

# Advanced Product Quality Planning

---

**APQP**  
Third Edition



**AIAG**   
ADVANCING MOBILITY

# **ADVANCED PRODUCT QUALITY PLANNING (APQP)**

Reference Manual

Third Edition

Issued June 1994, Second Printing February 1995 (new cover only), Second Edition, July 2008

Copyright © 1994, © 1995, © 2008, © 2024

Chrysler Corporation, Ford Motor Company, and General Motors Corporation

Third Edition March 2024

Ford Motor Company, General Motors Company, and Stellantis

ISBN: 978 1 60534 482 6



# FOREWORD

## Third Edition

Effective March 1, 2024, APQP Third Edition and Control Plan Reference Manual replace APQP and Control Plan Second Edition unless otherwise specified by your customer.

The APQP and Control Plan Second Edition were split into separate manuals. Decoupling of the two will facilitate more timely updates as systems evolve.

Factors driving the need for this update:

- Changes to other references necessitate updates for APQP to remain relevant. For example, new terminology and concepts consistent with IATF 16949, AIAG & VDA FMEA Handbook and other Ford, General Motors, and Stellantis core tool manuals.
- The due diligence for APQP is being strengthened to avoid pitfalls from known risk factors.
- Incorporation of lessons learned from past projects and problems.
- Applications of APQP are changing to meet demands imposed by higher automation and ultimately autonomous driving, electrification and expanding definition of mobility.
- Addition of a “Safe Launch” requirement to the Production Control Plan, to be applied in initial launch of Mass Production.
- Appropriate references to customer specifics provided without the full text.
- Supplier input was actively solicited and incorporated when appropriate.

This manual continues to provide general guidelines for ensuring that Advanced Product Quality Planning is implemented in accordance with the requirements of the customer. There are no specific instructions on how to arrive at each APQP entry, this is a task best left to each organization.

The intent of APQP is to proactively assess and mitigate risk factors impacting product launch.

While these guidelines are intended to cover most situations normally occurring either in the early planning, design phase, or process analysis, there will be questions that arise. Please direct any questions to your authorized customer representative.

The following individuals and their respective companies participated in the revision process.

Keith Peterfeso, Ford Motor Company  
Lida Kuehne, General Motors Company  
Scott Trantham, General Motors Company  
Bryan Book, Stellantis  
Giovanni DeSantis, Stellantis  
William Jones, Stellantis

This manual is copyrighted by Ford, General Motors, and Stellantis, all rights reserved, 2024. Additional copies can be ordered from AIAG at [www.aiag.org](http://www.aiag.org). Organizations purchasing APQP Third Edition have permission to copy any forms and/or checklists contained herein.



# TABLE OF CONTENTS

FOREWORD.....	III
INTRODUCTION.....	1
<i>Fundamentals of Advanced Product Quality Planning (APQP)</i> .....	1
<i>Purpose of this Manual</i> .....	1
<i>Product Quality Planning Responsibility</i> .....	2
GETTING STARTED.....	3
0.1 <i>Organize the Team</i> .....	3
0.2 <i>Define the Scope</i> .....	3
0.3 <i>Team-to-Team</i> .....	4
0.4 <i>Training</i> .....	4
0.5 <i>Sourcing</i> .....	4
0.6 <i>Customer and Organization Involvement</i> .....	5
0.7 <i>Simultaneous Engineering</i> .....	6
0.8 <i>Control Plans</i> .....	6
0.9 <i>Concern Resolution</i> .....	6
0.10 <i>Product Quality Timing Plan</i> .....	6
0.11 <i>Plans Relative to the Timing Chart</i> .....	7
<b>CHAPTER 1 PLAN AND DEFINE PROGRAM.....</b>	<b>9</b>
INTRODUCTION.....	11
1.1 <i>Voice of the Customer</i> .....	12
1.2 <i>Business Plan and Marketing Strategy</i> .....	13
1.3 <i>Product/Process Benchmark Data</i> .....	14
1.4 <i>Product/Process Assumptions</i> .....	14
1.5 <i>Product Reliability Studies</i> .....	14
1.6 <i>Customer Inputs</i> .....	14
1.7 <i>Design Goals</i> .....	14
1.8 <i>Reliability and Quality Goals</i> .....	15
1.9 <i>Preliminary Bill of Material</i> .....	15
1.10 <i>Preliminary Process Flow Chart</i> .....	15
1.11 <i>Preliminary Identification of Special Product and Process Characteristics</i> .....	15
1.12 <i>Product Assurance Plan</i> .....	16
1.13 <i>Capacity Planning</i> .....	16
1.14 <i>Leadership Support</i> .....	16
1.15 <i>Change Management Implementation</i> .....	17
1.16 <i>APQP Program Metrics</i> .....	18
1.17 <i>Risk Assessment Mitigation Plan</i> .....	19
<b>CHAPTER 2 PRODUCT DESIGN AND DEVELOPMENT .....</b>	<b>21</b>
INTRODUCTION.....	23
2.1 <i>Design Failure Mode and Effects Analysis (DFMEA)</i> .....	24
2.2 <i>Design for Manufacturability, Assembly, and Service</i> .....	24
2.3 <i>Design Verification</i> .....	25
2.4 <i>Design Reviews</i> .....	25
2.5 <i>Prototype Build Control Plan</i> .....	26
2.6 <i>Engineering Drawings (Including Math Data)</i> .....	26
2.7 <i>Engineering Specifications</i> .....	27
2.8 <i>Material Specifications</i> .....	27
2.9 <i>Drawing and Specification Changes</i> .....	27
2.10 <i>New Equipment, Tooling and Facilities Requirements</i> .....	27
2.11 <i>Special Product and Process Characteristics</i> .....	28
2.12 <i>Gages/Testing Equipment Requirements</i> .....	28
2.13 <i>Team Feasibility Commitment and Leadership Support</i> .....	28

