

MSG3-MSG4 : 2022 Revision Survey

The MSG3 document is planned for revision in CY2022.

The context of the survey considers new forward-looking applications of predictive analytics will be used for ICA development in both fixed wing and roto-craft. These tools are expected to improve applicability and effectiveness of maintenance programs.

An example is IP180 (AHM level 3 analysis) which is assumed to be adopted within the 2022 revision. This is a milestone and philosophy shift toward Integrated Aircraft Health Monitoring (IAHM).

Future MSG3 challenges include Single-pilot flight deck, non-crewed aircraft, VTOL, ground-controlled ops, next generation propulsion systems and recognition of ground crews considered part of operating crew, etc.

The timing may be right to rename MSG3 to MSG4 with revision 2022.

The survey purpose is to ask our industry partners and regulatory authorities what they think as we look forward to embracing IAHM and the other future challenges into our risk-based method.

* Required

1. Please provide your name

2. Please identify the entity / company you represent (e,g, Airbus, FAA, JetBlue))

3. Please identify which of the three(3) primary stakeholder you represent *

- ☐ Manufacturer
- ☐ Operator
- ☐ Regulator

4. As a Manufacturer do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift which justifies changing the name to MSG4 in 2022? *

- ☐ Yes
- ☐ No

5. As an Operator do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift which justifies changing the name to MSG4 in 2022? *

- ☐ Yes
- ☐ No

6. As a Regulator do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift which justifies changing the name to MSG4 in 2022? *

- ☐ Yes
- ☐ No

7. Please share your rational for retaining the current name / title of MSG3 *

8. Please provide any comments or considerations you would like to share

9. Do you believe MSG3 should remain the primary risk based analysis tool / host for the future challenges noted in the header?

☐ Yes

☐ No

10. Please provide your rational and alternative reference / host in lieu of MSG3 for for these future challenges

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Microsoft Forms

MSG3-MSG4 : 2022 Revision Survey

65

Responses

25:18

Average time to complete

Active

Status

1. Please provide your name

65

Responses

Latest Responses

"Patrick Donnellan"

"Federico HITA"

"Nicole Elders"

2 respondents (3%) answered **David** for this question.

Word cloud showing responses for the question "Please provide your name". The word **David** is the most prominent response, appearing in large blue text. Other visible names include Michael, Chris, Jan, Fernando, and many others in smaller sizes and colors (blue, teal, black).

2. Please identify the entity / company you represent (e,g, Airbus, FAA, JetBlue))

65

Responses

Latest Responses

"GE Aviation"

"Airbus DS"

"Rolls-Royce plc"

8 respondents (13%) answered **Airbus** for this question.

Archer AviationHavilland Aircraft

Leonardo HelicoptersBell TextronRolls-RoyceAviatic

Southwest AirlinesAircraft**Airbus**AviationAirbus

Dassault AviationCivil AviationTextron AviationEMBRAER SAAirbi

Aircraft EnginesAviation SafetyAirwaysBoeing Compa

3. Please identify which of the three(3) primary stakeholder you represent

<div></div> Manufacturer	38
<div></div> Operator	15
<div></div> Regulator	12



4. As a Manufacturer do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift which justifies changing the name to MSG4 in 2022?



5. As an Operator do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift which justifies changing the name to MSG4 in 2022?



6. As a Regulator do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift which justifies changing the name to MSG4 in 2022?



7. Please share your rational for retaining the current name / title of MSG3

25
Responses

Latest Responses

"Despite it is a change, we consider that it is not enough, there should be a disrruptive change to consider MSG4."

12 respondents (48%) answered **IP180** for this question.

