAM:	OVERALL ASSESSMENT RANKING AVERAGE:
DFMA EXPERTISE	0.0
Perform many DFM Analyses for a variety of assemblies	0
Calculate & explain the DFA Index	0
List & define the Minimum Part Count Categories	0
Describe the various Hand-Assembly Operation Difficulties	0
Explain the differences between Assembly Processes	0
Import a CAD model	0
Generate Graphs & Reports	0
Compare DFA analysis results between design options	0
Create & test Kohler specific DFM library items	0
DFM EXPERTISE	0.0
Perform many DFM analyses for a variety of parts	0
Demonstrate awareness of Automated Assembly	0
Use the Geometry Calculator to estimate Part Volume	0
Explain & estimate Surface Patches	0
Import a CAD model	0
Generate Graphs and Reports	0
Compare DFM analysis results for materials & processes	0
Create & test Kohler specific DFM library items	0
TECHNICAL KNOWLEDGE	0.0
Proficiency with part fabrication processes: Injection Molding, Casting, Machining, Forging, Hydroforming, Stamping & Forming	0
Competency with drawings, tolerances & CAD models	0
Proficient user of SAP, Windchill	0
Use DFMA to support computer product analysis	0
FACILITATION SKILLS	0
Demonstrate competent training skills	0
Manage conflict resolution	0
Organize multiple DFMA workshops/events	0
Competently present training modules for DFMA Users	0
DFA, In-line Exercise & DFMA	0
Identify and resolve common DFMA beginner mistakes	0
DFMA ADVOCACY	0
Active involvement in the Kohler DFMA User Group	0
Attend & share ROI sponsored DFMA Webinars	0
Collaboration with ROL & DFMA Forum contributions	0
Provide DFMA information to others	0
IMPROVEMENT PLAN	



DFMA Expert Assessment

KOHLER DFMA EXPERT ASSESSMENT	
CANDIDATE NAME:	DATE:
ASSESSMENT TEAM:	OVERALL ASSESSMENT RANKING AVERAGE:
	0.0
	COMMENTS
DFA EXPERTISE	0.0
Perform many DFA Analyses for a variety of assemblies	0
Calculate & explain the DFA index	0
List & define the Minimum Part Criteria categories	0
Describe the various Handling & Insertion Difficulties	0
Explain the different Securing Processes	0
Import a Part into I/OEM	0
Generate Results & Reports	0
Compare DFA analysis results between design options	0
Create & test Kohler specific library Operations	0
DFM EXPERTISE	0.0
Perform many DFM analyses for a variety of parts	0
Demonstrate awareness of Assembly Assembly	0
Use the Geometry Calculator to estimate Part Volume	0
Explain & estimate Surface Patches	0
Import a CAD model	0
Generate Reports and Reports	0
Compare DFM analysis results for materials & processes	0
Create & test Kohler specific DFM library items	0
TECHNICAL KNOWLEDGE	0.0
Basic familiarity with part fabrication processes: Injection Molding, Casting, Machining, Forging, Hydroforming, Stamping & Forming	0
Competency with drawings, tolerances & CAD models	0
Proficient user of SAP & WindChill	0
Use DFMA to support competitor product analysis	0
TRAINING SKILLS	0.0
Demonstrate competent training skills	0
Manage conflict	0
Organize multiple DFMA Webinars/Events	0
Competently present training material for DFMA Overview, DFA, In-line Exercise & DFM	0
Identify and resolve common DFMA beginner mistakes	0
DFMA ADVOCACY	0.0
Active involvement in the Kohler DFMA User Group	0
Attend & share ROI sponsored DFMA Webinars	0
Collaboration with ROI & DFMA Forum contributions	0
Provide DFMA information to others	0
IMPROVEMENT PLAN	

TECHNICAL KNOWLEDGE	0.0	
Basic familiarity with part fabrication processes: Injection Molding, Casting, Machining, Forging, Hydroforming, Stamping & Forming	0	
Competency with drawings, tolerances & CAD models	0	
Proficient user of SAP & WindChill	0	
Use DFMA to support competitor product analysis	0	



