



Product Development for Lean Manufacturing

***How Freudenberg-NOK Integrates
Lean Product Development into APQP***



Aras Community Network



The Freudenberg and NOK Group



- \$7.5 billion in total **annual sales**, with global automotive sales of ~\$4 billion
 - **One of only 8 in the top 100 OE** automotive suppliers that has **global balance** in each of the three major automotive markets - Asia, Europe and North America - *Automotive News*
 - Offers world-class product development and manufacturing at **57 automotive operations** in 27 countries - facilities include:
 - ✓ 25 in North and South America
 - ✓ 21 in Europe
 - ✓ 11 in the Pacific Rim
 - One of the world's **largest non-tire rubber fabricators**, annually **produces 10 billion components** worldwide
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Automotive Products



- **Sealing packages** for engines, transmissions, brakes, axles and steering



- Complete noise, vibration and harshness (NVH) reduction components and packages



- All rubber, plastic and PTFE components for suspension, electrical and fuel systems





Lean at Freudenberg-NOK



Growth® is an acronym for **Get Rid Of Waste Through Team Harmony**, and represents Freudenberg-NOK's company-wide program stressing lean business practice

Where's the
Product Development
for Lean Initiative? Nothing formal,
It just happened organically

Lean Evolution

Becoming lean is a never ending journey to eliminate waste. Freudenberg-NOK's journey to lean:

1992 - [Kaizen](#)

1995 - [VA / VE](#)

1998 - [3P](#)

1999 - [Lean Supplier Initiative](#)

2000 - [Six Sigma](#)

2001 - [Reached 16,000 Kaizens](#)





Product Development at Freudenberg-NOK



- We are a SKU warrior
 - ✓ Many individual unrelated components
 - Evolution of Product Development Process
 - ✓ Focused on Program Mgt within APQP context
 - ✓ Tried to avoid having our solutions deployment stagnate into an “engineering only” system
 - Focused on broad, phase-based product development with emphasis on high level tasks and deliverables
 - Using Aras Innovator for over 4 years
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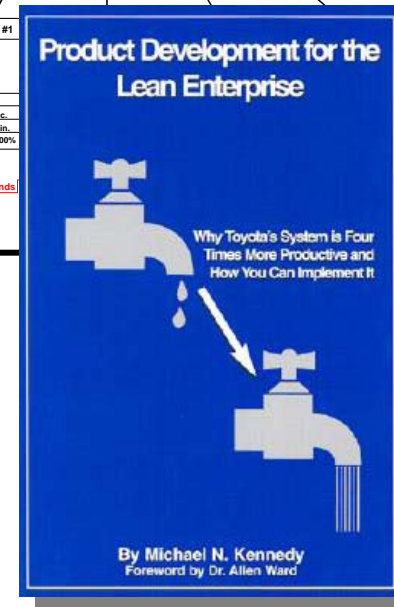
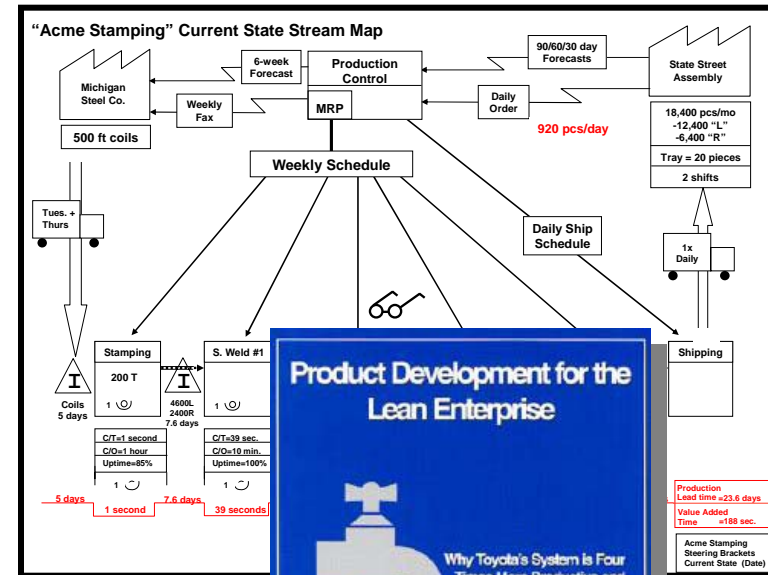
Approaches to Lean in Product Development



