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Agencija za civilno letalstvo  
Slovenija



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Civil Aviation Agency  
Slovenija

Sergej Koncilja – Letalski nadzornik

# PRODUKTNA PRESOJA AMO IN CAMO

Konferenca o začetni stalni plovnosti – Šenčur, 6. december 2019

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## NAMEN PREZENTACIJE

Namen prezentacije je povzeti zakonodajo in opisati praktične primere izbire produktne presoje.

Tako boste organizacije lahko bolj učinkovito izvajale produktne presoje, npr. da ne presojate vseh produktov na odobritvi ampak, da produkte izbirate, na podlagi v prezentaciji naštetih meril.



## 1. Povzetek zakonodaje Part-145 za AMO

### SECTION A TECHNICAL REQUIREMENTS Part-145

#### 145.A.65 Safety and quality policy, maintenance procedures and quality system

##### 145.A.65(c)

The **organisation shall establish a quality system** that includes the following:

1.

**Independent audits** in order to:

- **monitor compliance** with required **aircraft/ component standards**  
and
- **adequacy of the procedures** to ensure that such procedures **invoke good maintenance practices** and **airworthy aircraft/ components**.



# 1. Povzetek zakonodaje Part-145 za AMO

## AMC 145.A.65(c)1

### 1.

The primary objectives of the quality system are to enable the organisation to ensure:

- that it can **deliver a safe product**
- and
- that organisation **remains in compliance with requirements.**

### 2.

An essential element of the quality system is the **independent audit.**



# 1.Povzetek zakonodaje Part-145 za AMO

## AMC 145.A.65(c)1 nadaljevanje

3.

The **independent audit** is an objective **process of routine sample checks** of all aspects of the organisation's **ability to carry out all maintenance to the required standards** and **includes some product sampling as this is the end result of the maintenance process.**

It represents an **objective overview of the complete maintenance related activities** and is intended to complement the 145.A.50(a) requirement for certifying staff to be satisfied that all required maintenance has been properly carried out before issue of the certificate of release to service.

*145.A.50 Certification of maintenance*

*145.A.50(a)*

*A certificate of release to service shall be issued by appropriately authorised certifying staff on behalf of the organisation when it has been verified that all maintenance ordered has been properly carried out by the organisation in accordance with the procedures specified in point 145.A.70, taking into account the availability and use of the maintenance data specified in point 145.A.45 and that there are no non-compliances which are known to endanger flight safety.*

Independent audits should include a percentage of **random audits carried out on a sample basis** when **maintenance is being carried out**. This means some audits during the night for those organisations that work at night.



# 1.Povzetek zakonodaje Part-145 za AMO

## AMC 145.A.65(c)1 nadaljevanje

4.

Except as specified in sub-paragraphs 7 and 9, the independent audit should ensure that all aspects of Part-145 compliance are **checked every 12 months** and may be carried out as a **complete single exercise** or **subdivided over the 12 month period** in accordance with a **scheduled plan**.

The independent audit **does not require** each procedure to be checked against each **product line** when it can be shown that the particular **procedure is common to more than one product** line and the procedure has been checked every 12 months **without resultant findings**.

Where findings have been identified, the particular **procedure should be rechecked against other product lines until the findings have been rectified** after which the independent audit procedure may revert back to 12 monthly for the particular procedure.



# 1. Povzetek zakonodaje Part-145 za AMO

## AMC 145.A.65(c)1 nadaljevanje

5.

Except as specified otherwise in subparagraphs 7, the independent audit should **sample check one product on each product line every 12 months** as a demonstration of the effectiveness of maintenance procedures compliance.

It is recommended that **procedures and product audits be combined by selecting a specific product example, such as an aircraft or engine or instrument and sample checking all the procedures and requirements associated with the specific product example** to ensure that the end result should be an **airworthy product**.

For the purpose of the independent audit, a **product line includes any product** under an Appendix II **approval class rating** as specified in the approval schedule issued to the particular organisation.