DFMA Expert Assessment

KOHLER DFMA EXPERT ASSESSMENT	
CANDIDATE NAME:	DATE:
ASSESSMENT TEAM:	OVERALL ASSESSMENT RANKING AVERAGE:
	D.O
	COMMENTS
DFMA EXPERTISE	0.0
Perform many DFA Analyses for a variety of assemblies	0
Calculate & explain the DFA index	0
List & define the Minimum Part Criteria categories	0
Describe the various Handling & Insertion Difficulties	0
Explain the different Securing Processes	0
Import a Part into IRODM	0
Generate Results & Reports	0
Compare DFA analysis results between design options	0
Create & test Kohler specific library Operations	0
DFM EXPERTISE	0.0
Perform many DFM analyses for a variety of parts	0
Demonstrate awareness of Automated Assembly	0
Use the Geometry Calculator to estimate Part Volume	0
Explain & estimate Surface Patches	0
Import a CAD model	0
Generate Graphs and Reports	0
Compare DFM analysis results for methods & processes	0
Create & test Kohler specific library items	0
TECHNICAL KNOWLEDGE	0.0
Basic familiarity of part fabrication processes: Injection Molding, Casting, Machining, Forging, Hydroforming, Stamping & Forming	0
Competency with drawings, tolerances & CAD models	0
Competent user of SAP & Windchill	0
Use DFMA to support computer product analysis	0
FACILITATION SKILLS	0.0
Demonstrate competent training skills	0
Manage conflict resolution	0
Organize multiple DFMA workshops/events	0
Competently present training modules for DFMA Overview, DFA, Piston Exercise & DFM	0
Identify and resolve common DFMA beginner mistakes	0
LEADERSHIP FACTS	0.0
Active member of the Kohler DFMA User Group	0
Attend & share ROI opportunities with colleagues	0
Collaboration with ROL & DFMA Forum Contributions	0
Provide DFMA information to others	0
IMPROVEMENT PLAN	

FACILITATION SKILLS		0
Demonstrate competent training skills		0
Manage conflict resolution		0
Organize multiple DFMA workshops/events		0
Competently present training modules for DFMA Overview, DFA, Piston Exercise & DFM		0
Identify and resolve common DFMA beginner mistakes		0

DFMA Expert Assessment



KOHLER DFMA EXPERT ASSESSMENT	
CANDIDATE NAME:	DATE:
ASSESSMENT TEAM:	OVERALL ASSESSMENT RANKING AVERAGE:
	0.0
	COMMENTS
DFA EXPERTISE	0.0
Perform many DFA Analyses for a variety of assemblies	0
Calculate & explain the DFA Index	0
Use & define the Minimum Part Criteria categories	0
Describe the various Handling & Insertion Difficulties	0
Explain the different Securing Processes	0
Import a Part into BOM	0
Generate Results & Reports	0
Compare DFA analysis results between design options	0
Create & test Kohler specific library Operations	0
DFM EXPERTISE	0.0
Perform many DFM analyses for a variety of parts	0
Demonstrate awareness of Automated Assembly	0
Use the Geometry Calculator to estimate Part Volume	0
Explain & estimate Surface Patches	0
Import a CAD model	0
Generate Graphs and Reports	0
Compare DFM analysis results for materials & processes	0
Create & test Kohler specific DFM library items	0
TECHNICAL KNOWLEDGE	0.0
Basic familiarity with part fabrication processes: Die-casting, Molding, Casting, Machining, Forging, Hydroforming, Stamping & Forming	0
Competency with drawings, tolerances & CAD models	0
Proficient user of SAP & WinCC	0
Use DFMA to support customer product analysis	0
FACILITATION SKILLS	0
Demonstrate competent training skills	0
Manage conflict resolution	0
Organize multiple DFMA workshops/events	0
Confidently present training modules for DFMA Overview, Cost, Process Execution & DFMA	0
Identify and resolve common DFMA beginner mistakes	0
DFMA ADVOCACY	0.0
Active involvement in the Kohler DFMA User Group	0
Attend & share BDI sponsored DFMA Webinars	0
Collaboration with BDI, & DFMA Forum contributions	0
Provide DFMA info to others	0
IMPROVEMENT PLAN	

DFMA ADVOCACY	0.0
Active involvement in the Kohler DFMA User Group	0
Attend & share BDI sponsored DFMA Webinars	0
Collaboration with BDI, & DFMA Forum contributions	0
Provide DFMA information to others	0



DFMA DASHBOARD (2017.APR.30)



