


EASA	COMMENT RESPONSE DOCUMENT
	EASA PAD No. 14-056 [Published on 25 March 2014 and officially closed for comments on 22 April 2014]

Commenter 1: HOP! Regional – Jerome Brosse – 26/3/2014

Comment # 1

Some comments regarding the PAD 14-056 (E170 and E190 brakes replacement) - on the section required actions and compliance time:
table 1 : "FC accumulated by the carbon brakes, on the effective date of this AD" => since new ?, since installation on the A/C ?, since overhaul? => could you clarify ?
I assume it is **since overhaul**.

Moreover, regarding the brakes replacement : **The compliance time is too short.**

If I take the example of our fleet, I must replace around 43 brakes (29 on the E190 fleet and 14 on the e170 fleet) within the next 100 FC. this is not possible. We will **ground more than 40 % of our fleet 100 FC after effective date of the AD !!!!**

Moreover **all other brakes will be very quickly limited**

I think Meggitt will not be able to support the operators in a such short period .

What I propose, it is an inspection every 100 FC (as described in the paragraph 1 of this PAD) and a replacement within (at least) 18 months after the issuance of the AD. But to my part this compliance time must be consolidated with Meggitt to make sure they could support the retrofit.

Based on the experience we had in the past with Meggitt on the retrofit (we already performed a retrofit from brakes -2PR to -3PR on our e170 fleet) tha TAT (from door to door) is around 20 days to retrofit each brake.

EASA response:

Comments partially accepted. Following a meeting between EASA, Embraer, MABS and Liebherr, the Final AD has been amended accordingly.

Commenter 2: Air Dolomiti – Luca Bressan – 26/3/2014

Comment # 2

In response to the consultation process for this pad we have the following comments:

[1] Section REQUIRED ACTIONS and COMPLIANCE TIMES:

Paragraph (3) Table 1 requires replacement of the carbon brakes with new P/Ns at 800 FC or within 100 FC (depending on the FC of the Brake at the effectivity date).

We believe the timeframe for brake replacement to new P/N shall be extended for the following reasons:

- High probability of unavailability of enough spare brakes with new P/N to be installed on the planes within the proposed FC Limits.
- Need to plan ahead the fleet-wise replacement of all the brakes to avoid operational impacts.

To support a possible extension of the compliance times for brake replacement requirement, there is already a requirement for repetitive inspections at every 14 days or 100 FC as per paragraph (1).

[2] Section REQUIRED ACTIONS and COMPLIANCE TIMES:

Paragraph (3) Table 1 specifies the different conditions of the brakes in terms of FC to define the limits for replacement of the brake with new P/N.

Please specify how the FC accumulated (Less than 700 FC / 700 FC or more) have to be intended:

- Since NEW
- Since OVERHAUL
- Since INSTALLATION

Table 1 – Carbon Brake Replacement

FC accumulated by the carbon brakes, on the effective date of this AD	Compliance Time
Less than 700 FC	Before exceeding 800 FC
700 FC or more	Within 100 FC after the effective date of this AD

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 3: KLM Cityhopper – Dirk-Jan Andriesse – 26/3/2014

Comment # 3

We would like to comment on this AD proposal and specifically on the proposed compliance.

[A] The compliance does not specify the starting point. It is not specified if the number of cycles are since last overhaul, new or repair.

[B] The compliance times given are not realistic and will in practice not be feasible.

KLM Cityhopper at this moment has 88 brakes pn 90002340-2PR in the fleet. For all brakes close to 700 FC or over 700 FC a compliance time for replacement of

100FC is proposed. In practice this means that at this moment in time KLM Cityhopper must do 68 brake replacements in approximately 2 weeks. This is not a realistic proposal especially since the Brake manufacturer (MABS) does not have that many brakes pn 90002340-4PR available. Another 20 brake replacements will have to follow shortly after.

KLM Cityhopper uses a hard time for the brakes pn 90002340-2PR of 2200 FC. Since the introduction of the new brake pn 90002340-4PR, a little more than 1 month ago, all brakes pn 90002340-2PR that are returned to MABS will automatically be modified to brake pn 90002340-4PR. This means that the upgrading program is already running and can be finished in approximately 1 year time. This seems a far more realistic schedule than the proposed compliance in PAD No. 14-056.

KLM Cityhopper already introduced a “one-way interchangeability” in our systems meaning that a brake pn 90002340-4PR cannot be replaced by a brake pn 90002340-2PR.

KLM Cityhopper already does a daily inspection on the rotor disk #1 for cracks or damages (as described in AMM 32-49-11-210-801).

Can EASA please consider the above comments before release of a possible Airworthiness Directive?