It therefore follows for example that a maintenance organisation approved under Part-145 with a **capability to maintain aircraft, repair engines, brakes and autopilots** would need to carry out **four complete audit sample checks each year** except as specified otherwise in subparagraphs 5, 7 or 9.

6.

The sample check of a product means to **witness any relevant testing and visually inspect the product and associated documentation**. The sample check should not involve repeat disassembly or testing unless the sample check identifies findings requiring such action.





# 1.Povzetek zakonodaje Part-145 za AMO

## AMC 145.A.65(c)1 nadaljevanje

9.

Except as specified otherwise in sub-paragraph 5, the competent **authority may agree to increase** any of the **audit time periods** specified in this AMC 145.A.65(c)(1) **by up to 100%** provided that there are **no safety related findings** and subject to being satisfied that the **organisation has a good record of rectifying findings in a timely manner.**

10.

A **report should be raised** each time an audit is carried out describing **what was checked and the resulting findings against applicable requirements, procedures and products.**

11.

The **independence of the audit** should be established by always ensuring that **audits are carried out by personnel not responsible** for the function, procedure or **products being checked.**



## 2. Povzetek zakonodaje Part-M-F za AMO

Part-M-F AMO

### M.A.616 Organisational review

AMC M.A.616

1.

The **primary objectives** of the **organisational review** are to enable the approved maintenance organisation to ensure:

- that it can **deliver a safe product**

and

- that approved maintenance organisation **remains in compliance with the requirements.**

3.

The **organisation quality system as specified in Part-145 provides an acceptable basic structure for the organisational review** system for organisations with more than 10 maintenance staff, dependent upon the complexity of the organisation.



### 3. Povzetek zakonodaje iz Part-145 za CAA

#### SECTION B PROCEDURES FOR COMPETENT AUTHORITIES

##### 145.B.20 Initial approval

##### 145.B.20(3)

##### AMC 145.B.20(3)

2.

It is recommended that the audit is carried out on a product line type basis in that, for example, in the case of an organisation **with Airbus A310 and A320 ratings**, the audit be **concentrated on one type only** for a **full compliance check** and dependent upon the result, the **second type may only require a sample check** against those activities seen to be **weak on compliance for the first type**.

Verjetno bi bilo bolj primerno, da je ta zahteva del zahteve 145.B.30 Continuation of an approval , torej stalnega nadzora in ne začetne odobritve. Kako lahko CAA izvede produktno presojo, če organizacija (še) ne izvaja vzdrževanja na "produktih" ?



## 4. Povzetek zakonodaje iz Part-M-G - CAMO

### M.A.712 Quality system M.A.712(a)

To ensure that the approved continuing airworthiness management organisation continues to meet the requirements of this Subpart, it shall **establish a quality system** and **designate a quality manager to monitor compliance** with, and the adequacy of, **procedures required to ensure airworthy aircraft.**

### *M.A.712(b)* *AMC M.A.712(b)*

1.

The primary objectives of the quality system are to

- **enable the CAMO to ensure airworthy aircraft**
- and
- to **remain in compliance with the Part-M** requirements.

2.

An essential element of the quality system is the **independent audit.**



## 4.Povzetek zakonodaje iz Part-M-G - CAMO

### AMC M.A.712(b) nadaljevanje

3.

The independent audit is an **objective process of routine sample checks** of all aspects of the CAMO ability to carry out continuing airworthiness management to the required standards.

It includes some **product sampling as this is the end result of the process.**

4.

The independent audit represents an objective **overview of the complete continuing airworthiness management related activities.** It is intended to complement the M.A.902 requirement for an airworthiness review to be satisfied that all **aircraft managed by the organisation remain airworthy.**



## 4.Povzetek zakonodaje iz Part-M-G - CAMO

### AMC M.A.712(b) nadaljevanje

5.

The **independent audit should ensure** that all aspects of M.A. Subpart G compliance **are checked annually**, including **all the sub-contracted activities**, and may be carried out as a **complete single exercise or subdivided over the annual period** in accordance with a **scheduled plan**.

Zakaj ni potrebno presojati VSEH produktov?

