GPSC Academy

Leaders Teach & Leaders Learn

Supplier Technical Review Training – April 2023 Revision

OSHKOSH™

Technical Reviews – Agenda

Agenda

1. Introduction
2. Technical Review Process
3. Technical Review Format
4. Technical Review Questions
5. Follow-Up
6. Lessons Learned
7. Assistance

Technical Reviews – Introduction

What is a Technical Review?

- A structured discussion between the Supplier, Oshkosh Purchasing, Oshkosh Engineering and Oshkosh Quality about:
  - Design Requirements
  - Other Oshkosh Requirements (PPAP, packaging, etc.)
  - Drawing Interpretation
  - Manufacturing Processes & Tooling
  - Inspection Processes
  - Recommendations for changes
  - Special Process Requirements (Welding, Paint, etc.)

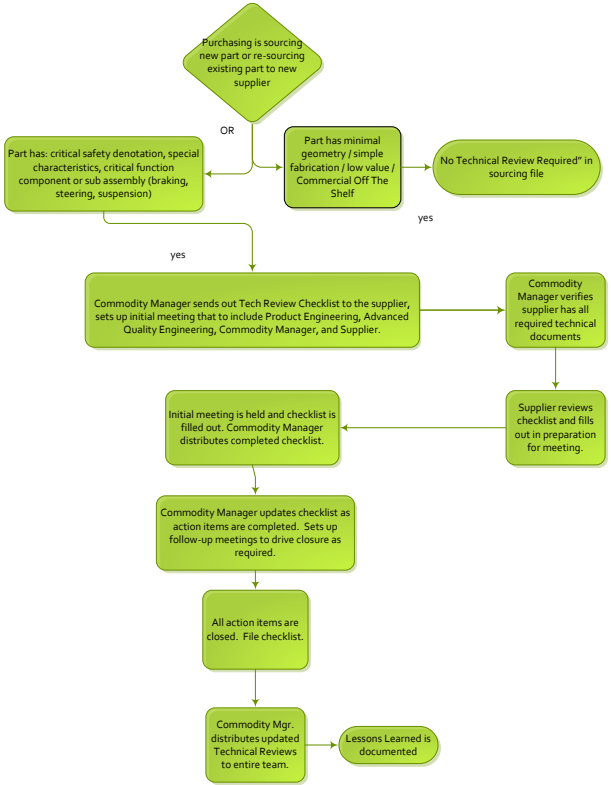
Technical Reviews – Introduction

- Who should be involved in Technical Reviews?
- Oshkosh
  - Strategic Purchasing
    - Global Commodity Managers
    - Segment Commodity Managers
    - NPD Buyers
    - PFP Buyers
  - Design Engineering
  - (Advanced) Supplier Quality Engineering
  - Others are required (Reliability, Supplier Development, Cost Management, etc.)
- Supplier
- Engineering Personnel
- Manufacturing Personnel
- Quality Personnel

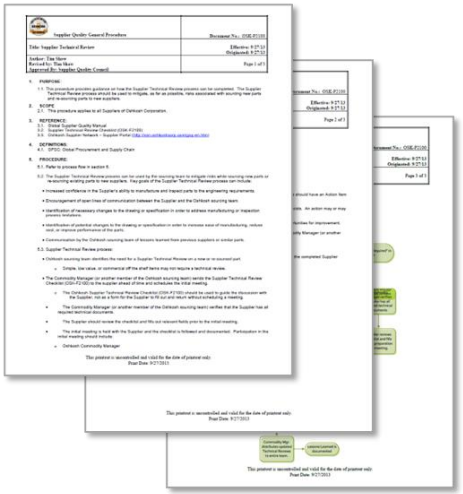
Technical Reviews - Introduction

- Why perform a Technical Review?
  - To gain confidence in the Supplier's ability to manufacture and inspect parts to the engineering requirements.
  - To identify changes to the engineering documents based on the Supplier's processes and capabilities. Engineering changes should result in one of the following:
    - Eliminate a problem that would prevent the Supplier from being able to manufacture or inspect.
    - Increase ease of manufacturing or ease of inspection.
    - Reduce cost.
    - Improve the performance.
  - To all the Supplier to discuss engineering and quality requirements with Oshkosh in order to verify understanding and compliance.
  - To pass on lessons learned from the manufacturing history of the part or of similar parts to the Supplier.
  - To create open lines of communication between the Supplier and Oshkosh purchasing, engineering and quality.