PROJECT USAGE

2017 Projects Requiring DFMA = 100
 Cumulative # of Projects Utilizing DFMA = 34 Project Participation Rate (YTD) = 34%

Projects Utilizing DFMA This Month

LOC	PROJ#	PROJECT	PHASE	NAME(S)	LOC	PROJ#	PROJECT	PHASE	NAME(S)
SFO	1234	Sample Parts	D2	J Doe	IFO	8765	Mini-me Look-a-like	D4	J Smith, B Jones
MIRA	1823	Hi-Profile Assy	D3	J Doe Jr	WFO	9753	Flux Capacitor, Rev-2	D1	J Smith Jr
WFO	4321	New Product	D2	D John	WFO	7531	Next Gen Assy	D2	D John
WFO	5678	High Efficiency Product	D1	J Smith	BFO	2468	Advanced Tech Parts	D3	C Wang

Competitor Product Analysis/Benchmarking

	DFA Index	Est. Assy Time	Part Count	Operations
Product A (Min Parts = 6)	15.1	125.1 s	15	2
20.Mar.2017 Product B (Min Parts = 6)	9.6	205.0 s	21	5
Product C (Min Parts = 6)	12.3	162.6 s	17	4

Comparing Early DFMA Estimates to Final Results

		Original Estimate	Final Actual	Difference %
Big Product	DFA Index	14.3	14.5	1.4%
15.Apr.2017	Assy Time (min.)	5.6	5.1	-8.9%
	Part Count	38	37	-2.6%
	Total Cost (\$)	\$ 100.00	\$ 98.00	-2.0%

DFMA WORKSHOP RESULTS



Date	Location	DFMA Workshop	DFA Index %Δ
7-Apr	WFO	Flux Capacitor, Rev-2	38.7%
16-Mar	BFO	Advanced Tech Parts	N/A
2-Feb	WFO	New Product	14.5%
25-Jan	WFO	Next Gen Assy	23.2%

Monthly DFMA Dashboard

COMMUNICATION & SOCIALIZATION

DFMA Advocacy & Application

	Plan	Act
DFMA Workshops/Events	14	7
Lunch-n-Learn/Presentations	6	5
DFMA SharePoint Site Visitors	200	229

- The DFMA Roadmap was presented to Purchasing management. Additional meetings have been setup to develop DFM proficiency within Purchasing.
 - A BDI webinar about using DFM to review quotes was shown to Purchasing.
 - A Fastener video has been created and posted on the DFMA SharePoint site.
 - A 2-day DFMA training class was held.

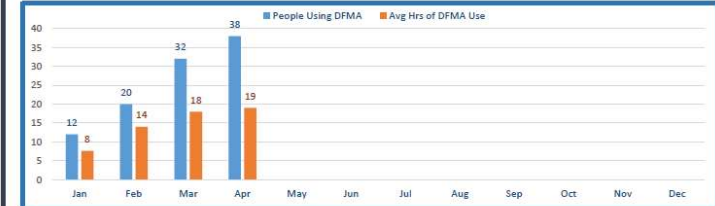
DFMA User Group Activity

	Plan	Act
DFMA User Group Meetings	16	5

- The TCO team has provided definitions for the TCO Risk Factors and calculations.
 - A DFMA workshop was held with the hi-tech application group.

- The 6 sigma project for CAD Importing was completed. Implementation is underway.
 - Operations for "Knurling", "Profit Margin" and "Additional Time Consumption" have been tested and added to the libraries.
 - A DFA analysis was conducted on competitor products. All three products analyzed have six parts that meet the minimum part criteria.

TOOL MANAGEMENT



Licenses Used Simultaneously

6	2	12	22	37
5	13	27	34	56
4	22	23	48	67
3	76	108	198	315
2	215	346	414	478
1	487	515	623	657
Jan	Feb	Mar	Apr	May
Jun	Jul	Aug	Sep	Oct
Nov	Dec			

Kohler Example



Monthly DFMA Dashboard



PROJECT USAGE

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 Project Participation Rate (YTD) = 34%

Projects Utilizing DFMA This Month

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MIRA	1823	Hi-Profile Assy	D3	J Doe Jr	WFO	9753	Flux Capacitor, Rev-2	D1	J Smith Jr
WFO	4321	New Product	D2	D John	WFO	7531	Next Gen Assy	D2	D John
WFO	5678	High Efficiency Product	D1	J Smith	BFO	2468	Advanced Tech Parts	D3	C Wang

Competitor Product Analysis/Benchmarking

	DFA Index	Est. Assy Time	Part Count	Operations
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20.Mar.2017 Product B (Min Parts = 6)	9.6	205.0 s	21	5
Product C (Min Parts = 6)	12.3	162.6 s	17	4