Applying Lean Techniques to Engineering

Kennedy & Liker TPDS Methodology

Basic Considerations





How We Approached Lean Development



Basic Lean Considerations during Product Development

- ✓ Slot into an existing Lean Product Family?
 - ✓ Use existing Value Stream and / or Sequence of Events?
 - ✓ Existing preferred suppliers qualified for Lean deliveries?
 - ✓ Targeting specific lines or work cells?
 - ✓ Takt Time calculated prior to launch?
 - ✓ Tooling & equipment 'quick change over' SMED ready?
 - ✓ Design for manufacturability include poka yoke "mistake proofing"?
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Fundamental Goals



- ✓ Reduce Time to Volume at Launch
 - ✓ Ensure Highest Quality Levels
 - ✓ Eliminate Waste During Production Ramp
 - ✓ Achieve Operations and Supply Chain Readiness
 - ✓ Reduce Associated Preproduction Preparation Costs
 - ✓ Maximize New Product Profit Margins
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APQP – Lean Touch Points



Standard
APQP
Checklist



All APQP phases
have activities that
initiate Lean Processes

Phase	Activity	Value Engineering	Value Analysis	(DPTP) Design To Production Transition	(DFSS) Design for Six Sigma	3P	Poka Yoke (Mistake Proofing)	Standard Work	Takt time
Phase 1	Activity 1.1								
Phase 1	Activity 1.2								
Phase 1	Activity 1.3								
Phase 1	Activity 1.4								
Phase 1	Activity 1.5								
Phase 1	Activity 1.6								
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Lean Processes

Value Engineering

Value Analysis

(DPTP) Design To
Production Transition

(DFSS) Design for
Six Sigma

3P

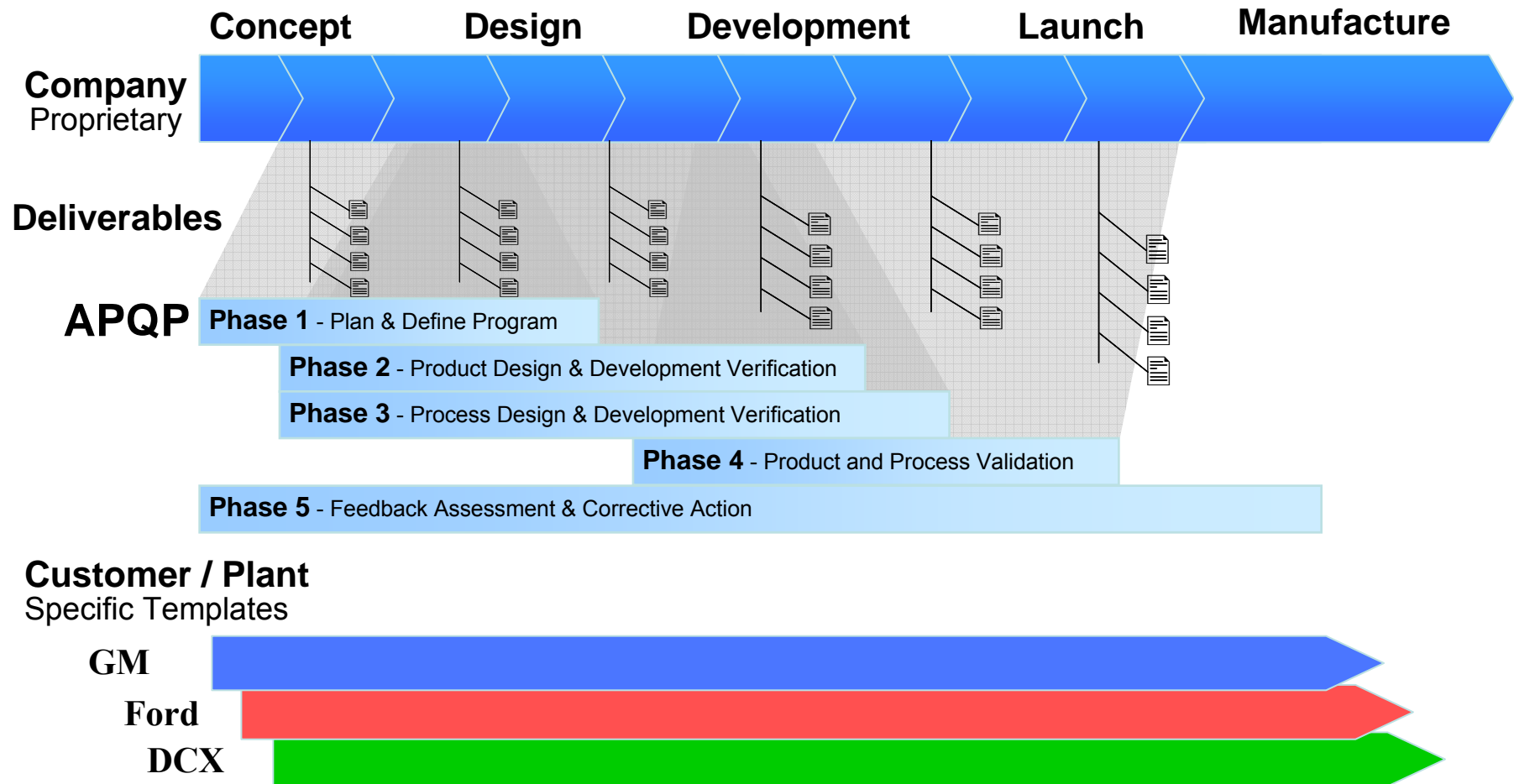
Poka Yoke
(Mistake Proofing)