Technical Reviews – Technical Review Process

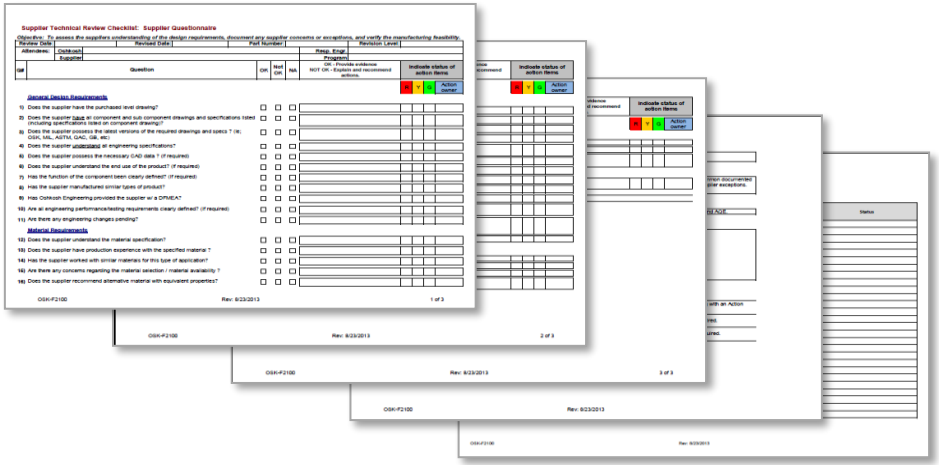


- This is the basic flow for the Technical Review process.
- Refer to procedure: Supplier Technical Review (OSK-P2100)



Technical Reviews – Technical Review Format

- The Technical Review checklist is available internally on the Corporate Supplier Quality documents site. (Link)
- The checklist is a three page excel spreadsheet consisting of 37 questions. The spreadsheet also includes an instructions tab and an action tracker.



Technical Reviews – Technical Review Questions

Q#	Question	OK	Not OK	NA	YES - Provide evidence No - Explain and recommend actions.	R	Y	G	Action owner
			1		2		3		
	General Design Requirements								
1)	Does the supplier have the purchased level drawing?								

- Each question on the checklist has:
  1. Checkboxes for the reviewer to indicate: “OK”, “Not OK”, or “NA”
  2. A field for the reviewer to record evidence, discussion, required actions and other items. (This field can be expanded if necessary)
  3. Red, Yellow, and Green fields to indicate high priority action items. (Type a “1” in the appropriate box for it to change colors.)
     1. Red indicates that significant risks exist, and action is required. All red items should have an action item listed along with an action owner. These items should be addressed first.
     2. Yellow indicates that a possible risk exists or an opportunity for improvement exists. An action may or may not be required.
     3. Green indicates that no significant risks exist and there are no significant opportunities for improvement.

Technical Reviews – Technical Review Questions

General Design Requirements

1. Does the supplier have the purchased level drawing?
2. Does the supplier have all component and sub-component drawings and specifications listed (including specifications listed on component drawing)?
3. Does the supplier possess the latest versions of the required drawings and specs? (ie: OSK, MIL, ASTM, QAC, GB, etc.)
   - *This includes the component and sub-component drawings, fasteners, material specifications, paint and surface finish specifications, Oshkosh specifications like QAC-079 or FM100, and any other applicable documents.*
4. Does the supplier understand all engineering specifications?

