

INSTALL CONFIDENCE[®]

Automatic Belt Tensioners and Idler Pulleys



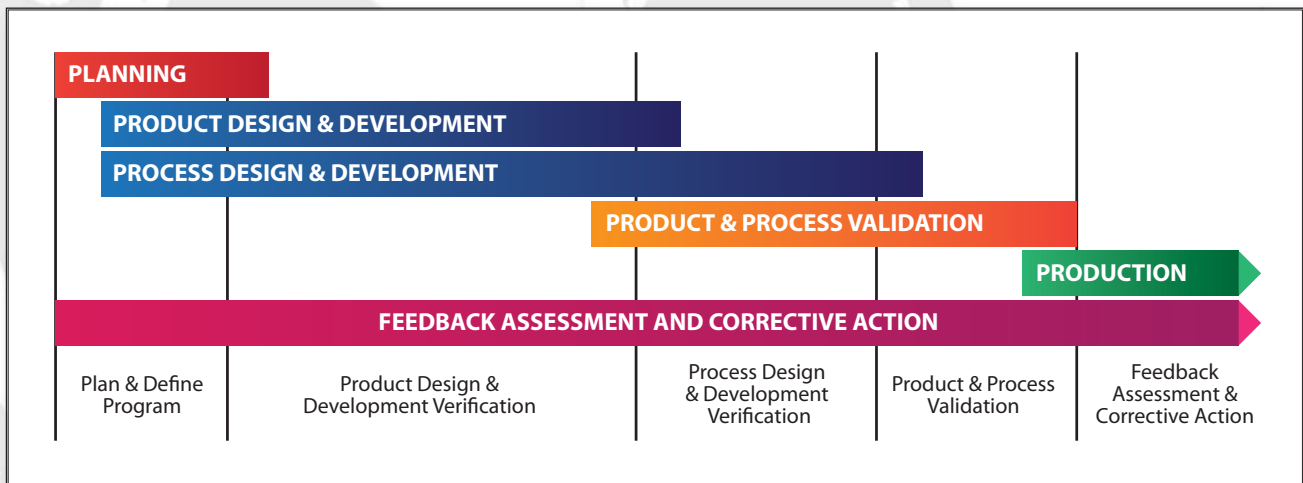
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Advanced Product Quality Planning (APQP)

Advanced Product Quality Planning (APQP) is a quality framework used for developing new products in the [Automotive Industry](#). It can be applied to any industry and is similar in many respects to the concept of **Design for Six Sigma (DFSS)**. The APQP process is described in [The Automotive Industry Action Group \(AIAG\) manual](#). Its purpose is "to produce a product quality plan which will support development of a product or service that will satisfy the customer." It does this by focusing on:

- Up-front quality planning
- Evaluating the output to determine if customers are satisfied and support continual improvement

The Advanced Product Quality Planning process consists of four phases and five major activities along with ongoing feedback assessment and corrective action as shown below:



A further indication of the APQP process is to examine the process outputs by phase. This is shown in the table below:

Plan & Define Program	Product Design & Development	Process Design & Development	Product & Process Validation
<ul style="list-style-type: none"> • Design Goals • Reliability & Quality Goals • Preliminary Bill of Materials • Preliminary Process Flow • Preliminary Listing of Special Product & Process Characteristics • Product Assurance Plan 	<ul style="list-style-type: none"> • Design FMEA • Design Verification • Design Reviews • Prototype Build • Engineering Drawings • Engineering Specifications • Material Specifications • Special Product & Process Characteristics 	<ul style="list-style-type: none"> • Packaging Standards • Product/Process Quality System Review • Process Flow Chart • Process FMEA • Pre-Launch Control Plan • Process Instructions • Packaging Specifications 	<ul style="list-style-type: none"> • Preliminary Process Capability Study • Production Part Approval • Production Validation Testing • Packaging Evaluation • Production Control Plan • Vehicle Try-ons & Durability Testing

A few Key Elements of The APQP process

PLAN & DEFINE PROGRAM



Understand Customer Needs

This is done using Voice of the Customer techniques to determine customer needs and using Quality Function Deployment to organize those needs and translate them into product characteristics/requirements.

PRODUCT / PROCESS DESIGN DEVELOPMENT

Potential Failure Modes	Potential Effects of Failure	Severity	Occurrence	Detectability	Potential Cause / Mechanism of Failure	Current Design Controls
Fracture/Break	Loss of function of Alternator, Steering Pump, Water Pump and AC Compressor	7	7	7	Table designed incorrectly	Drawing review Material Analysis of Control Samples Review Material Recommendation
Wear	Decrease in function of Alternator, Steering Pump, Water Pump and AC Compressor	7	7	7	Incorrect material used	Material Analysis of Control Samples Review Material Recommendation
Fracture/Break	Loss of function of Alternator, Steering Pump, Water Pump and AC Compressor	7	7	7	Incorrect material used	Ensure the use of proper Standard and Grade of material
Wear	Decrease in function of Alternator, Steering Pump, Water Pump and AC Compressor	7	7	7	Incorrect material used	Material Analysis of Control Samples Review Material Recommendation

Analyze & Mitigate Potential Failure Modes

This is done using techniques such as Failure Modes and Effects Analysis.



3D CAD Model

Validates dimensions, interfaces, and tolerances.



3-Dimensional Coordinate Measuring

Aids in establishing and validating overall design and specifications.

CONTROL PLAN									
Item Number	Item Description	Pre Control Plan	Process Control Plan	Final Control Plan	Control Method	Control Frequency	Control Location	Control Responsibility	Control Status
101	Mounting Spring	Visual	Visual	Visual	Visual	100%	Production	Operator	Open
102	Mounting Spring	Visual	Visual	Visual	Visual	100%	Production	Operator	Open
103	Mounting Spring	Visual	Visual	Visual	Visual	100%	Production	Operator	Open

Process Control Plans

Provide a written description of systems used in minimizing product and process variation.