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 4: British Airways (BA) CityFlyer – Mark Leather – 27/3/2014

Comment # 4

We regret to advise that we would not be able to comply with the proposed AD in its current form. The time limits proposed for replacement of brake units with the modified version, are not realistic or practical with respect to the number of float units available and the OEMs ability to adhere to such an aggressive modification programme. If BA CityFlyer were to comply with the PAD then we would be forced to ground the majority of our fleet on reaching the first time limit.

BA CityFlyer [] have been managing this issue since the first reports of carbon break-up on E170 aircraft in 2011. For your information, BA CityFlyer experienced some of the first failures of the carbon heat pack rotor lugs in June 2011, and immediately took steps to mitigate any further flight safety and/or airworthiness risks. The steps we have taken are as follows:

1. Wheel-Off inspections of carbon brake units P/N 90000583-3PR (E170) every 400 flight cycles and P/N 900002340-2PR (E190) every 700 flight cycles (over and above the AMM requirements proposed in the PAD). We have carried out these inspections since June 2011 [inspection data made available to EASA] and have had no further findings related to carbon heat pack break-up.
2. We imposed a hard-life of 2,000 flight cycles for P/N 90000583-3PR brake units and 2,500 flight cycles for P/N 90002340-2PR brake units. Again, since imposing these limits we have had no instances of carbon break-up or any other failure of the heat packs.
3. Proactive modification to P/N 90000583-5PR units on E170 aircraft on an attrition basis as soon as the new units became available. To-date we have modified 16 brake units installed on our fleet of 6 E170 aircraft, and are about to commence the modification to P/N 90002340-4PR units on our fleet of 8 E190 aircraft.

Based on our experience to date, together with assistance and data from Embraer and Meggitt Aircraft Braking System (MABS), BA CityFlyer believe we have taken more than adequate steps to mitigate the risk of carbon heat pack failure on our fleet of Embraer E170 and E190 aircraft. We firmly believe that PAD 14-056 is somewhat over the top in terms of compliance timescales and would strongly urge EASA to reconsider these aspects of the proposed AD.

EASA response:**Comments partially accepted. See answer to Comment #1.****Commenter 5: TUI Airlines Belgium (Jetairfly) – David Van Cauteren – 27/3/2014****Comment # 5**

TUI Airlines Belgium (trading as Jetairfly), further referenced in this email as TLB has reviewed EASA PAD 14-056 for models ERJ 170 and ERJ 190 concerning the MABS brakes installed on subject aircrafts. TLB has two aircrafts (ERJ 190) in its fleet equipped with PN 90002340-2PR (including some spare brakes on stock). For your information, TLB has been operating both aircraft for a little as over one year (both delivered beginning of 2013) and no issues were noted on these brakes. TLB hasn't experienced any reliability issues with the brakes since beginning of operations.

TLB has the following comments concerning the proposal for AD:

- (a) Brake part numbers 90000583-3PR (ERJ 170) and 90002340-2PR (ERJ 190) are mentioned, but no reference is made to older versions of the brakes. As TLB is operating ERJ 190s we're also allowed to install brakes PN 90002340PR and 90002340-1PR on our aircraft in addition to PN 90002340-2PR. Hence TLB is wondering if the older type of brakes are also affected by this proposed AD.
- (b) Point (1) in the required action section mentions an inspection to be performed in accordance with AMM Task 32-49-11-210-801-A. Embraer MPD asks for this inspection to be performed per MPD Task 32-49-11-001 with an interval of 14 Days and 120FH. TLB would like to propose to refer to the Embraer MPD task which is already performed instead of adding a new requirement and if required to change the MPD interval to coincide with the interval 14 days and 100FC.
- (c) Point (3) in the required action section mentions that brakes which accumulated more than 700FC should be replaced within 100FC or 14 days after the effective date of the AD or before exceeding 800FC. TLB would like some clarification on when they should start to count the flight cycles, Should it be 700FC from last shop visit (since installation), overhaul or since new? Cycles since new is not always traceable, which means that these brakes will have to be replaced anyway. TLB would like to have clearly stated in the AD which base line should be considered.
- (d) Point (5) in the required action section mentions that after incorporation of point (3) no brake with PN 90002340-2PR (or 9000583-3PR) can't be installed on the aircraft anymore. TLB would like to have the possibility to install a brake for example PN 90002340-2PR, which hasn't accumulated 800FC yet and to continue to perform the inspection as per AMM with the MPD interval and to replace the brake after 800FC again. To summarize TLB would like to continue to use PN 90002340-2PR and use a hard time requirement of 800FC if still required.
- (e) SB 900002340-32-09 replaces all the stator and rotor plates amongst other things, in other words the heat stack needs to be replaced even though it hasn't been used up completely. From experience on other type of aircraft equipped with carbon brakes TLB knows that carbon disks are difficult to obtain and costly, partly due to their long manufacturing process. TLB is afraid that the limitations used in the PAD, will impact the availability of parts from the manufacturer which will ultimately lead to TLB having to ground their ERJ 190 fleet awaiting replacement parts. TLB would like EASA to consider the impact of the limitations within the PAD on the availability of parts, TLB has great concerns that the manufacturer will not be able to meet demands for the replacement parts.