Technical Reviews – Technical Review Questions

General Design Requirements

5. Does the supplier possess the necessary CAD data? (if required)
6. Does the supplier understand the end use of the product? (if required)
   - *This can help the supplier identify important features and dimensions if the drawing does not include critical features.*
7. Has the function of the component been clearly defined? (if required)
   - *It may be possible to create a functional gage.*
8. Has the supplier manufactured similar types of product?
   - *Are the processes required to manufacture this part within the Supplier's core competencies (e.g., sending a welded part to a supplier that has never welded for an OEM before)*?

Technical Reviews – Technical Review Questions

General Design Requirements

9. Has Oshkosh Engineering Provided the supplier w/ a DFMEA?
   - *This will help the Supplier create their PFMEA.*
10. Are all engineering performance/testing requirements clearly defined? (if required)
    - *Does the supplier have any questions about any performance notes on the drawings? Do they know what testing will be required to verify conformance?*
11. Are there any engineering changes pending?
    - *This could include Oshkosh engineering changes and any F1000s.*

Technical Reviews – Technical Review Questions

Material Requirements

12. Does the supplier understand the material specification?
    - *Does the supplier know how to verify the raw material, if needed?*
13. Does the supplier have production experience with the specified material?
14. Has the supplier worked with similar materials for this type of application?
15. Are there any concerns regarding the material selection / material availability?
    - *Has the supplier verified pricing and availability for the required materials?*
16. Does the supplier recommend alternative material with equivalent properties?
    - *It is important to emphasize that all material changes require an approved design change or an approved F1000.*

Technical Reviews – Technical Review Questions

Print Dimensional and Specification Requirements

17. Are all dimensions and tolerances manufacturable and measurable?
18. Does the supplier have recommended design changes for ease of manufacturing?
    - *Changes to match standard tooling sizes, common manufacturing practices for the supplier, etc. This could include opening tolerances in order to improve process capabilities.*
19. Does the supplier have recommended design changes for ease of inspection?
    - *This could include changing the GD&T for clearance holes to allow for hard gaging, simplification of features to eliminate need for CMM, etc.*
20. Does the supplier have recommended design changes for cost reduction?
    - *This could include changes that eliminate the required number of operations. Examples include opening a diameter tolerance up to change it from two machining operations to one or changing a component to an equivalent one the supplier can acquire more inexpensively.*

Technical Reviews – Technical Review Questions

Print Dimensional and Specification Requirements

21. Does the supplier have proper equipment to measure / inspect parts to drawing specifications? (CMM for GD&T)
    - *Where possible, the supplier should have at least a 5:1 ratio of measurement accuracy to tolerance for all features (optimally 10:1).*
22. Will the supplier utilize tooling / fixtures to manufacture?
23. Does the supplier have a tooling design & verification plan?
    - *Is the schedule for tooling being tracked? How will tooling be verified? (e.g., If a mold has multiple cavities, will the supplier inspect parts out of every cavity?)*
24. Are all notes understood and can the supplier conform to all notes?
25. Is the GD&T understood, manufacturable, and measurable? (if required)
    - *Does the supplier have a full understanding of all GD&T (projected tolerance zones, composite feature control frames, theoretical intersect points, etc.)?*

Technical Reviews – Technical Review Questions

Print Dimensional and Specification Requirements

26. Are special/critical characteristics identified and understood? (if required)
    - *Does the supplier understand requirements for verifying special/critical characteristics?*
27. Does the supplier understand Oshkosh PPAP requirements outlined in the Supplier Quality Manual (section 9)?
    - *Has the supplier reviewed which PPAP level is required? Is the supplier able to create meaningful Process Flow Diagrams, Process Failure Modes and Effects Analysis (PFMEA) and Control Plans?*
28. Does the supplier understand Oshkosh packaging requirements outlined in the Supplier Standards Guide (section J)? Is there any special packaging required (not covered in section J)?
29. Will the supplier use returnable packaging?

