

# FORD'S SYSTEM FOR COST REDUCTION DUE TO DEVELOPMENT TIME

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*To reduce costs due to development time*

## Abstract

*GPDS (Global Product Development System) was developed from two AIAG standards, namely PPAP (Production Part Approval Process) and APQP (Advanced Product Quality Planning). The resulting GPDS includes 31 elements covering everything from quality processes, change management processes and revision control. The new system by Ford reduces development time from former 42 months (according to the FPDS – Ford Product Development System) to admirable 30-32 months.*

## GPDS Ambitions

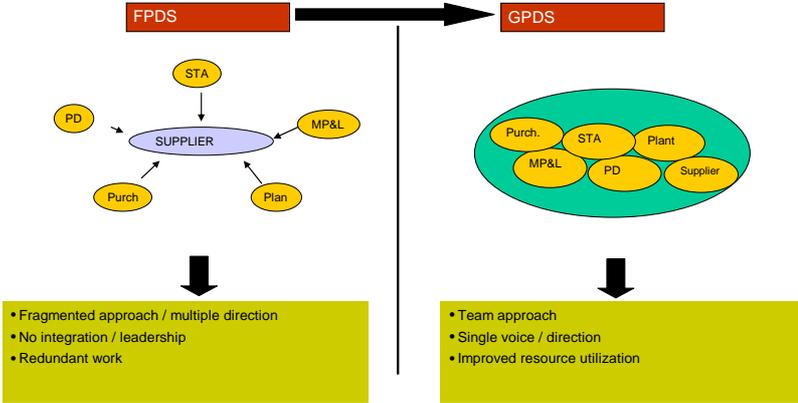
In December 2005 Jon Hewett of Ford Communications Network promoted the new Ford's Global Product Development System. "This program will be completed faster than any we've ever done here in North America," said Graydon Reitz, director, Electrical Electronic Systems Engineering (EESA). "We have to establish confidence in the North American organization that we can actually do a 'go-fast' program, and do it with high quality. This program has made a lot of believers of the adjacent teams within the organization" [1].

Having benchmarked Mazda's "Final Drawing Plan" best practice in advance of their launch, the Expedition/Navigator/F-150 team brought the concept home. Slightly modified, and dubbed the "Perfect Drawing Process" (PDP), it aims to reduce parts design "churn," or re-work.

The intention is that Ford will adopt their GPDS across all their brands and across all car platforms by 2009. The intention is to have a global car development process and all suppliers that wish to work with any Ford related brand must be able to use and comply with this process. In addition the GPDS also includes a single, common reporting tool for suppliers, and a standardized management reporting tool for Ford execs. The GPDS will help Ford to improve the quality of design and engineering related information that is sent to them by their suppliers. [2]

**Differences between FPDS and GPDS**

The main difference between FPDS (Ford Product development system) and GPDS is the approach to suppliers. Supplier is now a part of Ford’s team (Fig. 1). Supplier launch success is a cross-functional, shared responsibility – PD, STA, Buyers & MP&L are core team members. Ford cross-functional teams will work proactively with the highest leverage suppliers on a program.



*Fig. 1 Differences between FPDS and GPDS [3]*

Supplier engagement will begin early in a program – immediately after sourcing. Ford cross functional teams will visit the key supplier manufacturing facility a minimum of four (4) times. The teams will provide the supplier with a single Ford voice on key launch matters. Underlying APQP and PPAP processes and roles & responsibilities will remain the same. Team engagement will continue until the supplier has successfully completed all PPAP requirements and fully met all program ramp-up volumes. Ford will implement the supplier engagement process consistently on a global basis in alignment with the global makeup of the supply base.

**GPDS Purpose**

The main GPDS’s purpose is to improve the competitiveness of Ford Motor Company products and to enhance Ford’s relationships with supply base. One of the most important aspects of the GPDS manufacturing philosophy is the synchronization of parts development and testing early on in the vehicle design process.

"We found roughly a 30 percent savings in the cost of prototype development alone (eliminating approximately 100 prototypes)," said Reitz. "The cost savings per vehicle

platform averages out to \$500 for each Expedition/Navigator, and between \$300 and \$350 for each F-150 we build" [1].

### GPDS 31 Elements

There are 31 elements for the GPDS to be fulfilled. Each element may contain one or more deliverable (Fig. 2).

GPDS ELEMENTS [3]

Table 1

	APQP/PPAP Element	Lead*		APQP/PPAP Element	Lead*
1	Sourcing decision	Buyer	16	Measurement systems evaluation/ Measurement System Analysis studies	STA
2	Customer input requirements	PD			
3	Craftsmanship/ appearance approval report	PD	17	Qualified laboratory documentation	STA
4	DFMEA	PD	18	Checking aids	STA
5	Design/manufacturing reviews	PD/STA	19	Pre-launch control plan	STA
6	DVP&R material, performance test results	PD	20	Operator process instructions	STA
7	Subcontractor APQP status	STA	21	Packaging specifications	MP&L
8	Facilities, tools, & gauges	STA	22	Production trial run	STA
9	Prototype build control plan	PD	23	Production control plan/ control plan	STA
10	Prototype builds	PD	24	Dimensional results	STA
11	Drawing & specification design records	PD	25	Initial process capability study	STA
12	Engineering change document	PD	26	Production validation testing	PD
13	Team feasibility commitment/ customer engineering approval	PD/STA	27	Part submission warrant	STA/PD
14	Manufacturing process flowchart/ process flow diagram	STA	28	Bulk material requirements	STA
15	PFMEA	STA/PD	29	Sample product	STA
			30	Master sample	STA
			31	Record of compliance	STA

### GPDS Supplier Engagement – Process Overview

GPDS supplier engagement process is realized according to the scheme below (Fig. 2).