PRODUCT / PROCESS VALIDATION



Torque Testing

Validates spring torque to provide proper belt tension.



Spring Back Testing

Validates unit stands up to wrenches slipping off during belt installation.



Contamination Testing

Validates sealing system protects against contaminants.



Corrosion Resistance Testing

Validates durability in wet, humid and salt environments.

ON-VEHICLE TESTING



On-vehicle Testing

Validates trouble free installation, performance and durability.

53 TOTAL SKUs...Priced to Lower the Total Cost of Repair

Automatic Belt Tensioners

Make	Years	Engine	Dorman Number	OE Number	AC Delco Number	Gates Number	Goodyear Number	Motorcraft Number
Chrysler	2000-90	3.8L, 3.3L	419-300	4612894AF	38113	38113	49215	NA
Chrysler	2002-92	3.9L, 5.2L, 5.9L	419-301	53010158AC	38116	38116	49216	NA
Chrysler	2000-90	3.0L	419-302	4536154AC	38122	38122	49204	NA
Ford	2000-93	4.0L	419-200	F77Z6B209AA	38102	38102	49202	BT46
Ford	2005-93	3.0L	419-201	YF1Z6B209AA	38114	38114	49220	BT58
Ford	1995-88	3.8L	419-202	F68Z6B209AA	38139	38139	49247	BT42
Ford	1997-93	5.0L, 7.3L, 5.8L	419-203	F5TZ6B209D	38123	38123	49223	BT37
Ford	1999-92	4.6L	419-204	F8AZ6B209AA	38132	38132	49236	BT47
Ford	1996-87	4.9L	419-205	F4TZ6B209AA	38131	38131	49233	BT32
Ford	1996-91	1.9L	419-206	F4CZ6B209A	38129	38129	49229	BT29
Ford	2001-97	5.4L, 4.6L, 6.8L	419-207	1L3Z6B209AA	38133	38133	49231	BT62
Ford	2004-86	3.8L	419-208	F4SZ6B209B	38127	38127	49227	BT30
Ford	2003-92	2.3L	419-209	1L5Z6B209AA	38155	38155	49243	NA
Ford	2005-00	4.0L	419-210	YL2Z6B209AA	38137	38137	49250	NA
Ford	2005-97	4.2L	419-211	5L3Z6B209AA	38138	38138	49232	BT85
GM	2005-96	7.4L, 4.3L, 5.0L, 5.7L	419-100	89017309	38103	38103	49203	NA
GM	2005-87	2.8L, 3.1L, 3.4L	419-101	12563084	38105	38105	49205	NA
GM	1995-87	4.3L, 5.0L, 5.7L	419-102	10229114	38108	38108	49208	NA
GM	2005-99	3.4L, 3.5L, 3.1L	419-104	12563083	38104	38104	49245	NA
GM	1998-95	3.8L	419-105	24504818	38152	38152	49239	NA
GM	1996-87	2.2 L, 2.0L	419-106	24575251	38109	38109	49209	NA
GM	1997-93	5.7L, 4.3L, 3.4L	419-107	12552509	38145	38145	49252	NA
GM	1997-92	2.2L	419-108	24575252	38110	38110	49210	NA
GM	2007-99	6.0L, 5.3L, 4.8L, 6.2L	419-109	12580196	38159	38159	49276	NA
GM	1999-91	2.3L, 2.4L	419-110	24575670	38146	38146	49238	NA
GM	2002-98	2.2L	419-111	24574843	38164	38164	49258	NA
GM	2005-99	6.0L, 5.3L, 4.8L	419-112	12580162	38158	38158	49275	NA
GM	1996-90	4.3L, 5.0L, 5.7L	419-113	10069964	38107	38107	49207	NA
GM	1995-90	4.5L, 4.9L	419-114	3543027	38184	38184	49288	NA
GM	2003-98	2.2L	419-115	24576073	38165	38165	49259	NA
GM	1992-87	2.5L	419-116	10101898	38111	38111	49211	NA
GM	2005-93	4.6L, 4.0L	419-117	12557838	38153	38153	49240	NA
GM	1993-87	2.8L	419-118	14102645	38130	38130	49230	NA
GM	2002-99	2.4L	419-119	24575354	38247	38247	49317	NA
GM	1995-92	3.8L	419-120	24504575	38126	38126	49226	NA
Saturn	2002-91	1.9L	419-103	21007465	38112	38112	49212	NA

Idler Pulleys

Part #	OD (mm)	Width (mm)	Material	Type	Gates #
419-602	90	30	Steel	Profiled	38001, 38042
419-603	75	22.6	Plastic	Grooved	38009
419-604	69	23	Plastic	Grooved	38008
419-605	90	40	Steel	Profiled	38022, 38033
419-606	82.5	30	Steel	Flat	38005, 38027
419-607	76.2	26	Plastic	Flat	38015
419-608	75	26	Plastic	Grooved	38016
419-609	90	26.5	Plastic	Flat	38007
419-610	76.3	31	Steel	Profiled	38006, 38043
419-611	100	28	Steel	Profiled	38026
419-612	76	38	Steel	Profiled	38023, 38028
419-613	91	25.8	Plastic	Profiled/Flanged	38012
419-615	69.8	26	Plastic	Flat	38018
419-616	81	12	Steel	V-Type	38037
419-617	82.5	30	Steel	Flat	38011, 38032
419-620	80	27.5	Steel	Flat	36229
419-621	95.25	27	Steel	Flat	NA



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