Technical Reviews – Technical Review Questions

Welding Requirements

30. Are the specified welding standards understood by the supplier?
    - *Is the supplier certified to AWS D1.1 or equivalent?*
31. Are the welding symbols understood, manufacturable, and verifiable?
    - *Have they been reviewed with the supplier's welding personnel?*
32. Does supplier have CWI on staff or utilize a CWI contractor?
    - *Where is their welding expertise coming from?*
33. Does the supplier have Welding Procedure Specification (WPS) and Procedure Qualification Records (PQR) for each defined weld?
    - *If not, does the supplier have a qualification plan for each?*

Technical Reviews – Technical Review Questions

Painting Requirements

34. Will the supplier do the painting in-house or outsource the process?
    - *Does the supplier have a plan for how parts will be verified after painting?*
35. Is the painted approved by Oshkosh Corp.?
    - *This would include approval by JLG Supplier Quality for JLG parts and completion of a PS100 audit for Defense.*
36. Does the supplier possess and understand all the latest versions of the painting specification?

Outside Processing

37. Will the supplier utilize any outside processing? What processes are outsourced? What steps are taken to ensure requirements are being met?

Technical Reviews – Follow-up

- The Technical Review follow-up should continue until both the supplier and the Oshkosh teams are satisfied that all major risks have been addressed and significant opportunities for improvement have been pursued.
  - One of the primary goals of the Technical Review process is to reduce the risks associated with the product launch.
    - It is not always possible to address every single risk that is present.
  - Elements flagged as red in the checklist should be addresses before closing the Technical Review.

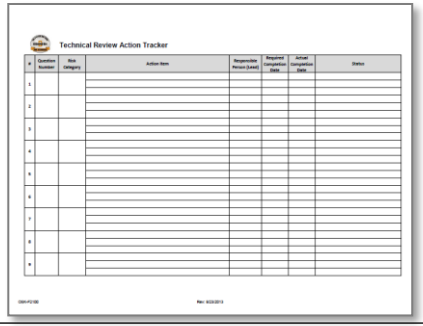
Q#	Question	OK	Not OK	NA	OK - Provide evidence NOT OK - Explain and recommend actions.	Indicate status of action items			
						R	Y	G	Action owner
	General Design Requirements								
1)	Does the supplier have the purchased level drawing?	☐	☑	☐	*The correct revision is N, supplier has A.*				Buyer, A.

Technical Reviews – Follow-up

- The team should also prioritize and address the more important yellow items.

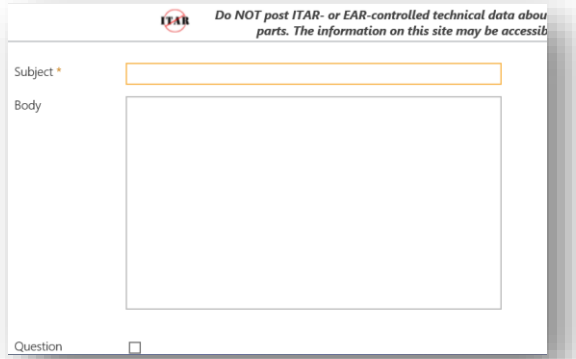
Q#	Question	OK	Not OK	NA	OK - Provide evidence NOT OK - Explain and recommend actions.	Indicate status of action items			
						R	Y	G	Action owner
	Print Dimensional and Specification Requirements								
17)	Are all dimensions and tolerances manufacturable and measurable?	☑	☐	☐	*Yes, but RFS true position zones are used for clearance holes.*				Bell, A.
18)	Does the supplier have recommended design changes for ease of manufacturing?	☑	☐	☐	*None*				
19)	Does the supplier have recommended design changes for ease of inspection?	☑	☐	☐	*Yes, use MMC true positions for clearance holes (to allow use of gage).*				Bell, A.

- The Action Tracker provided in the Technical Review spreadsheet can be used to track follow-up.



Technical Reviews - Conclusion

- After completing the Technical Review Process, don't forget to document lessons learned. This will help the whole Oshkosh team.
- Lessons learned can be easily added and reviewed on the discussion forum in the Oshkosh Corporate Supplier Quality Engineering intranet site. (Link)



- Items that should be included:
  - Recommendations to improve the Technical Review form, training, or procedure.
  - Important or unexpected outcomes of the Technical Review process.
  - Things to watch out for.

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