EASA response:**Comments partially accepted. See answer to Comment #1.**

Commenter 6: Lufthansa CityLine GmbH – Christian Heinen – 28/3/2014**Comment # 6**

Lufthansa CityLine has a fleet of 33 ERJ190 and we have implanted a soft time limit of 2700FC since end 2011 to the brake assy P/N 90002340-2PR. In addition we are inspecting the brake assembly based on a MS-Task:

32.49.MRB.0007 - TVC of Brake Wear Indicator and Brake Assembly. Inspect brake wear indicator pin (flush with brake housing), brakes general conditions and external hydraulic leakage.

AMM 32-49-11-210-801-A/600 - Interval 14 days/ 120FH

In addition, the brakes are thoroughly inspected on every tyre change (Brake Assembly (Complete - Wheel removed from aircraft) – Inspection Task: AMM 32-49-11-200-801-A)

Our measures have demonstrated that we avoid early brake failures due to the established inspections and the 2700FC life limit. We have just started implementing the new brake assembly P/N 90002340-4PR in our fleet.

Following the proposed actions in PAD 14-056 will not be feasible. Neither the brake shop is able to modify 132 brakes nor is MABS able to supply modified heat stacks in such tight timeframe. In addition introducing such strict timeframe is bearing the risk of quality decrease during manufacture and can cause adverse effects on the safety of the brake and aircraft. It absolutely makes senses to force every operator to establish regular inspections on the brake assembly P/N 90002340-2PR/90000583-3PR and to incorporate a life limit on the brake.

We propose to publish a life limit of 1200FC for the brake assy P/N 90002340-2PR and 90000583-3PR, the implementation of the inspection every 14days/100FC according AMM and to introduce a compliance time of 18 month after effective date of the AD to install only the new carbon brake standard P/N 90002340-4PR/90000583-5PR on all ERJ170/190.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 7: Air Astana – Viktor Pukhalskiy – 1/4/2014**Comment # 7**

KZR considers that compliance time specified in Table 1 of Paragraph (3) of PAD 14-056 will have significant operational cost impact.

Actually, as per our statistic, average time to full brake wear is 2500FC. Therefore, brakes replacement as per compliance time of paragraph (3) of PAD 14-056 will force KZR to remove and discard the brakes far from theirs worn condition.

Therefore we propose to extend the compliance time of paragraph (3) up to 2500FC accumulated by a brake from the last brake overhaul.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 8: Meggitt Aircraft Braking Systems (MABS) – Gary Percival – 2/4/2014

Comment # 8

MABS, OEM for the ERJ 170 and ERJ190 brakes have reviewed the EASA PAD 14-056 and would like to make the attached comments [Ed.: only 'cover' page not copied into this CRD].

EASA PAD No 14-056 ERJ170/190

Embraer ERJ-170/ERJ-190 – Rotor Drive Event History

- Objective to avoid loss of rotor drive channels from brake assembly.
- "Soft life" is the term agreed between Embraer and Meggitt in order to allow for a scheduled planned removal campaign without extra burden on operators for the logistics to manage spare brake packs. It is a recommended target for carbon pack removal, however, if the A/C schedule or route changes, the operator may then reschedule the removal at a later date and location without grounding the A/C.
- Soft life limitation introduced in September 2011 to affected operators in support of the Service Bulletin inspections:
 - ERJ-170 inspection SB - 90000583-32-03
 - ERJ-190 inspection SB - 90002340-32-05
- Soft life limit derivation established using known operator event data including:
 - Channels detachments
 - Significant cracking in the anti-nesting groove
 - Channel looseness to the extent that carbon damage has occurred
- Soft life limit derivation is operator specific in consideration of operational environment and experience.
- Soft Life limitations established based on capturing 80% of events with each specific operator
 - accounts for lowest brake cycle being outside general trends.
- MABS reached agreement on soft life limits with affected operators considering all the relevant available data.
- MABS has provided logistics support for introduction of the soft life limitation on an operator specific basis.

