PURPOSE: To provide an overview of the minimum requirements and sequence of events for all phases

SCOPE: Applies to all TMI suppliers for mass production approval of parts

EXPLANATION: In order to achieve the successful launch of any new program, it is necessary for TMI to coordinate and study trial production, sample evaluation, checking fixture data, parts fitting trials, assembly trials, and production capacity and capability with all suppliers. This entire process requires thorough and detailed documentation at each level.

RESPONSIBILITIES:

1) The supplier should develop and use a cross functional team to ensure adequate implementation of all TMI requirements. This team should include representatives of engineering, manufacturing, material control, purchasing, quality, sales, field services, subsuppliers, and customers as appropriate.

2) At the beginning of each new project TMI Purchasing will issue a purchase order and a QUALITY ASSURANCE PROJECT PLAN (QAPP) (TMI SQAM Section 25) to each supplier listing the due dates for delivery of provisional approval parts.

3) There are three main phases in mass production preparation as shown in the matrix below and detailed in the flow chart at the end of this section.

PHASE 1	Tool Preparation Confirmation
PHASE 2	Process Confirmation / Pilot Production Trials
PHASE 3	Initial and Mass Production

A) **PHASE 1 - TOOL PREPARATION CONFIRMATION -** Main objectives of this phase:

- To manufacture tooling which is capable of producing parts which conform to the drawing and inspection standard.
- To develop and manufacture parts checking fixtures capable of validating parts to drawing and inspection standard.
- To develop, issue, and follow open issues matrices (format to be approved by TMI Development QC) that will ensure improvement in next phase

a) Supplier responsibilities are as follows unless otherwise specified by TMI:
   aa) Develop QAS (Quality Assurance Schedule - TMI SQAM - Section 4)
   bb) Perform PFMEA (Process Failure Mode Effects Analysis - TMI SQAM - Section 9) and submit results per TMI plant QC timing requirements.
   cc) Manufacture tooling so that the part conforms to the nominal of both the drawing and inspection standard
   dd) Manufacture and obtain approval for checking fixtures (if required) in time for the first – off tool parts to be confirmed - (Checking Fixtures - TMI SQAM - Section 8).

   ee) Develop and submit the initial draft of the MQC / CP (Manufacturing Quality Chart / Control Plan -

TMI SQAM - Section 10) and submit to TMI before the first production trial and revise as items to be controlled are identified during subsequent trials and mass production

ff) Draft initial level INSPECTION STANDARD (TMI SQAM Section 7) and ensure initial production part quality by checking conformance to the drawing and Inspection Standard by using any necessary checking fixtures as required by TMI

gg) Conduct testing per any regulation item (i.e. FMVSS / CMVSS) as specified per drawing for 1st Off Tool part

B) **PHASE 2 - PROCESS CONFIRMATION / PILOT PRODUCTION TRIALS** - Main objectives of this phase are:

- To verify design improvement countermeasure effectiveness
- To solve manufacturing problems in advance of mass production
- To evaluate process capability and capacity through mass production simulation
- To finalize process layout and work flow
- To confirm and improve part quality and update the inspection standard to production level
- To develop, issue, and follow open issues matrices (format to be approved by TMI plant QC) that will ensure improvement in next phase

a) Supplier responsibilities are as follows unless otherwise specified by TMI:

aa) Run production trials at the mass production location, simulating mass production conditions (i.e. line speed, tooling cycle time, production workers, production tooling, etc.) in order to adequately evaluate the parts quality and process capability (TMI SQAM - High Volume Production Trial - Section 15).

bb) Inspect all production trial parts to the inspection standard and the Parts Evaluation Plan (TMI SQAM - Section 11) and submit the results to TMI plant QC using the Sample Data Sheet (TMI SQAM - Section 11). During production trials, the supplier must assure the dimensional accuracy of the part even if hand reworked.

cc) Determine the tooling capability from the checking fixture data

dd) Study the part relationship to mating parts and use this information to establish internal critical characteristic controls

ee) Implement countermeasures quickly to correct part nonconformance to the inspection standard, mass production part drawing, or technical instruction sheet as applicable

ff) Update / revise the MQC / CP and submit to TMI for final approval as required by TMI plant QC.

gg) Study the process and tooling to develop or improve internal jigs, fixtures, and process flow and react quickly to solve any problems identified

hh) Draft the work instructions and standards for each process including inspection

ii) If required, grain tools per authorization from TMI QC (Typically, grain instruction will be issued between the 1A and 2A production trials.)

jj) Update / revise the QAS and submit to TMI

kk) Complete the training plan for production and inspection workers

ll) Develop and implement a delivery system based on TMI PC instruction to ensure 100% on time deliveries

mm) Make minor tooling adjustments to target the nominal inspection criteria per the inspection standard

nn) Develop a preventative / predictive / regular maintenance plan for tooling and equipment

oo) Develop contingency plans and systems for emergencies resulting from equipment breakdown

pp) Develop rework / repair procedures and confirm impact of rework on part performance and reliability

qq) Monitor subsupplier production preparation activity to schedule

rr) Confirm and verify the implementation of all ECIs (TMI SQAM - Section 6).
ss) Update / revise the inspection standard to production level
tt) Request Provisional Approval (TMI SQAM - Section 14) from TMI when all design and quality requirements are met

C) **PHASE 3 - INITIAL AND MASS PRODUCTION CONFIRMATION -** Main objectives of this phase are:

- To confirm parts quality at mass production level and prevent recurrences of prototype or pilot production issues or problems through special inspection
- To confirm the mass production capability and capacity
- To start and maintain delivery of conforming parts per production schedules

a) Supplier responsibilities are as follows unless otherwise specified by TMI:

aa) Monitor for problems that were not identified during low volume pilot and preproduction stages
bb) Develop and implement a special inspection plan (as defined in the QAS) for start of production to prevent shipment of nonconforming parts to TMI
cc) Confirm the accuracy of quality controls as described in the MQC / CP and revise the MQC / CP if needed
dd) Submit Sample Data Sheets through the (QCS) quality confirmation build stage (if required by TMI plant QC)
ee) Review and enforce work instructions and standards and revise if needed
ff) Review preventative / predictive maintenance procedures and system, determine effectiveness, and improve as needed
gg) Request final approval from TMI once parts quality and process capability meet all TMI requirements - (TMI SQAM - Section 14).

REVISION	REVISION DATE	SECTION	CHANGE DESCRIPTION
0	07/09/01	ALL	Initial release
1	05/20/03	ALL	Added revision record
2	06/17/03	3 - C – Phase 3	Moved requirement for submission of testing per regulation items from “Section C - Phase 3” to “Section A - Phase 1 - Tool Preparation Confirmation” and stipulated timing for testing at 1st Off Tool part.
3	06/28/04	3 – “Purpose / Resp”	Added Phase 1 requirements / Modified table of phases / Revised flow chart