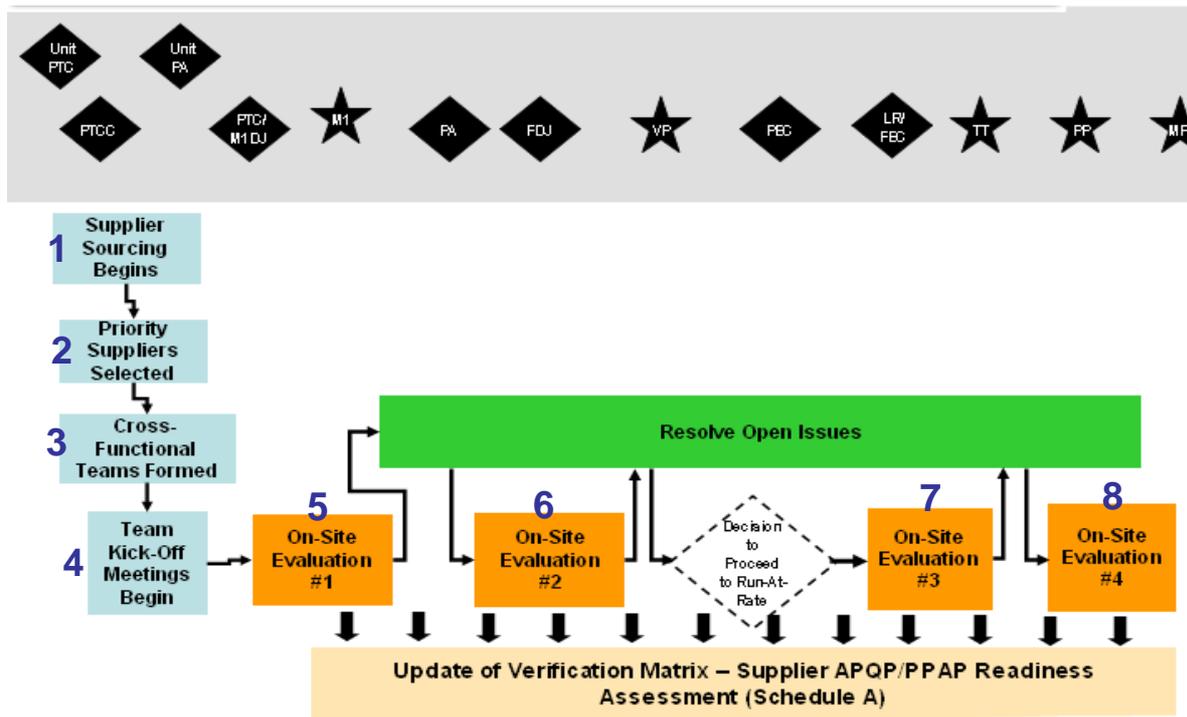


Fig. 3 Supplier engagement process scheme [3]

1. The GPDS Supplier Engagement Process will begin once the *suppliers are sourced*.
2. Once sourcing is complete, the STA Program Lead and the PD Program Lead will work with the PMT leaders and STA Site Managers to complete the Selection of “*Priority suppliers*” for the program. A specific risk model is used to determine the Priority suppliers. Priority suppliers have new-tooled end items that present risks to the launch (site, part, or program risk).
- 3 / 4. The STA and PD Program leads will notify the appropriate D&R Engineers, Buyers, STA Site Engineers, and MP&L analysts (as required) that their suppliers are designated as Priority for a given program. This notification will include specific timing and reporting requirements for the program. Prior to the On-Site Evaluations, the *cross-functional Ford team* members will meet with their supplier team to review program expectations and begin the preparations for site visits. This is called the “*Kick-Off meeting*”.
5. The cross-functional team’s first visit is called “*On-Site Evaluation #1* – Verification of Supplier Failure Mode Avoidance Strategy & Manufacturing Plan. 5 of 31 APQP / PPAP elements are to be fulfilled before the meeting. Those are:
  - Sourcing decision (*Required Sourcing Agreement Signed, Required Supplier Commercial & Program Agreements Signed, Final Mix, Maximum Weekly Volume Communicated and Agreed*)
  - Customer input requirements (*Program Expectations Cascaded to Suppliers*)
  - DFMEA (*DFMEA Completed, Special Characteristics Cascaded to Supplier*)
  - Facilities, tools, & gauges (*Supplier’s OEE Plan is Confirmed by Surrogate Data*)
  - Drawing & specification/design records (*Design Styling Confirmation*)