Page 2
© Meggitt Aircraft Braking Systems. Proprietary. 2 April 2014

MEGGITT

EASA PAD No 14-056 ERJ170/190

Embraer ERJ-170/ERJ-190 – European Fleet Data

ERJ170

Region	No of Operators	No of Aircraft	No of Operators Subjected to Soft Life	No of A/C Subjected to Soft Life	% Aircraft Affected (Worldwide Fleet)
Europe	14	87	3	23	7

ERJ190

Region	No of Operators	No of Aircraft	No of Operators Subjected to Soft Life	No of A/C Subjected to Soft Life	% Aircraft Affected (Worldwide Fleet)
Europe	18	157	4	71	12

EASA PAD No 14-056 ERJ170/190

Embraer ERJ-170/ERJ-190 – Current European Soft Life Limits

Operator	Aircraft Model	Fleet Size	Soft Life (Landings)
BA CITYFLYER	ERJ170	6	2000
BA CITYFLYER	ERJ190	8	2500
FINNAIR	ERJ170	1	3000
KLM CITYHOPPER	ERJ190	25	2200
LUFTHANSA CITYLINE	ERJ190	28	2600
REGIONAL	ERJ170	16	1711
REGIONAL	ERJ190	10	1769

Page 4

© Meggitt Aircraft Braking Systems. Proprietary. 2 April 2014

MEGGITT



EASA PAD No 14-056 ERJ170/190

Embraer ERJ-170/ERJ-190 – European Operators Soft Life Limits

- MABS continues to monitor Operators both with the soft life implemented and new reported events.
- MABS have reviewed European operators currently adopting the soft life restrictions and have identified that the following operators have experienced some rotor drive events pre soft life limit:
 - **ERJ-170**
 - BA Cityflyer 1 off
 - Finnair 1 off
 - Regional 7 off
 - Republic 1 off
 - **ERJ-190**
 - KLM Cityhopper 3 off
 - Lufthansa Cityline 4 off
 - Regional 1 off
- Not all the events listed above resulted in FOD but were observed during inspection.
- MABS can confirm that only 4 of the above events resulted in FOD.

EASA PAD No 14-056 ERJ170/190

MABS Comments to PAD 14-056

- MABS have previously presented to EASA that this issue is strongly related to specific aircraft operations and that following any further reports MABS would if required review the soft life.
- MABS interpretation of the required action(s) and compliance time(s) of PAD 14-056 is that all operators must perform a brake replacement within 800 FC which mandates a modification that **was not** classified as mandatory.
- From the in-service data gathered and presented herein MABS consider that this proposed AD penalises European operators that are safely operating within the current recommended guide lines.
- Following a review of the soft life data, there has only been 4 European reported events resulting in FOD (affecting 2 operators), therefore MABS recommends the following soft life revisions following consultation and agreement with the affected operators:

Operator	Aircraft Model	Current Soft Life (Landings)	Revised Soft Life (Landings)
KLM CITYHOPPER	ERJ190	2200	2200 *1600 (Brake No 1 Position Only)
REGIONAL	ERJ170	1711	1487

*Data indicates that Brake Position No 1 is the prominent position affected hence a reduction in soft life proposed.



EASA PAD No 14-056 ERJ170/190

MABS Comments to PAD 14-056

- MABS have incorporated an upgrade programme on an attrition basis since the introduction of SB 90000583-32-08 issued April 2013 (ERJ170) and SB 90002340-32-09 issued Jan 2014 (ERJ190).
- The current soft life programme supported by brake inspections per SB - 90000583-32-03 (ERJ170) and SB - 90002340-32-05 (ERJ190) plus additional on-wing inspections (performed by some affected operators), is the MABS proposed containment action.
- MABS proposal is further supported by revision of the current soft life limits for KLM Cityhopper (ERJ190) and Regional (ERJ170) refer to slide 6.
- MABS considers this to be a more preferred approach than that proposed in PAD 14-056.
- Can EASA please consider the above comments in lieu of the release of a possible Airworthiness Directive.

Page 7

© Meggitt Aircraft Braking Systems. Proprietary. 2 April 2014

MEGGITT

Can it also please be noted that as the OEM, MABS were very surprised when this PAD was issued as no consultation had taken place in generating the required action(s) and compliance time(s). Can EASA please consider the attached comments in lieu of the release of a possible Airworthiness Directive.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 9: Saudia Airlines – Khaled Al-Ghamdi – 4/4/2014
Comment # 9

Saudia Airlines is obliged to follow EASA rules and regarding the subject PAD, please note the following:

Deicing fluids are not used in Saudia Arabia.

Saudi Embraer fleet fly mainly inside the kingdom.

Saudia airlines have never experienced a damaged MLG brakes on Embraer E170 fleet.

Aircraft engineering would like EASA to consider this information and exclude Saudi Airlines from any future AD related to the subject PAD.