The independent audit **does not require** each procedure to be checked against each **product line** when it can be shown that the particular **procedure is common to more than one product line** and the **procedure has been checked every year without resultant findings**.

Where **findings** have been identified, the particular **procedure should be rechecked** against **other product lines** **until the findings have been rectified** after which the independent audit procedure may revert back to the annual interval for the particular procedure.

Provided that there are **no safety related findings**, the **audit time periods** specified in this AMC **may be increased by up to 100% subject to agreement by the competent authority**.



## 4. Povzetek zakonodaje iz Part-M-G - CAMO

AMC M.A.712(b) nadaljevanje

7.

A **report should be raised** each time an audit is carried out **describing what was checked** and the resulting **findings against applicable requirements, procedures and products.**

8.

The **independence of the audit should be established** by always ensuring that **audits are carried out by personnel not responsible** for the function, procedure or **products being checked.**

9.

An organisation should **establish a quality plan** acceptable to the competent authority to show when and how often the activities as required by M.A. Subpart G will be audited.

Produktna presoja mora torej biti vključena v letni plan presoj.



## 5. Povzetek zakonodaje iz Part-M-G – za CAA

### SECTION B PROCEDURES FOR COMPETENT AUTHORITIES

#### *M.B.702 Initial approval*

#### *AMC M.B.702(c)*

2.

The audit may be carried out on a product line type basis. For example, in the case of an organisation with Airbus A320 and Airbus A310 ratings, the audit is concentrated on one type only for a full compliance check. Dependent upon the result, the second type may only require a sample check that should at least cover the activities identified as weak for the first type.

#### **M.B.704 Continuing oversight**

#### **M.B.704(c)**

A relevant sample of the aircraft managed by the organisation approved under Section B, Subpart G of this Annex (Part-M) shall be surveyed in every 24 month period.

The size of the sample will be decided by the competent authority based on the result of prior audits and earlier product surveys.

Verjetno bi bilo tudi tukaj bolj primerno, da je ta zahteva del zahteve M.B.704 Continuing oversight, torej stalnega nadzora in ne začetne odobritve. Kako lahko CAA izvede produktno presojo, če organizacija (še) ne izvaja vodenja stalne plovnosti na "produktih" ?





## 6. Praktični primeri

### AMO

Kaj so primeri produktne presoje v AMO (Part-145 in M-F)?

Odvisno od odobritve imamo lahko različne primere.

- Organizacija, ki ima v odobritvi zrakoplove "generalnega letalstva" (letala ali helikopterje), oz. skupino letal npr. CESSNA SINGLE PISTON ENGINE za presojo izbere določen tip= produkt iz skupine in ga uvrsti v plan presoj.
- Organizacija, ki ima večji obseg odobritev izbere "produkte iz RATING-ov" iz posameznih razredov (AIRCRAFT, ENGINE, COMPONENTS, SPECIALISED SERVICES – NDT).
- Različni produkti- AIRCRAFT se lahko izberejo tudi odvisno od tega ali gre za bazno ali za linijsko vzdrževanje.
- Če bi bila AMO odobrena tudi za izvajanje Airworthiness review (za ELA1) bi bila produktna presoja tudi izvedba le-tega.