IAHM processes

task **MSG-3** **IP180** change
MSG-4 **AHM** level

8. Please provide any comments or considerations you would like to share

40
Responses

Latest Responses

"I do agree that the use of IAHM represents a philosophical shift but to a more basic point it is a significant change that will introduce new processe"

"The introduction of IP180 and IAHM provides an opportunity to evolve and optimise maintenance regimes, taking account of digital toolsets, with far re"

12 respondents (31%) answered **MSG-4** for this question.

evolution to MSG-4 process methodology aircraft MSG3
shift to MSG-4 **IAHM** new **MSG-4** change IP180 AHM
MSG-3 analysis
MSG-4 document **systems** Maintenance **MSG-3** OEMs term
change is not significant

9. Do you believe the MSG methodology should remain the primary risk-based analysis tool / host for the future challenges noted in the header?



10. Please provide your rational and alternative reference / host in lieu of MSG3 for for these future challenges

2

Responses

Latest Responses

Please identify which of the three(3) primary stakeholder you represent		As a Manufacturer do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift...	As an Operator do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift w...	As a Regulator do you believe the adoption of Integrated Aircraft Health Management (IAHM) processes such as IP180 (as the 1st of several novel milestones noted) represents a philosophical shift w...	Please share your rational for retaining the current name / title of MSG3	Please provide any comments or considerations you would like to share	Do you believe the MSG methodology should remain the primary risk-based analysis tool / host for the future challenges noted in the header?	Please provide your rational and alternative reference / host in lieu of MSG3 for these future challenges
Operator	No				I feel that MSG3 should be modified to provide AHM as an alternate failure finding method (similar to performing a Functional Check or Operational Check), but the process definition of system description, failure identification, failure effect, etc. is unchanged.	I would not be opposed to MSG4, and I recognize that aircraft and systems are smarter than when MSG3 was developed. That said, IAHM provides alternate actions that can be included in MSG3, but the philosophy change is not as dramatic as what we saw when we moved from RCM to MSG2, or MSG2 to MSG3.	Yes	
Manufacturer	Yes					The title change makes sense as we adopt new technologies. The change could be a good way mark that change of perspective in the industry.	Yes	
Manufacturer	Yes					With the adoption of AHM, the MSG analysis will move for a different kind of analysis. The level 3 is new path inside the analysis.	Yes	
Operator	No				IP 180 represents small increment to MSG-3 methodology. Transition to MSG4 will be viable only when SHM and AHM will be fully functional and supported well with tooling by OEMs	"Condition Based Maintenance" is the future we need more support from all parties OEMs, Regulators, Operators and Academia to evolve this new philosophy	Yes	
Manufacturer	No				Health monitoring is already available per IP180 in the current revision of the ATA. While this is an enormous milestone, it is the only item of the many listed that will shift the process. I think that when predictive analytics, ground crews considered art of operating crew, and non-crewed aircraft processes are mature, then we move to MSG-4.	Textron Aviation has already utilized ECM and Single-Pilot flight deck on an existing product that was analyzed under 2015.1.	Yes	
Operator		Yes				See my comments and presentation provided to the SWG	Yes	
Manufacturer	Yes						Yes	
Manufacturer	No				The AHM is an optional further step from the current Systems MSG-3 logic. Contrary to the MSG-2 to MSG-3 evolution, when the changes where at a much higher level and not limited to the Systems methodology only, the AHM does not change the top-down approach utilized by MSG-3, but further enhances it.	We do understand that other factors apart from the technical side might be used provide further visibility of our process, and those could by themselves be enough to justify a 'title evolution' from MSG-3 to MSG-4. One question is: if an OEM continues using just 'Classic' maintenance on their program, does that mean that the OEM is applying MSG-3, not MSG-4? In my opinion, if we are to consider an evolution to MSG-4, we should take the opportunity and change other things in the logic that we've refrained from changing because it would be a 'big change to processes and software' currently in place. I'd propose to make the bold decision to target an MSG-4 revision in the future with specific goals, instead of changing the 2022 revision to MSG-4 because of one particular evolution of one subset of the MSG-3 document. We can make our document so much better if we are allowed to be more aggressive with the proposed changes, and MSG-4 could be the perfect opportunity.	Yes	
Manufacturer	Yes					I've been an MSG-3 practitioner for 27 years (ATA Airlines, Delta Air Lines, now Boeing) - MPIG (& MPSC) member since 2002 - RMPiG member as well. The MSG-4 distinction is long overdue I think - could have been made when we added Zonal, Enhanced Zonal, or L/HIRF. That said, given IAHM incorporation adds an additional level of Systems/Powerplant Logic (Level 3) this would be an opportune point in time to update the name. Stating "MSG-3; Rev XXXX.X" is a bit cumbersome in light of the significance of the logic changes since 1980.	Yes	
Manufacturer	No				AHM is an option after the level 2, which keep the same fundamentals up to this point.		Yes	
Operator	Yes					Aircraft Health Monitoring is an airline reality for several years. As the technology advances every day, we need to take advantage of it to optimize scheduled maintenance. IP180 set up the ground rules to do it, we are more than ready to launch MSG-4 !!	Yes	
Regulator			Yes				No	