EASA response:

Comment understood, but not agreed. The apparent decision that “Saudia Airlines is obliged to follow EASA rules” is a National one, made the Saudi Arabian State, i.e. outside the jurisdiction of EASA. Consequently, only the Saudi National Airworthiness Authority can provide an exemption to the [Saudi] requirement to “follow EASA rules” regarding this particular AD. Please also note our [AD FAQ](#).

No changes have been made to the Final AD in response to this comment.

Commenter 10: Ukraine International Airlines – Oleg Voloshyn – 4/4/2014
Comment # 10

Our company operate 5 A/C of ERJ-190 equipped with carbon brake P/N 90002340-2PR. As for now total flight cycles (of all brakes) more than 700 F/C.

If we right understand requirements of PAD 14-056 we must perform modification/replacement of all brakes during 100 F/C after effective date of new AD (date : TBD). Modification should be performed independently of inspection? Inspection may postpone execution modification or not?

EASA response:

Comments partially accepted. Modification of an aircraft is an action independent from the repetitive inspections. Continued inspections do not ‘delay’ the required modification, but modification (installation of new P/N) on an aircraft will stop the need for further inspections of that aircraft. Paragraph (4) of the AD specifies that, after aircraft modification, the repetitive inspections are no longer required (terminating action). See also answer to Comment #1.

Commenter 11: Lufthansa CityLine GmbH [2] – Christian Heinen – 28/3/2014**Comment # 11**

In addition to my previous mail [see Comment #6 above] I would like to circumstantiate our removal data and inspections on our Embraer Fleet, in order to prove that a sufficient safety level is already achieved.

We introduced a soft time limit of 2700 FC in November 2011 after we suffered from 11 brake failure events with an average brake failure of 2830 CSI (cycles since installation on A/C). The basis of the introduction of the life limit was an Operational Risk Evaluation (ORE) we performed /see attached.

Since introduction of the soft time limit of 2700 FC we replaced in total 9 brakes which were found during brake inspections, none of them had an adverse effect on safety of the aircraft or other aircrafts as the defect was identified early enough.

In total we replaced since November 2011 188 brakes and performed 1692 inspections with an interval of 14 days plus additional 1097 inspections during regular main wheel replacements.

Thus we had a finding rate of 0,32 %, showing that our selected soft time limit of 2700 FC is effective.

Summing up all relevant data, we can clearly state that in our point of view the regular inspection intervals which are implemented in the MRB/MS and the associated inspection procedures as they are established in the AMM, in conjunction with a soft time of 2700 FC is minimizing the risk of carbon brake failure, and possible loss/debris of carbon brake disc parts on the runway/tarmac, to a sufficient level.

Taking into account the possible feasible turnaround time of brake modifications in the brake shop and the necessary material support from MABS, I consider the PAD as not being feasible and reasonable to the airline industry.

I kindly request to establish at least a soft time limit of 2.000 FC for the P/N 90002340-2PR brake and a timeframe of 24 months to introduce the new brake configuration in the fleet.

For your information please find attached [data made available to EASA] removal data of brakes from our fleet and current installation of brake assemblies.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 12: Oman Air – Saed R. Kayed – 6/4/2014**Comment # 12**

With reference to subject EASA PAD 14-056, and with reference to the Embraer and Meggit recommendations, Oman Air the national carrier of Sultanate of Oman (Middle east) would like to report the following reliability data and findings on the Meggit brake assembly P/N 90000583-3PR:

- (a) Currently all of our fleet including 4 aircraft operated by Oman Air and one aircraft operated by Royal Oman Police (ROP) are installed with 90000583-3PR brake assemblies.
- (b) You will find attached the current fleet status [data made available to EASA] for the installed Brake P/N 90000583-3PR on the mentioned fleet (CSN and CSO included)

- (c) We are currently following revised MPD 32-49-11-001 inspection every 120 FH or 14 days.
- (d) In 2013/2014 there were No brakes removed due to damaged or missing parts during operation
- (e) You will find attached [data made available to EASA] all of Oman Air brake 90000583-3PR removals and shop findings (Noting that ROP aircraft had no removals since delivery).
- (f) Oman Air currently holding 6 spares of modified -5PR brake assembly, however in case of AD taking effectivity, Oman Air & ROP will be impacted with a shortage of 14 spares of -5PR.

After attending the ERJ WEBEX on the subject PAD we notice that the discussion of the PAD was considering the E175 operators in Europe and Central of Asia whereas the PAD itself did not mention which operators will be affected.