Comparing Early DFMA Estimates to Final Results

		Original Estimate	Final Actual	Difference %
2016 Big Product Released: 15.Apr.2017	DFA Index	14.3	14.5	1.4%
	Assy Time (min.)	5.6	5.1	-8.9%
	Part Count	38	37	-2.6%
	Total Cost (\$)	\$ 100.00	\$ 98.00	-2.0%

DFMA DASHBOARD (2017.APR.30)

PROJECT USAGE
 2017 Projects Requiring DFMA = 100
 Cumulative # of Projects Utilizing DFMA = 34
 Project Participation Rate (YTD) = 34%

DFMA WORKSHOP RESULTS
 Line chart showing cumulative projects utilizing DFMA from Jan to Dec.

COMPETITOR PRODUCT ANALYSIS/BENCHMARKING
 Table comparing Product A, B, and C across DFA Index, Est. Assy Time, Part Count, and Operations.

TOOL MANAGEMENT
 Bar chart showing licenses used simultaneously from Jan to Dec.

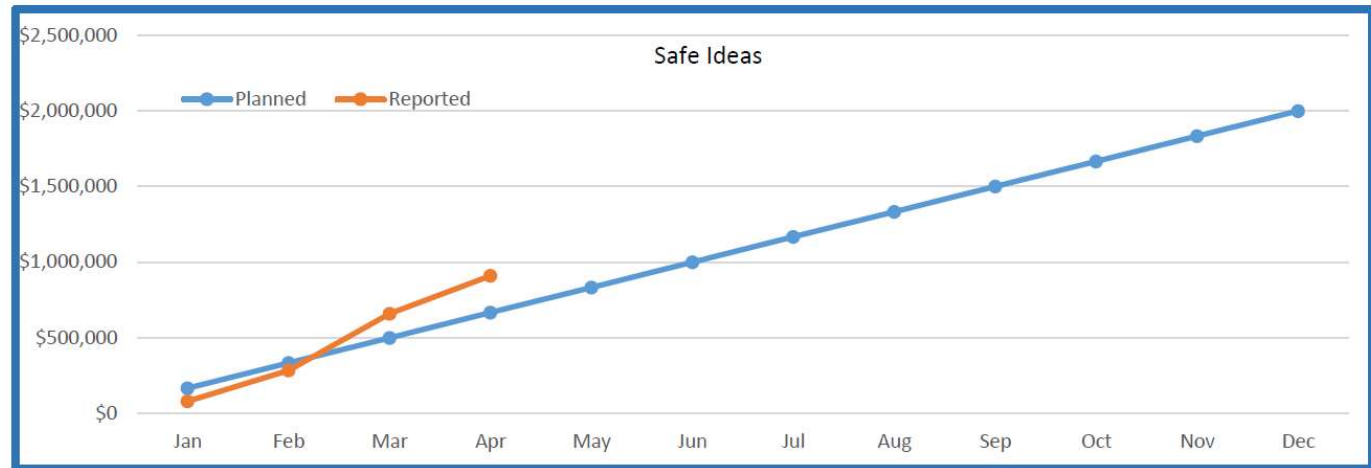
COMMUNICATION & SOCIALIZATION
 Text describing DFMA training and communication activities.

DFMA USER GROUP MEETINGS
 Table listing meeting dates and attendance.



Monthly DFMA Dashboard

DFMA WORKSHOP RESULTS



Date	Location	DFMA Workshop	DFMA Index %Δ
7-Apr	WFO	Flux Capacitor, Rev-2	38.7%
16-Mar	BFO	Advanced Tech Parts	N/A
2-Feb	WFO	New Product	14.5%
25-Jan	WFO	Next Gen Assy	23.2%

DFMA DASHBOARD (P=17, APR.30)

2017 Projects Requiring DFMA = 100
Cumulative # of Projects Utilizing DFMA = 34
Project Participation Rate (YTD) = 34%

PROJECTS REQUIRING DFMA (YTD)

ID	NAME	PROJECT	STATUS	DFMA INDEX	PROJECT	STATUS	DATE	STATUS	
101	101A	Service Parts	01	0.00	010	010A	Master Control Unit	01	0.00
102	102A	Hydraulic Assy	01	0.00	010	010B	Flux Capacitor, Rev-2	01	0.00
103	103A	New Product	01	0.00	010	010C	Next Gen Assy	01	0.00
104	104A	High-Pressure Product	01	0.00	010	010D	Advanced Tech Parts	01	0.00