6. The cross-functional team's second visit is called "**On-Site Evaluation #2** – Verification of Supplier Launch Preparation. APQP/PPAP Elements to be fulfilled till this stage:
  - Sourcing Decision (*All Production Tool Orders Issued to Suppliers*)
  - Subcontractor APQP Status (*Sub-supplier PPAP Timing Plan Completed*)
  - Facilities Tools & Gauges (*Facility and Tooling Timing Plan Completed, Gauge Plan (including Released Gauge Drawings) Completed*)
  - Prototype Build Control Plan (*Prototype Build Control Plan Completed*)
  - Prototype Builds (*All Prototype Tool Orders Issued to Supplier, Prototype Parts Ordered, Prototype Parts Achieve 100% of Required Print Specifications*)
  - Drawing & Specification Design Records (*Design Release (WERS) Completed*)
  - Team Feasibility Commitment/Customer Engineering Approval (*Design, Process, & Timing Feasibility Confirmation*)
  - PFMEA (*Final PFMEA Completed with Linkages*)
  
7. The cross-functional team's third visit is called "**On-Site Evaluation #3** – Verification of Supplier Capability. This visit always occurs prior to the supplier's shipment of parts for production Tool Tryout (TT) builds. APQP/PPAP Elements to be fulfilled till this stage:
  - Craftsmanship/Appearance Approval Report (*AAR Approved*)
  - DVP&R Material/Performance Test Results (*DV Testing Complete*)
  - Subcontractor APQP Status (*Sub-supplier PPAP Phase 1 (or equivalent) Completed*)
  - Facilities, Tools, and Gauges (*Facilities/Tools/Gauges are at the Final Production Location, Suppliers Demonstrated OEE (Phase 0) Supports Capacity Requirements*)
  - Engineering Change Documents (*All Ford Engineering Changes Approved & Recognized by the Supplier*)
  - Manufacturing Process Flowchart/Process Flow Diagram (*Final Process Flowchart Supports PPAP Phase 0 Event*)
  - Measurement System Evaluation/Measurement Systems Analysis Studies (*Gauge R&R Results  $\leq 10\%$  per PPAP Ford Customer Specifics*)
  - Qualified Laboratory Documentation (*Supplier Internal & External Laboratory Compliance*)
  - Checking Aids (*Checking Aids Compliant with Part Specifications*)
  - Pre-Launch Control Plan (*Pre-Launch Control Plan Completed with Linkages*)
  - Operator Process Instructions (*Operator Process Instructions Completed*)
  - Packaging Specifications (*Packaging Approval Process Completed*)
  - Production Trial Run (*PPAP Phase 0 (Including Sub-Suppliers) Completed*)
  - Production Control Plan (*Production Control Plan Completed with Linkages*)
  - Initial Process Capability (*Initial Process Capability Results ( $Ppk \geq 1.67$ )*)
  - Dimensional Results (*100% of Required Measurement Points within Tolerance*)
  - Production Validation Testing (*PV Testing Complete*)
  - Part Submission Warrant (*PPAP Phase 1 Complete, PPAP Phase 2 Complete (if Single Workstream)*)
  - Bulk Materials Requirement (*Bulk Materials Checklist Included in PPAP Submission*)
  - Sample Product (*Sample Product Produced with Ford Identification*)
  - Master Sample (*Master Sample Approved*)
  - Record of Compliance (*Ford-Specific Requirements Documented*)
  
8. The cross-functional team's fourth visit is called "**On-Site Evaluation #4** – Verification of Supplier Capacity. This visit should always occur prior to the supplier's shipment of parts for Mass Production 1 (MP1) builds. APQP/PPAP Elements to be fulfilled till this stage:

- Craftsmanship (*Color Changes Completed Supporting Color Harmony*)
- Design/Manufacturing Reviews (*Quality Issues Closed and Effective*)
- Subcontractor APQP Status (*Sub-Supplier PPAP Phase 3 (or equivalent) Completed*)
- Part Submission Warrant (*PPAP Phase 2 Completed (if multiple workstreams), PPAP Phase 3 Completed, Supplier's Demonstrated OEE (Phase 3) Supports Capacity Requirements*)

### **Conclusion**

Getting new products to market faster within Ford's operations is no longer just an idea or a leadership directive. It's being successfully demonstrated in an ongoing high-profile, high-priority vehicle program. At the core of the ongoing product creation evolution at Ford is the combining of "best practices" across all brands through the GPDS philosophy of shared vehicle platforms and manufacturing processes.

While the primary benefit of that commonality is quality, a secondary benefit is cost. By essentially leveraging close to a million units of planned production on the same platform, the economy of scale generated translates into millions of dollars saved [1].

### **References:**

[1] [http://media.ford.com/newsroom/feature\\_display.cfm?release=22104](http://media.ford.com/newsroom/feature_display.cfm?release=22104)

[2] <http://blogs.gxs.com/morleym/2007/08/>

[3] GPDS Supplier Engagement Process – Training manual