Recommendations to Customers

Introduction:

- All operators are welcome to send their comments to EASA regarding the proposed AD
- Until Apr/22nd enquiries should be referred to the Safety Information Section, Executive Directorate, EASA. E-mail: ADS@easa.europa.eu

Recommendation:

- Embraer suggest the following topics to be included in operators communication to EASA:
 - Complete fleet status: Installed brake PN and CSO
 - What is your current mitigation plan – Inspection periodicity / Soft time value
 - In 2013/2014 how many brakes were found damaged leading to component removal
 - In 2013/2014 how many brakes were found with missing parts
 - Detailed customer impact by current PAD compliance

Participants:

- Speaking: Embraer Fleet Technical Center ... (Host)
- nelmar (me)
- Embraer Fleet Technical ... (Host)
- Rodrigo de Macedo - EFTC
- ahmed_elkharb
- Air Dolomiti - Luca Bressan
- Air Europa - Bartolomé Quetglas
- Alexandros Lekkas (RCSE - EAT)
- Andreas CSE@AZAL
- Andy Emery
- Call-in User_11
- Call-in User_2
- Call-in User_3
- Call-in User_5
- Call-in User_6

Chat:

from Air Europa - Bartolomé Quetglas to Everyone:
We would like also to ask teh reason for the 15% reduction in the pn

from Nassar Fahdouni to Everyone:
not to mention the PRE-MOD spares that we will not get the chance to use

from Nassar Fahdouni to Everyone:
Pre-Mod brakes are not allowed to be installed from the effective date of the AD.

Send to: Flavio - Embraer Europe

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 13: Mandarin Airlines – Jim Chen – 15/4/2014

Comment # 13

Mandarin Airlines are the current operator of ERJ 190 aircraft. We have operated E190 since 2007 and the utilization is around 2000 FC per year.

Mandarin Airlines has not had any issues with our E190 brake rotor lugs until this date, not even one. As of now our whole fleet of eight E190 aircraft is installed with brakes that will be affected by your proposed AD.

To meet the required action (3), twenty-two of the thirty-two brakes will need to be replaced within 100 FC after the effective date due to their accumulated FC are more than 700 FC.

At this time only three compliant brakes can be made available to us as replacement with further delivery of compliant brakes limited to the same rate as our normal usage, about two per month, for the next few months at least. As a result, we will have almost all of our aircraft grounded due to the required action (3) for some months.

Please consider to extend the compliance time as specified in Table 1. Otherwise, the brake manufacture may not provide sufficient brakes to operator.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 14: Montenegro Airlines – Ivan Petrović – 15/4/2014**Comment # 14**

Montenegro Airlines Technical Department realized that it will be very difficult to meet the requirements given in PAD 14-056.

Please, review our current status regarding affected brakes and our mitigation plan.

Montenegro Airlines has ERJ 190-200 LR, with following serial and tail numbers:

19000180 = 4O-AOA;

19000283 = 4O-AOB;

19000358 = 4O-AOC.

Accordingly, installed brakes are PN:90002340-2PR, in total 12 brakes + one overhauled (not modified) in storage.

(a) Please find attached spread sheet with complete fleet status of installed pn:90002340-2PR ('e195_brakes status, 07.04.2014.');

(b) Current mitigation plan is based on preventive maintenance re-action:

- We are performing the ERJ MRB task 32-49-11-001 (on 7 days interval, instead recommended 14 days) - task description:

'Brake Assembly Wear-Pin (Fast check - Wheel installed on aircraft) - General Visual Inspection, in accordance with ERJ AMM 32-49-11-210-801-A/600.'

(attached)

- Daily, on 24 hours period and before every flight, We check general condition of brakes and brake wear (Fast check - Wheel installed on aircraft);

- Additionally, on every wheel change, i.a.w. AMM 32-49-05-000-801-A, due to tire change, missing bolt,..., We perform AMM 32-49-11-200-801-A/600 (attached).

(c) Please find attached spread sheet of removed brakes due to failure & damage, with description, for 2013/2014. Also, attached is spread sheet with all, in total, removed brake assy pn:90002340-2PR in MGX E195 fleet. Average flight cycles accumulated by the brakes, before the replacement, for the pn:90002340-2PR is 2577 fc (only MGX fleet).

(d) We have pool & on-site-Podgorica airport arrangement with Embraer, through Paris center, for the available brake assy pn:90002340-2PR. If the PAD becomes AD, as is, in next 100 fc will need from Embraer 5 of each brake assy for immediate replacement. It is important to be noted that We have only one (1) spare brake assy (pn:90002340-2PR). That is, We can perform only single brake replacement and modification, i.e. every replacement/modification will have to be performed after the previous one.

[note: where reference is made to an attachment, detailed information has been made available to EASA]

Before June, 100 FC is ~2 weeks. After beginning of the June, 100 fc are ~10 days, or less.

