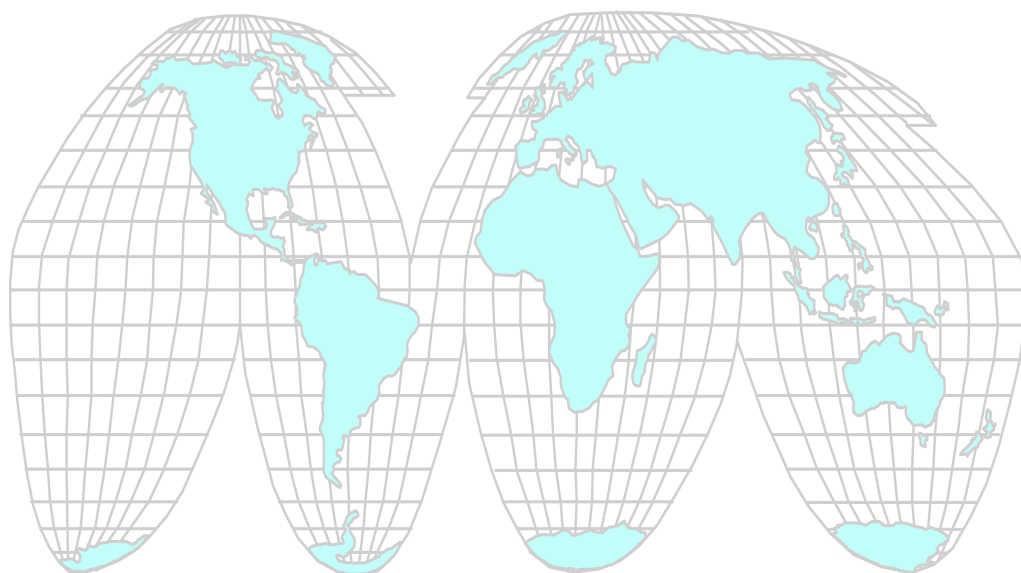




# Continuous Improvement



**General Procedure  
GP-8**

**May 15, 2005**

## CONTINUOUS IMPROVEMENT GP-8

**1.0 PURPOSE:** GP-8 defines the supplier's responsibility to have an on-going process for continuous improvement of parts and related manufacturing and supporting processes to reduce variation and waste and to insure the process has stability and capability over time. It outlines the customer expectations for the suppliers after a part has satisfactorily completed Production Part Approval Process (PPAP).

**2.0 SCOPE** - The GP-8 applies to all suppliers to General Motors and it's joint ventures, including allied and affiliated manufacturing operations, and is applicable for all parts and materials even when the customer has not requested data to be provided or Key Product Characteristics (KPC's) and/or Product Quality Characteristics (PQC's) have not been called out on the design record.

**3.0 BASIC QUALITY REQUIREMENTS** - All suppliers are required to have quality systems in place that insure parts shipped to the customer meet specification. Suppliers are also expected to have a system to properly identify the true root cause of non-conformities, to capture and read across lessons learned and ultimately prevent recurrence of non-conformances across their operations. Additionally, all suppliers shall have processes in place for:

**3.1 Voice of the customer** (These measures reflect quality performance as seen by the customer)

- **Compliance with GP-5** - Problem Reporting and Resolution (PR/Rs) are issued by the customer for problems in connection with a supplier's quality, packaging and delivery performance as described in GP-5. Suppliers are required to have a process in place that appropriately response to PR/Rs on a timely basis.
- **Defective parts shipped to the customer** - This measure represents the number of non-conforming parts shipped to the customer and is expressed in parts per million (PPM). Those suppliers that ship to our assembly and manufacturing plants via a sub-assembler and/or sequencer must also monitor any defective product found at either the sub-assembler and/or sequencer, as this non-conforming product is also considered to be defects that were shipped to the customer. Defective parts must also consider field and warranty issues.

**3.2 Voice of the process** (These measures reflect quality performance as seen in the supplier's facility/process)

- **Measure First Time Quality** - First time quality (FTQ) is a measure of a process' ability to make quality parts without scrap or rework. The rework of parts may take parts out of the normal production process and may result in undesirable variation if the rework was not initially comprehended in the process. Reducing and controlling the variation in the input variables presents an opportunity for continuous improvement.

FTQ should be measured at the following locations:

- End of line FTQ measurement (at a minimum)
- Quality or verification stations for key processes

Quality or verification stations should include the following elements:

- Alarm limits established (e.g. 2 defects per hour) to drive immediate containment upstream in the process
- A Pareto of failure modes for a specific timeframe
- FTQ trend chart (I-Chart format recommended – GM 1927-66)

Further, suppliers are expected to have an action plan and the necessary controls to maintain and improve the process capability of KPC's and PQC's designated by the customer.