Operator		No			AHM is an alternative method(option) for current non-safety task. So if AHM is an only method for the task including the CAT 5 and 8, the name should be changed to MSG4. And if the name is changed to MSG4 and authority requires to meet operator's maintenance program to MSG4, the transition from MSG3 to MSG4 is a big burden to operator.	Yes	
Manufacturer	Yes					Yes	
Manufacturer	No				IP180 is ceratinly a step forward in the right direction, but to move to MSG-4 would require a real step change and to address plenty other items. In particular the systems methodology is outdated when analyzing modern avionics and the interaction between systems. Also emerging design like single pilot cockpit and the ground functions that are interacting more and more with the aircraft	Yes	
Manufacturer	Yes					Yes	
Operator		Yes				Yes	
Manufacturer	Yes				Previous name changes were driven by significant changes to the analysis process. Adding Level 3 is significant.	Yes	
Manufacturer	Yes				Yes it can be considered a changing point in the methodology. But if the group is pursuing this change we should take the opportunity to discuss additional changes for the new MSG document version, like the structural methodology seems to be obsolete as it doesn't give much flexibility to use experience gathered during years. Usage of rating system seems to make the evaluating process limited to the values adopted and some times it doesn't exactly describe what is really going on.	Yes	
Manufacturer	Yes				The concepts within IP180 AHM are a pivotal shift from existing methodology which we have today in MSG-3.	Yes	
Manufacturer	Yes				There are a number of activities in SAE/FAA/etc which need to be aligned. An official recognition of the impact of AHM on future maintenance requirements by renaming to MSG4 would signal to industry the importance of formalizing the processed needed to ensure integrity when AHM is used for airworthiness credit.	Yes	
Operator		Yes			We need to identify the major issues and work on resolving/mitigating them. There are a number of significant ones (including commercial matters of significant impact)	Yes	
Manufacturer	No				Its a evolution of inspection technique	Yes	
Operator		Yes			Only concern with this is that OEM's then say since they are MSG-3 aircraft that they will not move forward with the work to implement IAHM.	Yes	
Manufacturer	Yes					Yes	
Manufacturer	No				I dont believe AHM is a shift in philosophy, additional alert/evidence.	Yes	
Operator		Yes			The introduction of a new level (Level 3) of analysis (notwithstanding its "optional use" status) would be in itself a significant departure from the MSG-3 tradition. It opens the door to a new level of tailoring the MSG implementation, thus it may be the time to evolve/escalate to an MSG-4 although somebody may consider that, in itself, this change doesn't amount to the kind of "critical mass" transformation which motivated the transition from MSG-2 to MSG-3. The evolution to MSG-4 should be captured appropriately in the regulatory documents which make reference to MSG-3 (e.g. Rules for Continuing Airworthiness (Regulation (EU) No 1321/2014).	Yes	
Operator		Yes				Yes	
Manufacturer	Yes				The timing can be right, even if I have several doubts about the cost effectiveness of such approaches due to their lack of maturity in this moment (2022)	Yes	
Operator		Yes				Yes	
Manufacturer	Yes					Yes	
Regulator			Yes		None	Yes	
Operator		Yes				Yes	