## 6. Praktični primeri

RAZRED (CLASS)	AKTIVNOSTI (RATING)	OMEJITVE (LIMITATION)	BASE	LINE
ZRAKOPLOVI (AIRCRAFT)	A1: Letala nad 5700 kg (Aeroplane above 5700 kg)	<u>REZERVIRANO ZA VZDRŽEVALNO ORGANIZACIJO</u> <u>POTRJEJENO PO DEL 145.</u> (Rating reserved to Maintenance Organisations approved in accordance with Annex II (Part-145)) Vpiše se proizvajalca ali skupino ali serijo ali tip letala in/ali obseg vzdrževanja <b>State aeroplane manufacturer or group or series or type and/or the maintenance tasks</b> <b>Primer/Example:</b> Airbus A320 Series		
	A2: Letala pod in vključno z 5700 kg (Aeroplane 5700 kg and below)	Vpiše se proizvajalca ali skupino ali serijo ali tip letala in/ali obseg vzdrževanja. Navesti je potrebno ali je oziroma ni potrebna izdaja potrdila o pregledu plovnosti (samo za ELA1 zrakoplove, ki niso udeleženi v komercialnih operacijah) (State aeroplane manufacturer or group or series or type and/or the maintenance tasks) <b>Primer/Example:</b> DHC-6 Twin Otter Series State whether the issue of airworthiness review certificate is requested or not (only possible for ELA1 aircraft not involved in commercial operations)		
	A3: Helikopterji (Helicopters)	Vpiše se proizvajalca ali skupino ali serijo ali tip helikopterja in/ali obseg vzdrževanja (State helicopter manufacturer or group or series or type and/or the maintenance tasks) <b>Primer/Example:</b> Robinson R44		
	A4: Drugi zrakoplovi razen A1, A2, A3; (Aircraft other than A1, A2, A3)	Navesti je potrebno kategorijo zrakoplova (jadralno letalo, balon, zračna ladja, itd.), proizvajalca, grupo ali serijo ali serijo in/ali obseg vzdrževanja. Navesti je potrebno ali je oziroma ni potrebna izdaja potrdila o pregledu plovnosti (samo za ELA1 zrakoplove, ki niso udeleženi v komercialnih operacijah) State aircraft category (sailplane, balloon, airship, etc), manufacturer or group or series or type and/or the maintenance task(s). (State whether the issue of airworthiness review certificate is requested or not (only possible for ELA1 aircraft not involved in commercial operations))		
MOTORJI (ENGINES)	B1: Turbinski motorji (Turbine)	Vpiše se serijo ali tip motorja motorja in/ali obseg vzdrževanja (State engine series or type and/or the maintenance task(s)) <b>Primer/Example:</b> PT6A Series		
	B2: Batni motorji (Piston)	Vpiše se proizvajalca ali serijo ali tip motorja motorja in/ali obseg vzdrževanja (State engine manufacturer or series or type and/or the maintenance task(s))		
	B3: Pomožni agregati električne in pnevmatske energije (APU)	Vpiše se proizvajalca ali serijo ali tip motorja in/ali obseg vzdrževanja (State engine manufacturer or series or type and/or the maintenance task(s))		
KOMPONENTE, RAZEN KOMPLETNIH MOTORJEV ALI APU (COMPONENTS OTHER THAN COMPLETE ENGINES OR APUs)	C1: Sistem prezračevanja in pritiska (Air Cond & Press)	Vpiše se tip zrakoplova ali proizvajalca zrakoplova ali proizvajalca komponente ali posamezno komponento in / ali preveri s seznamom odobrenih del v priročniku. (State aircraft type or aircraft manufacturer or component manufacturer or the particular component and/or cross refer to a capability list in the exposition and/or the maintenance task(s)). <b>Primer/Example:</b> PT6A Fuel Control		
	C2: Sistem avtopilota (Auto Flight)			
	C3: Komunikacijski in navigacijski sistem (Comms and Nav)			
	C4: Vrata - zaklopna vratca (Doors - Hatches)			
	C5: Električna energija in osvetlitev (Electrical power & lights)			
	C6: Oprema (Equipment)			
	C7: Motor – pomožni agregat (Engine - APU)			
	C8: Krmilni sistemi zrakoplova (Flight Controls)			
	C9: Gorivo (Fuel)			
	C10: Helikopter-Rotorji (Helicopter - Rotors)			
	C11: Helikopter-Transmisija (Helicopter - Trans)			
	C12: Hidravlika (Hydraulic power)			
	C13: Zapisovalniki (Indicating - recording system)			
	C14: Podvožje (Landing Gear)			
	C15: Kisik (Oxygen)			
	C16: Propeler (Propeller)			
	C17: Pnevmatika in vakumski sistem (Pneumatic & Vacuum)			
	C18: Zaščita pred ledom in dežjem, protipožarni sistem (Protection ice/rain/fire)			
	C19: Okna (Windows)			
	C20: Struktura (Structure)			
	C21: Vodni balast (Water ballast)			
	C22: Povečanje pogonske moči (Propulsion Augmentation)			
POSEBNA DELA (SPECIALISED SERVICES)	D1: Pregledi brez porušitve materiala (Non destructive insp.)	Navedemo posebno NDT metodo (State particular NDT method)		



## 6. Praktični primeri

Definirali smo že, da ni potrebno presojati vseh produktov, če se isti postopki vzdrževanja uporabljajo za več produktov.