It is very obvious that the first replacements are going to be problematic. We'll have, in average, 2.5 days, before June, for:

- removal of brake,
- brake shipment to MABS,
- MABS overhaul and modification, and
- shipment of the modified brake to TGD airport,
- receiving and installation on aircraft.

You will agree, this is impossible. Major factor is MABS` capability to support all the overhaul & modifications. Even, if MABS can support that much of short notice brake modifications, We, as operator, will have problem not having enough time for sending and receiving the brakes. It will require significant additional efforts to schedule shipments and the replacements, along with newly introduced inspections. Having on mind that MABS has lot of European operators with both part numbers affected by PAD, the same given time frame for immediate brake overhaul & modifications, requirements should give more time.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 15: Flybe Finland – Jussi Sippola – 17/4/2014

Comment # 15

Flybe Finland has operated with E170 and E190 aircraft since November 2012. Previously, this same fleet was operated by Finnair OYJ. Given comment is based on experience from operation history of both companies.

Carbon brake carbon disc cracking issue is well known on brakes affected by PAD. Flybe Finland has issued to Aircraft Maintenance Program dedicated task card to inspect if cracks are present on brakes at intervals of 14D/120Fh . Brakes are also inspected with same criteria during aircraft Service Checks (48h).

Maintenance persons are also trained during annual recurrent training to best practice to inspect brakes. Mentioned actions are issued at 31 Jan 2007 for both aircraft type. Maintenance actions are based on Embraer AMM and brake manufacturer MABS instructions.

Our removal data since 1 Jan 2012 shows following;

Total number of removed brakes: 54 ea

Removed as fully worn heat stack: 16 ea

Removed as other than worn or heat stack damage: 3 ea

Removed as heat stack cracks or related damages: 33 ea

Removed as some pieces were missing from heat stack: 2 ea

Average time on wing before removal (any reason) is 3284 Fc since new/overhaul.

Our opinion is that current maintenance actions are adequate to mitigate brake carbon heat stack cracking issue related to safe aircraft operation. In that perspective Flybe Finland feels that proposed AD actions are too strong to solve this issue.

We hope that EASA will take into consideration our comments when decision of final rule of AD is made.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 16: AZA (Alitalia Compagnia Aerea Italiana) – Andrea Renzi – 17/4/2014

Comment # 16

AZA (Alitalia Compagnia Aerea Italiana) has reviewed the instructions and requirements provided by EASA PAD No. 14-056 - LG Wheel Brake Carbon Discs - Inspection / Replacement dated 25 March 2014, and it is able to provide you with following feedback:

1. Actually Alitalia Cityliner (AZA regional subsidiary) fleet have: 15 a/c E170-200 STD and 5 a/c E190-100 STD. All the A/C's are installing the following numbers of brakes, affected by subject AD:
 - P/N 90000583-3PR : 39 affected brakes of 60 total installed brakes on E170-200 STD a/c.
 - P/N 90002340-2PR : 18 affected brakes of 20 total installed brakes on E190-100 STD a/c.

Total affected brakes on Alitalia Cityliner fleet: 57

2. Alitalia MRO provider for Brakes Repair and Overhaul is Meggitt Aircraft Braking Systems (MABS).
3. Alitalia Brakes have a good reliability and as of now no case of brakes debris has been reported yet.
4. With clear reference to subject EASA PAD, pls note the following:
 - Actually Alitalia is performing Embraer AMM Task 32-49-11-210-801-A, Brake Assembly Wear-Pin (Fast check - Wheel installed on aircraft) which includes repetitive inspections (fast check) of the brake assembly every 14 Days /120 FH.
 - Making reference to “EASA PAD No. 14-056, required actions and compliance Time point (1)”, Alitalia fully agree with EASA proposal to revise Embraer AMM Task 32-49-11-210-801-A, changing the interval to 14 Days or 100 FC, whichever occurs first and point (2) to replace defective brakes if found.
 - Making reference to “EASA PAD No. 14-056 Required actions and compliance Time point (3) for affected brakes P/N 90000583-3PR and 90002340-2PR replacement with new Brakes and Table 1 for compliance Time, and after Brakes records review completion”, **Alitalia have 100% of P/N 90000583-3PR brakes with more of 700 FC and approximately 90 % of 90002340-2PR brakes with more of 700 FC which will need replacement within 100 FC after the effective date of the future AD.**
 - Alitalia is strongly concerned about the number of Brakes to be removed within the short time of 100 FC, if this will be the final threshold of official EASA AD. Alitalia will have to replace a great numbers of Brakes thus inducing significant potential a/c disruption.
 - Alitalia is also concerned about Meggitt real ability to support Alitalia as well as all other worldwide Embraer operators in terms of spares and brakes modifications TAT.