Manufacturer	Yes				Additionally to the header, the increased usage of data for prediction, IA, data science and caution about cybersecurity may also drive us somehow to a new methodology and MSG4 can be the starting point for this new "moment".	Yes	
Operator	Yes				Efforts will be needed throughout industry to update other document interfaces currently containing MSG3. I think this shift allows users (even those who may not be direct MSG3 practitioners) to recognize MSG4 is the point where predictive analytics and advanced automation was introduced.	Yes	
Regulator			Yes		IAHM is aimed at being predictive whilst current approach is more reactive.	Yes	
Manufacturer	No			CBM is already applied today. Thanks to on-A/C application a number of potential level 2 tasks are not selected because a health detection is taking place and reported e.g. via post flight report. IP180 is extending the application of CBM (pulling the ground segment into the end-to-end process, but cannot be seen as a philosophical shift which justifies a name change..	I do believe in the MSG methodology, but a more fundamental update is required to make MSG ready for the next generation aircraft (applications and vehicles as listed in the header). One aspect should be to consider the ground crew as part of the operating crew and to allow the consideration of e.g. virtual assistance.	Yes	
Manufacturer	Yes					Yes	
Manufacturer	No			IP180 not applicable to vol.02. Similar scope of 2018 integrated IP170 which was not considered enough to change the standard.	IP180 work started based on a different patch chosen by MPIG when HUMS was approved on rotorcraft vol.02. IP180 has further developed the approach but needs effective demonstration that additional administrative burden is justified respect to current in place no credit HUMS system. This will pass through certification (not under MSG-3) clarification. For rotorcrafts most of the application would not find a real benefit if limited to not safety FEC from their first application..	No	Primary means for any challenge remains the certification specifications anglosassone guidance materials. Some of the topics in the header are suitable for Boeing consider during an MSG3 exercise but would be not the primary means to address those topics.
Manufacturer	Yes				IAHM is ready to be adopted because of good experience gained together with EASA during test run up process	No	MRBR provide maintenance minimum which is enough for risk-based assessment in frames of certification, but even MSG-3 provide us ability to select tasks intended to be operation and economic related, which is extending initial scope of maintenance. The same approach is acceptable for structure, zonal, their assessment process.
Regulator			No	MSG-3 has always been a living document. IP180 is the latest in a series of accommodations, but it does not change the core philosophy of the process. At the end of the day most aspects of scheduled maintenance for most aircraft will still be developed in the traditional manner.		Yes	
Regulator			Yes			Yes	
Operator	No			The philosophy for determining an MSI, Functional Failure, Functional Effect, Category, task questions and Answer has not changed. What is being introduced is a methodology of inspection to address the concern.	By answering Yes in question 7 below, it is meant MSG3 methodology.	Yes	
Manufacturer	No			The changes defined in IP 180 have been explicitly defined in this way not to question the basic logic of MSG-3 MSI analysis.	To work on a MSG-4 we need to have a good understanding of expected new regulatory requirements e.g. related to "single pilot operation", "minimum crew operations" or new flight management applications for large aeroplanes	Yes	
Regulator	Yes					Yes	
Regulator			No	I do not consider that IP 180 is ready to be incorporated in MSG3 in 2022. What is the level of experience we have collected regarding IP 180 attempt implementation by the TCHs ? I am not aware of any significant feedback in that respect for the time being. I am not against any change to MSG4 in the future but I do not consider 2022 version as the appropriate introduction point. The new philosophy is not yet sufficiently identified.		Yes	