Standard Work

Takt time



Competitive Practices APQP Context





KPI Metrics



Freudenberg-NOK Flawless Launch Program

Project: Throttle Body Gasket

OEM: Ford

Project Description: Throttle Body Gasket

Project Status: Completed

SOP Date: 07/15/2004

Project Owner: Berry, Rick

Program: 6.8L

Business Unit: Gaskets

Location: Manchester

Business Unit: Gaskets

Path Name Number: 0229402

Created By: rwb

Created On: 07/31/2003

Modified By: rwb

Modified On: 06/16/2005

Locked By: admin

Plant Site: A

Activity: Activity File

Activity: Default PPAP Activity

Category	Type	Observation	Possible Score	Act At SOP	Act At E-Map
Customer Satisfaction	Quality	First Production Order Zero Defects	5	5	5
Customer Satisfaction	Quality	PPAP submittal zero defects	15	15	15
Customer Satisfaction	Quality	Product specification met	15	15	15
Customer Satisfaction	Readiness	SOP (First Production Order) On Time	10	10	10
Customer Satisfaction	Readiness	Logistics (EDI, ASN, Packaging, Etc.) Requirements Met	5	5	5
Customer Satisfaction	Service	Customer Service (Resolution Of Unforeseen Issues)	5	5	5
Customer Satisfaction	Timeliness	PPAP Submittal On Time	5	5	5

Scorecards #1

Created On: 11/04/2005 11:00

OEM: Ford

Champion: Berry, Rick

Flawless Launch Score: 95.5

Grand Total Score: 105.0

Ship To Customer: Mark IV

Program: 6.8L

Customer Satisfaction Score: 55.0

Internal (Plant) Launch Performance Score: 50.0

FHGP Location: Manchester

Business Unit: Gaskets

Project: Throttle Body Gasket

FHGP Item: 13-0234-39325-00

Customer Satisfaction		Possible Score	Actual Score
Service	Customer Service (resolution of unforeseen issues)	5	0
Timeliness	PPAP submittal on time	5	5
Readiness	Logistics (EDI, ASN, Packaging, etc.) requirements met	5	5
Quality	First production order zero defects	5	5
Quality	PPAP submittal zero defects	15	15
Quality	Product specification met	15	15
Readiness	SOP (First Production Order) on time	10	10
Split Score Total			55
Internal (Plant) Launch Performance		Possible Score	Actual Score
Quality	Tools and auxiliary equipment function as planned	10	10
Quality	Tools and auxiliary equipment within budget	5	5
Quality	No supplier issues	10	10
Quality	Process is 6 sigma capable for quality triggers	5	5
Readiness	Process is stable and production ready	5	5
Profitability	Process is equal or better than planned (cycles/cost)	15	15
Split Score Total			50

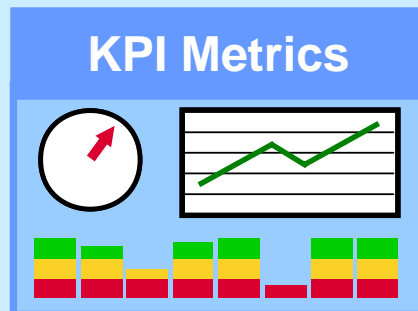
Executive Scorecards

Measure

- Customer Satisfaction
- Plant Launch Performance

Track

- ✓ Quality
- ✓ Service
- ✓ Readiness
- ✓ Timeliness
- ✓ Profitability





Future Direction



- Live Documents
 - ✓ Improve document control during phase 2 & 3
 - ✓ SIMPLE integration, eliminate share drives
 - Project Request Process
 - ✓ Use Aras Innovator for project initiation up front
 - ✓ Manage program initiation process
 - ✓ Use workflows with projects
 - » Who's working on what
 - » Hours charged
 - » Results achieved
 - These are areas we think offer collaboration opportunities moving forward
-



Summary



- Standardizing APQP has allowed us to standardize our signaling to kick off Lean processes
 - APQP like Lean is a process not a project
 - After 15 years and thousands of Kaizens, we still see lots of low hanging opportunity
-