COMPUTER PRODUCTIVITY (YTD)

Product #	DFMA Index	Part Count	Operations
20 Mar 2017	5.0	201.0	1
Product # (New Parts) = 8	5.0	201.0	1
Product # (Old Parts) = 0	5.0	201.0	1

COMPARING SAFE DFMA SOLUTIONS TO FINAL RESULTS

Product #	Original Estimate	Final Actual	Difference %
2016 Big Product	14.2	14.2	0.0%
Released: 15-Apr-2017	5.6	5.1	-8.9%
Part Count	36	36	0.0%
Total Cost (\$)	100.00	58.00	-42.0%

COMMUNICATION & SOCIALIZATION

DFMA Adoption & Application

- Additional meetings have been set up to develop DFMA proficiency within engineering.
- A DFMA webinar about using DFMA to reduce quotes was shown to marketing.
- A Feature Index has been created and posted on the DFMA dashboard.
- A 3-day DFMA training class was held.

DFMA User Group Activity

Plan	Act
1	1
2	2
3	3
4	4
5	5
6	6
7	7
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100	100

TOOL MANAGEMENT

Users Used Simultaneously

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6	2	12	22	26	28	34	34	34	34	34	34
5	13	27	34	34	34	34	34	34	34	34	34
4	22	23	48	47	47	47	47	47	47	47	47
3	76	108	198	315	315	315	315	315	315	315	315
2	215	246	414	478	478	478	478	478	478	478	478
1	487	515	623	657	657	657	657	657	657	657	657



Monthly DFMA Dashboard

COMMUNICATION & SOCIALIZATION

DFMA Advocay & Application

DFMA Workshops/Events	Plan 14	Act 7
Lunch-n-Learn/Presentations	6	5
DFMA SharePoint Site Visitors	200	229

- The DFMA Roadmap was presented to Purchasing management. Additional meetings have been setup to develop DFM proficiency within Purchasing.
- A BDI webinar about using DFM to review quotes was shown to Purchasing.
- A Fastener video has been created and posted on the DFMA SharePoint site.
- A 2-day DFMA training class was held.

DFMA User Group Activity

DFMA User Group Meetings	Plan 16	Act 5
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- The TCO team has provided definitions for the TCO Risk Factors and calculations.
- A DFMA workshop was held with the hi-tech application group.

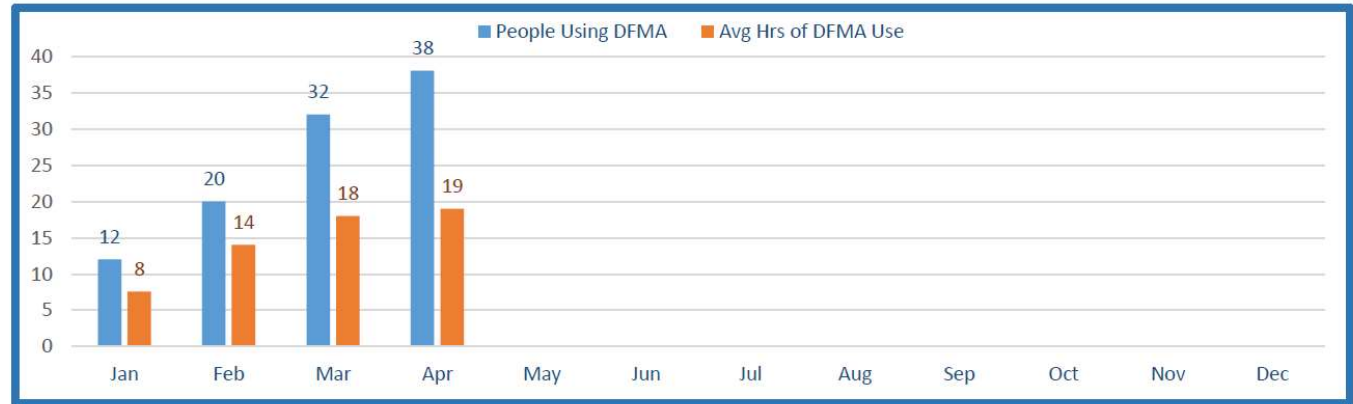
- The 6 sigma project for CAD Importing was completed. Implementation is underway.
- Operations for "Knurling", "Profit Margin" and "Additional Time Consumption" have been tested and added to the libraries.
- A DFA analysis was conducted on competitor products. All three products analyzed have six parts that meet the minimum part criteria.