Regulator				No	Despite the big novelty which might be introduced by IP180 if embodied in next document revision, the level of modifications introduced by the Level 3 analysis alone is not sufficient to justify such a significant switch in philosophy to require moving from MSG-3 to MSG-4. In our opinion, MSG-4 would embrace a new maintenance paradigm, which would embody elements of classic preventive maintenance with new predictive approaches. We are anyway in favor to start the discussions to prepare the IMRBPB for the incoming novelties and a possible introduction of MSG-4 when times are mature, maybe with a dedicated Working Group composed by Authorities and Industry members.	As of today, IP180/AHM is only applicable to a limited portion of the MSG-3 analysis (system, non safety-categories) and only for Volume 1. In addition, the switch to an MSG-4 document should be carefully evaluated in terms of impacts on the current Regulations/Guidance Materials..	Yes	
Regulator				No	Despite the big novelty which might be introduced by IP180 if embodied in next document revision, the level of modifications introduced by the Level 3 analysis alone is not sufficient to justify such a significant switch in philosophy to require moving from MSG-3 to MSG-4. In our opinion, MSG-4 would embrace a new maintenance paradigm, which would embody elements of classic preventive maintenance with new predictive approaches. We are anyway in favor to start the discussions to prepare the IMRBPB for the incoming novelties and a possible introduction of MSG-4 when times are mature, maybe with a dedicated Working Group composed by Authorities and Industry members.	As of today, IP180/AHM is only applicable to a limited portion of the MSG-3 analysis (system, non safety-categories) and only for Volume 1. In addition, the switch to an MSG-4 document should be carefully evaluated in terms of impacts on the current Regulations/Guidance Materials:	Yes	
Regulator				Yes			Yes	
Manufacturer				No	Accordring to the white paper "From Aircraft Health Monitoring to Aircraft Health Management" MSG-3 marked a departure from HT, OC and CM concepts. In my understanding, the current iteration does not mark a departure from current concepts but an extension to IAHM processes. I am not sure, if such a transition can be forced by a renaming.		Yes	
Regulator				No	IP180 is a philosophical shift yet at this stage the coverage of IP180 could not enable all tasks to be analysed through Level 3 analysis as introduced by IP180. Besides, the readiness of aircraft and technology to allow the implementation of IP180, and beyond, has yet to be demonstrated. It is premature to rename MSG-3 at this stage.	IP180 is a first important step towards MSG-4, yet more work would be required both on IP180 as well as on aircraft and technology readiness to complete the roadmap to MSG-4.	Yes	
Manufacturer				Yes			Yes	
Manufacturer				No	IP180 lays out a process to use AHM as an alternative to a "classic" task. This seems like a simple enough change to keep it in MSG-3.	A lot of reference documents (PPH, Marketing Literature, research papers, etc.) refer to MSG-3. Changing to MSG-4 would require all of these documents to be changed to be accurate. However, when/if the FAA publishes an Advisory Circular addressing the future challenges noted in the header, then it might be more appropriate to go to MSG-4.	Yes	
Manufacturer				No	A much more significant change would be expected to go to MSG-4. IP180 is considered as an add-on to MSG-3		Yes	
Manufacturer				Yes		Since the maintenance concept is evolving in such to add Condition Based Maintenance conception, we guess this is the right time to rename the methodology from MSG-3 to MSG-4.	Yes	
Manufacturer				Yes		I agree that is time to rename MSG3 to MSG4 based on all items already quoted (Single-pilot flight deck, non-crewed aircraft, VTOL, ground-controlled ops, next generation propulsion systems and recognition of ground crews considered part of operating crew, etc.) and we would like to suggest the ENVIRONMENTAL & ECOLOGICAL issues within the methodology logic.	Yes	
Manufacturer				Yes		MSG 3 has not rolled since the 80s and the addition of the IAHM makes it a good opportunity to roll the number.	Yes	
Operator				Yes		The will be a paradigm shift in methodology, workforce attributes and regulatory management, thus a demonstrative shift to MSG-4 demonstrates a move to forward to new activity.	Yes	