<b>CHAPTER 3 PROCESS DESIGN AND DEVELOPMENT</b> .....	<b>29</b>
INTRODUCTION.....	31
3.1 Packaging Standards and Specifications .....	31
3.2 Product/Process Quality System Review.....	32
3.3 Process Flow Chart.....	32
3.4 Floor Plan Layout.....	32
3.5 Process Failure Mode and Effects Analysis (PFMEA) .....	33
3.6 Pre-Launch Control Plan.....	33
3.7 Process Instructions .....	34
3.8 Measurement Systems Analysis Plan.....	34
3.9 Preliminary Process Capability Study Plan.....	35
3.10 Leadership Support .....	35
<b>CHAPTER 4 PRODUCT AND PROCESS VALIDATION</b> .....	<b>37</b>
INTRODUCTION.....	39
4.1 Significant Production Run .....	39
4.2 Measurement Systems Analysis.....	40
4.3 Preliminary Process Capability Study .....	40
4.4 Production Part Approval.....	40
4.5 Production Validation Testing .....	41
4.6 Packaging Evaluation .....	41
4.7 Production Control Plan.....	41
4.8 Quality Planning Sign-Off and Leadership Support .....	41
<b>CHAPTER 5 FEEDBACK, ASSESSMENT AND CORRECTIVE ACTION</b> .....	<b>43</b>
INTRODUCTION.....	45
5.1 Reduced Variation.....	46
5.2 Improved Customer Satisfaction .....	46
5.3 Improved Customer Service and Delivery.....	46
5.4 Effective Use of Lessons Learned/Best Practices.....	47
<b>APPENDIX A PRODUCT QUALITY PLANNING CHECKLISTS</b> .....	<b>49</b>
PURPOSE OF THE CHECKLISTS .....	50
A-0 APQP Risk Factors Checklist.....	51
A-1 Design FMEA Checklist .....	53
A-2 Design Information Checklist.....	54
A-3 New Equipment, Tooling, and Test Equipment Checklist.....	56
A-4 Product/Process Quality Checklist.....	58
A-5 Floor Plan Checklist.....	61
A-6 Process Flow Chart Checklist.....	62
A-7 Process FMEA Checklist .....	63
A-8 Change Management Checklist .....	64
A-9 Sourcing Checklist.....	65
A-10 Control Plan Checklist .....	68
<b>APPENDIX B GATED MANAGEMENT</b> .....	<b>69</b>
INTRODUCTION.....	70
Gate 0 (Program Concept) Section Instructions .....	74
Gate 1 (Program Approval) Section Instructions .....	76
Gate 2 (Design Feasibility) Section Instructions .....	78
Gate 3 (Process Feasibility) Section Instructions .....	81
Gate 4 (Launch Readiness) Section Instructions.....	85
Gate 5 (Feedback, Assessment and Corrective Action) Section Instructions.....	88
<b>APPENDIX C ANALYTICAL TECHNIQUES</b> .....	<b>89</b>

INTRODUCTION.....	90
<i>APQP Program Metrics</i> .....	90
<i>Assembly Build Variation Analysis</i> .....	90
<i>Benchmarking</i> .....	91
<i>Cause and Effect Diagram</i> .....	91
<i>Control Plan Special Characteristics</i> .....	92
<i>Critical Path Method</i> .....	92
<i>Design of Experiments (DOE)</i> .....	93
<i>Design for Manufacturability and Assembly</i> .....	93
<i>Design for Serviceability</i> .....	93
<i>Design Verification Plan and Report (DVP&amp;R)</i> .....	94
<i>Failure Mode and Effects Analysis (FMEA)</i> .....	94
<i>Mistake-Proofing/Error-Proofing</i> .....	95
<i>OEE (Overall Equipment Effectiveness)</i> .....	96
<i>Process Flow Charting</i> .....	98
<i>Risk Assessment Mitigation Plan</i> .....	98
<i>Traceability</i> .....	99
<b>APPENDIX D TEAM FEASIBILITY COMMITMENT .....</b>	<b>101</b>
<b>APPENDIX E QUALITY PLANNING SUMMARY AND APPROVAL.....</b>	<b>103</b>
<b>APPENDIX F REFERENCE MATERIAL .....</b>	<b>109</b>
<b>APPENDIX G SECTOR SPECIFIC GUIDANCE .....</b>	<b>111</b>
<b>APPENDIX H GLOSSARY .....</b>	<b>113</b>
<b>APPENDIX I INDEX .....</b>	<b>117</b>