Monthly DFMA Dashboard

TOOL MANAGEMENT



Licenses Used Simultaneously

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6	2	12	22	37								
5	13	27	34	56								
4	22	23	48	67								
3	76	108	198	315								
2	215	346	414	478								
1	487	515	623	657								

Kohler Example

DFMA DASHBOARD (2017.APR.30)

2017 Projects Requiring DFMA = 100
Cumulative # of Projects Utilizing DFMA = 34

PROJECT USAGE

DC	PRJ	PROJCT	PHASE	STATUS	DC	PRJ	PROJCT	PHASE	STATUS
001	1001	Service Parts	00 - Init	001	001	1001	Service Parts	00 - Init	001
001	1002	Hydraulic Assy	00 - Init	001	001	1002	Hydraulic Assy	00 - Init	001
001	1003	New Product	00 - Init	001	001	1003	New Product	00 - Init	001
001	1004	High-Volume Product	00 - Init	001	001	1004	High-Volume Product	00 - Init	001

COMPUTER PRODUCTIVITY

Product # (Mfr Part #)	DFMA Index	Est. Qty	Est. Cost	Est. Operations
20 Mar 2017 Product # (Mfr Part #)	5.0	201.0	21	5
Product # (Mfr Part #)	15.3	201.0	17	6

COMPARING EARLY DFMA SOLUTIONS TO FINAL RESULTS

Original Estimate	Final Actual	Difference %
14.2	14.1	-0.7%
5.6	5.1	-9.1%
36	37	+2.8%
\$ 100.00	\$ 88.00	-12.0%

COMMUNICATION & SOCIALIZATION

DFMA Adoption & Application

- Additional meetings have been held to discuss DFMA proficiency.
- A 3D model was created and posted on the DFMA dashboard.
- A 3-day DFMA training class was held.


DFMA User Group Activity

Plan	Act
13	13
13	13

Licenses Used Simultaneously


Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6	2	12	22	37							
5	13	27	34	56							
4	22	23	48	67							
3	76	108	198	315							
2	215	346	414	478							
1	487	515	623	657							

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 DEVENISH BILL


K&BA ENGINEERING SITES

Description/Purpose



Our DFMA objective is to reduce development time, improve cost position, and foster early collaboration through rapid data driven design decisions.


Introduction to DFMA Video




Quick Links

- Boothroyd Dewhurst, Inc.
- Boothroyd Dewhurst Online Tutorials
- DFMA Information
- DFMA Monthly Dashboards
- DFMA Tips
- DFMA User Group (DUG)
- DFMA Videos
- DFMA Workshops & Projects
- Add new link


Announcements

DFMA Dashboard for April 5/8/2017 8:04 AM
 by  DEVENISH BILL
 The monthly DFMA Dashboard for April has been posted.
<https://mykohler.sharepoint.com/sites/enqkb/dfma/Pages/DFMA-Monthly-Dashboards.aspx>

Use "STL" Files for CAD Importing 4/10/2017 9:33 AM
 by  DEVENISH BILL
 The results of a Kohler internal six-sigma project recommends that the "STL" file format be used when importing CAD models into DFM and DFA. The report, and project details, can be found in a folder within the DUG Projects link.

DFMA SharePoint Site

DFMA Experts

	Matthieu Da Rocha	Sr Product Project Engineer Reims, France	Matthieu.DaRocha@KohlerEurope.com
	Bill Devenish	Principal Engineer, Global DFX Kohler, WI, USA	Bill.Devenish@Kohler.com
	Stephanie Freier	Sr Staff Engineer, NPI Kohler, WI, USA	Stephanie.Freier@Kohler.com
	Adam Guenther	Manager, NPI North America Kohler, WI, USA	Adam.Guenther@Kohler.com



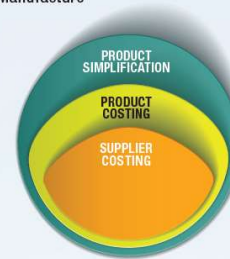


DFMA Poster

SAVE TIME, MONEY, & EFFORT

OPTIMIZE YOUR PROJECT WITH AN
EFFICIENT DESIGN APPROACH

Your team can reduce development time and cost, optimize product design and foster early collaboration through a Design for Manufacture and Assembly (DFMA) workshop. Engineering, Industrial Design, Supply Chain, Manufacturing and Quality participate in the workshop, which facilitates rapid data-driven design decisions that lead to measurable reductions.