Even though we do believe that IAHM and other novel technologies may come to be a philosophical shift that would justify MSG-3 turning into MSG-4, we understand we're not there yet and it would be too early to make this change still in 2022. The introduction of IAHM processes as per IP180 is still seen as a normal evolution of MSG-3. IP180 is still built under MSG-3 philosophy, and lies within current MSG-3 constraints, and it is applied only where level 2 analysis has identified a classic task. If IAHM were considered at the core of the methodology, IAHM tasks would be generated even where a classic task is not. Having those IAHM tasks as part of the initial minimum scheduled maintenance/inspection requirements would be fully in line with the objective of the method. Therefore, a paradigm shift that would justify a new MSG-4 should have IAHM and other novel technologies at its core, influencing all phases of the process, possibly even from the selection of candidate MSIs. Thus, we would encourage that MSG-4 should be built from the ground up, using, of course, MSG-3 experience as a fundamental reference. As an example, the "Scheduled Maintenance Objectives" as stated in MSG-3 should be retained and they would be the starting point for building MSG-4 around it. Additionally, a new MSG-4 would also bring the opportunity to solving known issues of MSG-3 that have been acknowledged as relevant by all IMRBPB participants (Industry included), but which are difficult to resolve given the MSG-3 constraints already in place (such as definitions and the structure of the methodology). As an example, allowing task intent rather than task type to be the driver when making decisions on applicability and effectiveness. In conclusion, we do believe an MSG-4 is near that would incorporate IAHM and other novel technologies, but there is still ground to be covered before that happens.							
Regulator	No			Yes			
Manufacturer	Yes				Engine Condition Monitoring (ECM) / Engine Health Monitoring (EHM) should be considered as an embedded part of the IAHM. We as engine OEM use our more and more enhanced EHM capabilities as reference and substantiation if we establish tasks and intervals for the Powerplant. As an OEM there are factors relating to Intellectual Property and Export Control that need to be taken into account, especially relating to the core engine and EHM parameters; this will provide challenges in terms of implementing and validating condition based maintenance.	Yes	
Manufacturer	No	Content is more important than title.			Changing title will impact a lot of documentation (AMC, AC...)	Yes	
Manufacturer	No			I believe a much more significant change would be required to change to MSG-4. And at the beginning of the development of IP180, it was agreed that it would be an amendment to MSG-3.	Thank you for asking our advice through this survey.	Yes	
Manufacturer	Yes				The introduction of IP180 and IAHM provides an opportunity to evolve and optimise maintenance regimes, taking account of digital toolsets, with far reaching implications for how maintenance is carried out in the future. This does represent a significant shift from current MSG-3 philosophy, and a move to MSG-4 is appropriate. As an OEM there are factors relating to Intellectual Property and Export Control that will need to be taken into account, especially relating to the core engine and access to the data used for health management activities in terms of defining, implementing and validating condition based maintenance. For new propulsion systems the maintenance task development process needs to be appropriate for the new systems and their maintenance philosophy. Where a lack of experience on a product exists, the validation of appropriate parameters, particularly for the core engine hardware or novel systems architectures could be more challenging and may require a different approach compared to programmes with significant in-service experience. A move to MSG-4 may also require the development of differing techniques to validate digital toolsets. Consideration would also need to be given to the knock-on impact that a move from MSG-3 to MSG-4 would have in terms of paperwork and documentation references in certification standards and documents throughout the aviation industry.	Yes	
Manufacturer	No	Despite it is a change, we consider that it is not enough, there should be a disruptive change to consider MSG4.				Yes	

Manufacturer	Yes		I do agree that the use of IAHM represents a philosophical shift but to a more basic point it is a significant change that will introduce new processes & capabilities that it needs a notable change in process title to draw attention to the significance.	Yes
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