*AMC M.A.712(b) točka 5.*

*"The independent audit does not require each procedure to be checked against each product line when it can be shown that the particular procedure is common to more than one product line and the procedure has been checked every 12 months without resultant findings."*

Odvisno od rezultata že izvedenih presoj organizacija v plan presoj za naslednje leto lahko uvrsti drug(e) "produkt(e)".

Pri izbiri "produkta" upošteva lastne izkušnje, kot so

- količina izdanih delovnih nalogov,
- kompleksnost vzdrževanja posameznih produktov,
- upošteva tudi morebitna interna ali CAA neskladja,
- itd.



## 6. Praktični primeri

Tako kot za ostale dele internih presoj je potrebno tudi za produktno presojo izdelati poročilo in definirati morebitna neskladja.

Poročilo mora vsebovati opis kaj je bilo pregledano npr:

- Kateri delovni nalog in za katero letalo –ali je bil le-ta izdan skladno s proceduro MOE...
- Ali so uporabljeni zadnji maintenance data- ali se le-ti kontrolirajo skladno z MOE...
- Ali so uporabljeni odobreni obrazci – iz MOE ali TPM poglavja ....
- Ali je bilo vzdrževanje izvedeno s strani ustrezno pooblaščenih oseb (authorised, support staff)- pregled avtorizacije in liste osebja
- Ali je bila uporabljena ustrezno orodje in oprema- ali je bila ustrezno kalibrirana
- Ali je CRS izdala ustrezno pooblaščen osebja (certifying staff) in skladno s procedure MOE....- pregled avtorizacije in liste osebja
- ...

*AMC 145.A.65(c) 1 točka 10 in podobno tudi v AMC M.A.712(b) točka 7.*

*"A report should be raised each time an audit is carried out describing what was checked and the resulting findings against applicable requirements, procedures and products."*



## 6. Praktični primeri

### CAMO

Pri CAMO je situacija podobna. Vedno je potrebno pogledati vsebino odobritve in privilegije organizacije.

Tip/ serija/ skupina zrakoplova <i>Aircraft type/ series/ group</i>	Dovoljen pregled plovnosti <i>Airworthiness review authorised</i>	Odobrena dovoljenja za letenje <i>Permits to fly authorised</i>	Organizacija(c) dela(jo) po sistemu kakovosti <i>Organisations working under the quality system</i>
Airbus xxx	DA	NE	----

Kaj so lahko "produkti" CAMO organizacij?

Produkt je imeti plovno letalo.

Naslednji produkt ja lahko Airworthiness review. Kot vemo se le-ta lahko izvaja tudi za letala, katerim CAMO ne vodi stalne plovnosti. Zato je to lahko "ločen produkt"

Če je CAMO odobrena za izdajo Permit to fly, so to ločeni postopki, zato je tudi to lahko "ločen produkt".

Če ima organizacija indirektni privilegij izdaje in AMP- je lahko produkt tudi to.

...



## 6. Praktični primeri

### EASA

Foreign Part 145 approvals - User Guide for Maintenance Organisation Exposition

Doc # UG.CAO.00024-007

[https://www.easa.europa.eu/sites/default/files/dfu/B01.UG\\_CAO\\_00024-007%20MOE.pdf](https://www.easa.europa.eu/sites/default/files/dfu/B01.UG_CAO_00024-007%20MOE.pdf)

### PART 3 – QUALITY SYSTEM PROCEDURES

#### 3.1 Quality Audit of Organisation Procedures.

Product audit (methods) is known as „trail“ / „investigation“ audit



## 6. Praktični primeri

TABLE 1 – audit matrix (Subject matter- Regulatory reference- Exposition- Functional areas)