- **Process performance on KPC's and PQC's** - Variation on key product characteristics (KPC) and product quality characteristics (PQC) reflects the variation in the process and is a result of a supplier's ability to control the input variables of a process. Reference Statistical Process Control Manual and AIAP PPAP Manual for requirements relative to Cpk, Ppk, CR, etc.
- PQC's – Are special characteristics in which the customer is equally satisfied across the entire specification, but the loss function is steep just outside of the specification limits. For these characteristics, ongoing monitoring and data collection where stability and control are required to insure conformance within specification.
- KPC's – Are special characteristics where the loss function shows that reasonably anticipated variation within specification could significantly affect customer satisfaction. For these characteristics, ongoing reduction in variation toward a target is required in addition to ongoing monitoring and data collection to insure stability and control.

### **3.3 Effective Problem Solving, Root Cause Analysis, and Corrective Action Implementation with Verification -**

Suppliers are required have an effective problem solving process in place so the root cause can be identified and verified on a timely basis and corrective action implemented and validated. A “3x5 Why” Analysis (GM 1927-84) is required per GP-5. The “3x5 Why” Analysis is also useful and recommended for suppliers’ internal quality identified from the “Voice of the Process”. Verification and validation of corrective action should demonstrate the ability to turn the problem on and off.

### **4.0 CONTINUOUS IMPROVEMENT REQUIREMENTS –** Suppliers must have an organized and integrated approach for continuous improvement that drives reduction of risk and variation associated with manufacturing and supporting processes. The continuous improvement process must be documented and institutionalized, actively supported by the supplier’s top leadership and consists of the following elements:

- Variation reduction on KPC's.
- RPN reduction process
- Lessons Learned process
- Focus on prediction and prevention of potential failures, including updating FMEAs, Process Flow Diagrams, and Control Plans

### **4.1 Variation Reduction on KPC's –** Suppliers are required to have an ongoing process to reduce variation on characteristics identified as KPCs.

### **4.2 RPN Reduction Process -** Suppliers are required to have a formal and documented RPN reduction process which includes:

- A cross functional team that meets regularly and updates FMEA and Control Plans
- Collection of external and internal data relative to rejects (scrap and rework)
- Incorporation of internal data (FTQ, scrap, etc.) and external data (PRR, etc.) into the FMEA and validation that assigned RPN numbers are reasonable and accurate
- A defined strategy for ongoing efforts for RPN reduction
- Identification and implementation of action plans with timing and accountability

### **4.3 Utilizing a Lessons Learned process**

- Suppliers a required to have a documented and effective process in place to drive lessons learned into current and future application of FMEAs and Control Plans.
- The process should apply lessons learned by a “read across” to similar processes within the facility and within the company (recommend PRR Read Across – GM 1927-69).

### **4.4 Focus on Prediction and Prevention of potential failures**

The supplier's efforts must ultimately be focused on prediction and prevention of potential failures and failure modes, as opposed to simply reacting to actual failures. To that end, the supplier's quality system should:

- Validate and Evaluate Error-Proofing to ensure it is capable of preventing defects.
- Ensure KPC's/PQC's/KCC's are audited/monitored and correlated.
- Maintain statistical control of the Process, using control charts for KCC's.
- Remove special causes of variation that causes any process instability.
- Improve the Process - Reduce variation of common causes in order to decrease the process spread variability.
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- Following implementation of engineering or tooling/process changes, ensure that existing process and engineering controls are still effective in certifying the quality of the product.
- When new process parameters have been determined, confirm the process stability again, and begin the continuous improvement cycle again to continue to decrease process variation.

#### 4.5 Update Quality Documentation

- The supplier is required to update and revise the FMEA, Control Plan, and Standardized Work.
- The revisions are not only required when there are design or process changes, but are based on internal or external data.
  - Internal data should drive quarterly updates at a minimum
  - External data should drive monthly updates at a minimum

#### 5.0 VERIFICATION OF A SUPPLIERS' CONTINUOUS IMPROVEMENT PROCESS BY THE CUSTOMER

-It is expected that the supplier will maintain documentation supporting the continuous improvement activities conducted in their facilities. The customer may, at their option, review a supplier's continuous improvement efforts periodically. Suppliers are expected to document, maintain and display the following at a minimum:

- First Time Quality Trend Chart
- PRR Analysis Summary
- Drill Deep (GM 1927-84)
- Revised FMEA's
- Revised Operator Standardized Work Instructions
- Revised Process Control Plan
- RPN Reduction Summary (GM 1927-21)
- Supplier Action Plans (GM 1927-79)
- Read Across (GM 1927-69)

#### References:

GMN 11011 GM Dimensional Engineering Supplier Requirements Guidelines  
GM 1927-69 PRR Read Across  
GM 1927 21 RPN Reduction Summary Chart  
GM 1927-28 Global Powertrain PFMEA Risk Ranking Form  
GM 1927-79 Supplier Action Plans  
GM 1927-84 5 Whys 3 Times  
AIAG Manuals for Process Control Plans, Statistical Process Control, and Production Part Approval