SCHEDULE A THREE-DAY, HANDS-ON DFMA TRAINING WORKSHOP TO KICK-START YOUR PROJECT. FOR ADDITIONAL INFORMATION, GO TO THE DFMA SHAREPOINT SITE, OR CONTACT SOMEONE FROM NPI.

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Devenish Honored for His Work in Design for Manufacture and Assembly

2016-07-14

Kohler Co.'s Bill Devenish, Principal



myKOHLER Articles

Design for Manufacture and Assembly Streamlines New Product Development

2017-01-10

This is the third article in a series about

In our third installment of [New Product Development](#) assembly.

We talked about Design for Manufacture and Assembly in our quick refresher.

What is DFMA?

Commercialized by two professors of mechanical engineering, DFMA is a tool that makes it possible to evaluate, test, and optimize parts while still in the design phase.

The two basic principles of DFMA are:

Reduce the number of assembly steps by

Optimize part manufacturing processes and

It may seem simple today but this concept was developed during the early 1970s when DFMA was simplifying individual parts to cost less and improve the development of DFMA exposed the fact that it is relative to the use of fewer, multi-function



Tenacious Collaboration Brings New Products to Market More Efficiently

2017-05-16

What happens when you put experts from disciplines like industrial design, manufacturing and assembly, quality control and supply chain on one project team? You get cutting-edge product design that exceeds customer expectations, is efficient to manufacture, limits environmental impact and hits the market quickly. You get tenacious collaboration. You get New Product Integration (NPI).

Using tools like Lean New Product Development and [Design for Manufacture and Assembly](#) (DFMA), the Global Faucets NPI team is working hard to help create that collaborative environment.

"One big thing about NPI's work is bringing experts together and providing tools which enable them to come to the best solution."





Fasteners.mp4



Mfg at Kohler.mp4



DFMA Workshops.mp4



DFMA Intro.mp4

DFMA Videos



Dance of the Faucets.mp4



DFA Index.mp4



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Makers Meeting

2017 MAKERS MEETING

THE POWER OF NETWORKING

Network with global innovators, thought leaders and colleagues to learn about cutting-edge technology, exchange ideas and develop connections that will enhance your career. This dynamic event will feature small-group dialog, hands-on demonstrations, presentations and open discussions and tours. It will allow you to enhance your business unit with solutions, ideas and up-to-date information to share and apply.

DISCOVER THE LATEST

- Materials and innovations
- Automation, robotics and technology
- Manufacturing business processes
- Continuous improvement projects
- Software solutions

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DFMA[®]

BOOTHROYD DEWHURST

Changing the course of product development
since 1983



Boothroyd Dewhurst, Inc.

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All activities



Boothroyd Dewhurst, Inc. uploaded a video 1 year ago



DFMA Q&A - Design for Assembly

Boothroyd Dewhurst, Inc.

1 year ago · 2,879 views

Nick Dewhurst demonstrates the Design for Assembly methodology using DFA Product Simplification software.



Boothroyd Dewhurst, Inc. uploaded a video 1 year ago



DFMA Q&A - Using DFM to Question a Quote

Boothroyd Dewhurst, Inc.

1 year ago · 710 views

Nick Dewhurst demonstrates how to use DFM Concurrent Costing[®] software to question a supplier quote.