Subject Matter	Regulation/User Guide reference	Exposition	FUNCTIONAL AREAS					...
			Base Maintenance	Line Maintenance	Quality	Receiving and Storage	Subcontracting	
Facilities	145.A.25(a)(1)	1.8	X	X		X	X	...
	AMC 145.A.25(a)	2.22	X	X		X	X	...
	...	...						...
Personnel	145.A.30(c)	1.4			X			...
	145.A.30(d)	1.7, 2.22	X	X	X	X	X	...
	...	...						...
Record Keeping	145.A.55(a)	...	X	X		X	X	...
	...	...						...
Certifying staff	145.A.35(a)/ UG.CAO.00121	3.8	X	X	X			...
	...	...						...
Fabrication of Parts	145.A.42(b)(iii)/ UG.CAO.00131	1.9, 2.9	X	X		X	X	...
...	...	...	...	...	...	...	...	...

TABLE 2 – audit plan

OPERATIONAL AREA	FUNCTIONAL AREA	Planned	Completed	Remarks
Base Maintenance Hangar 1	Base Maintenance	mmm yyyy	dd mmm yyyy	
Base Maintenance Hangar 2	Base Maintenance	mmm yyyy	dd mmm yyyy	
Line Maintenance location 1	Line Maintenance	mmm yyyy	dd mmm yyyy	
Line Maintenance location 2	Line Maintenance	mmm yyyy	dd mmm yyyy	
Quality	Quality	mmm yyyy	dd mmm yyyy	
Store 1,2,3	Receiving and Storage	mmm yyyy	dd mmm yyyy	
Receiving Inspection	Receiving and Storage	mmm yyyy	dd mmm yyyy	
Subcontractor 1	Subcontracting	mmm yyyy	dd mmm yyyy	
Aircraft Base Product audit A320	Base Maintenance	unannounced	dd mmm yyyy	during night shift
Aircraft Line Product audit A380	Line Maintenance	mmm yyyy	dd mmm yyyy	
.....	.....	.....	.....	.....



## 7. Zaključek, vprašanja

Moja razlaga kakšna je razlika med produktno presojo CAMO in AMO je, da so to različne presoje, tudi v primeru ko gre za en in isti zrakoplov.

V splošnem bi rekel, da kjer se konča produktna presoja CAMO se začne produktna presoja AMO.

**CAMO produktna presoja** se za določen zrakoplov začne z uvajanjem zrakoplova v sistem stalne plovnosti in konča z naročilom vzdrževanja vzdrževalni organizaciji -z izdajo t.i. Work request), oz. s prejemom dokumentacije o izvedenem vzdrževanju (CRS, work package).

Vmes pa je veliko stvari:

- izdelava AMP,
- spremljanje AD not,
- spremljanje delov z omejeno dobo,
- izdelava naročila vzdrževanja in pregled dokumentacijo po vzdrževanju
- ....





## 7. Zaključek, vprašanja

**Produktna presoja AMO** pa se začne s prejetjem naročila vzdrževanja s strani CAMO organizacije in konča z izdajo CRS po končanem vzdrževanju, oz. predajo dokumentacije (in letala) po končanem vzdrževanju naročniku- CAMO organizaciji.

Vmes pa je veliko stvari:

- planiranje vzdrževanja,
- izdelava delovnega naloga,
- določitev ustrezno avtoriziranega vzdrževalnega osebja,
- zagotavljanje podatkov za vzdrževanje- maintenance data,
- ...



## 7. Zaključek, vprašanja

Namen prezentacije je bil povzeti zakonodajo in opisati praktične primere izbire produktne presoje.

Tako boste organizacije lahko bolj učinkovito izvajale produktne presoje, npr. da ne presojuje vseh produktov na odobritvi ampak, da produkte izbirajo, na podlagi v prezentaciji naštetih meril.

Tako bo tudi uporaba razpoložljivega časa za interne presoje bolj učinkovita.

**JE NAMEN DOSEŽEN?**