BDI Webinars

Global DFMA Efforts





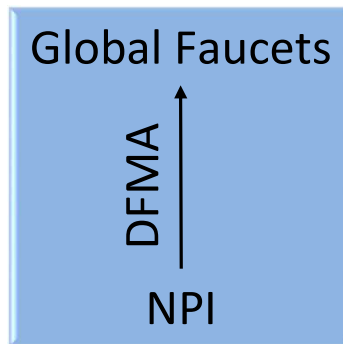
Culture Shock





The Spread of DFMA

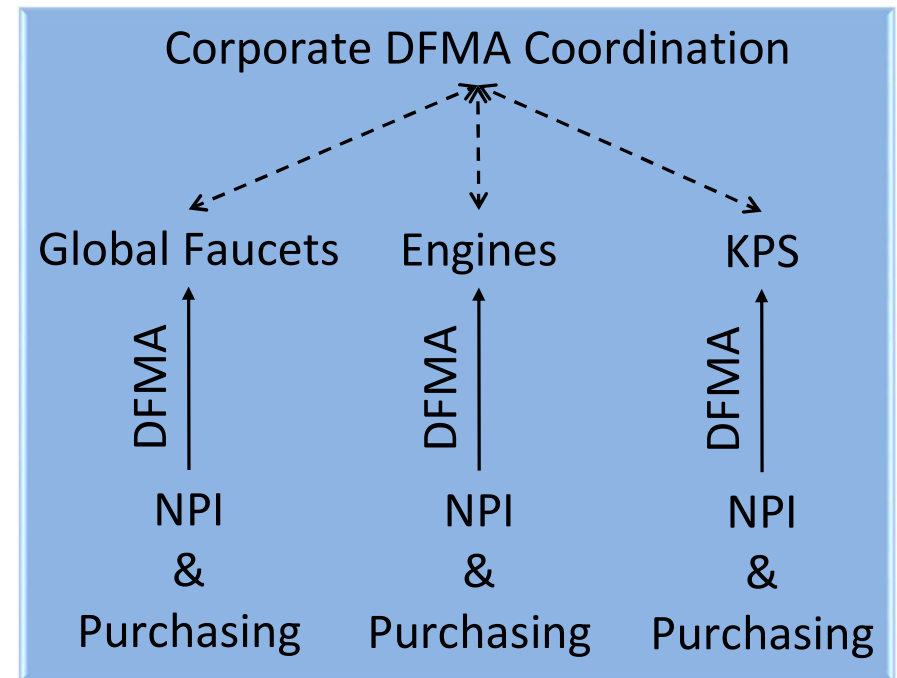
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Future

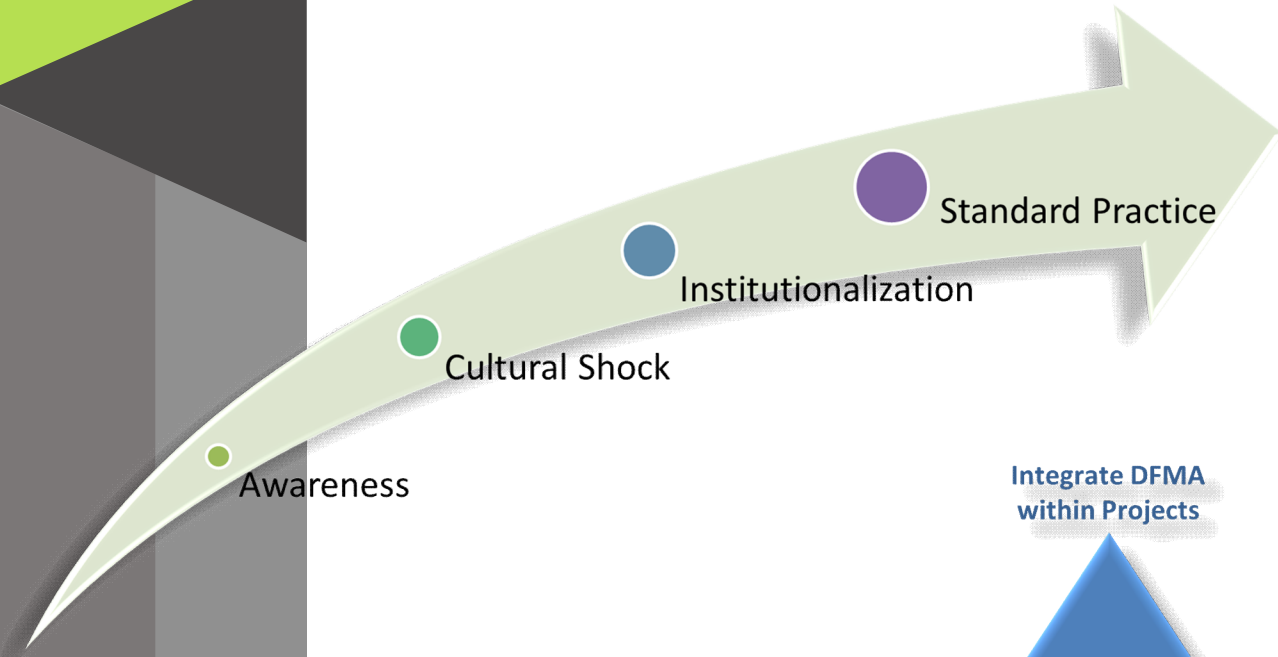




**“All adventures,
especially into new
territory, are scary.”**

Sally Ride

Panel Discussion



Integrate DFMA within Projects

DFMA Institutionalization

DFMA Communication and Socialization

DFMA Tool Management