Question: Based on above, Alitalia asks EASA to newly evaluate PAD point (3) defining a more manageable and sustainable compliance time for affected brakes removal either with less than 700 FC and with 700 FC or more. Such new compliance time should take care of actual industrial and operation constraints, including Meggitt real capability to support entire Aviation Industry.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 17: Embraer S.A. – Carlos Valadares – 17/4/2014

Comment # 17

Embraer, representing also Liebherr and MABS, would like to present the following comments to the text of EASA PAD 14-056, dated 25 March 2014:

(I) - About the "REASON":

While runway contamination can be eventually considered an unsafe condition, this classification presents a wide range, driven by aspects of expected effects and tendency, leading to an associated degree of urgency for fielding a solution.

Events that have occurred with Embraer ERJ 170 and ERJ 190 aircraft in Europe, as cited on the PAD text, have resulted on debris of small dimensions and weight (rotor lugs), meaning that for aircraft designed under CFR 14 Part 25, CS-25 or RBAC-25 which already consider the effects of such events on the design of the aircraft (25.571, 25.903, 25.963 and 25.1091) the probability that such an event would end up in a catastrophic is very low. On the other side, after introduction of mitigating actions by Embraer, on January 2012 we have registered only two events of runway contamination on the ERJ 170 fleet and two other events on the ERJ 190 fleet, in more than 1.6 million hours flown by the combined fleet of 258 aircraft flying in Europe on the same period.

Considering this scenario, Embraer, Liebherr and MABS understand that such an aggressive replacement requirement for brake assemblies P/N 90000583-3PR and P/N 90002340-2PR by new design brakes P/N 90000583-5PR and P/N 90002340-4PR, as requested by the PAD, is not necessary, considering also the results of the mitigating actions that are already in effect, some of which being also mandated by the text of the PAD.

(II) - About the "Required Action(s) and Compliance Time(s)"

The issuing of an AD on the terms of the PAD, requiring replacement of every brake assembly that have more than 700 FC within 100 FC from AD effective date, and replacement of the remaining by the time they reach 700 FC, will result on grounding most of the European fleet of ERJ 170 and ERJ 190 on about 30 days after AD effective date (209 aircraft out of a fleet of 258 aircraft). After that massive grounding we forecast that those aircraft will return to service at an average pace of 10 aircraft per month, with the last one returning on December 2015, because the production of the new brake assemblies P/N is conditioned to the capacity of MABS and we do not see any possible technical alternative to change this panorama considering the constraints related to the production of carbon disks raw material (8 months for material curing). Actions for increase of MABS production capacity had already taken, but they will produce results only after January 2015. Obviously the economic impact of this picture with so many aircraft grounded for such a long period is almost incommensurable.

Embraer, Liebherr and MABS have put in place an aggressive plan of containment actions that consider, among others, the fact that only three out of a total of 24 European operators (representing 86 out of a total of 258 aircraft) are facing such difficulties with the brakes resulting in runway contamination. As a result, plans in execution are aiming a priority on the replacement of the brakes on those three operators' aircraft that points out for a complete replacement on their fleets by December 2014, with the fleet of the worst of them in terms of events ending up by October 2014. At the same time Embraer, Liebherr and MABS have established tighter intervals of inspection and voluntary removal (soft time) for those three operators, with a close follow-up of the results.

For the remaining of the European fleet the maximum production rate capacity of MABS indicates that January 2015 will be the forecast date for replacement of the last

brake assembly on the ERJ 170 fleet and December 2015 will be the same for the ERJ 190 fleet.

All that considered, Embraer, Liebherr and MABS propose the following alterations on the PAD text:

"Required as indicated, unless accomplished previously:

For ERJ 170 airplanes equipped with P/N 90000583-3PR carbon brakes, and for ERJ 190 airplanes equipped with P/N 90002340-2PR carbon brakes, accomplish the actions specified in paragraphs (1), (2) and (3) of this AD.

- (1) Within 14 days after the effective date of this AD, and, thereafter, at intervals not to exceed 14 days or 100 flight cycles (Fe), whichever occurs first, inspect the brake assembly for discrepancies.

This inspection can be accomplished in accordance with the instructions of Task 32-49-11-210-801-A, in the applicable AMM.

- (2) If, during any inspection as required by paragraph (1) of this AD, discrepancies (as defined in the applicable AMM) are found, before next flight, replace the affected brake with a serviceable unit.
- (3) Within the compliance time as specified in Table 1 of this AD, as applicable, remove each carbon brake P/N 90000583-3PR (ERJ 170) and P/N 90002340-2PR (ERJ 190) from the aeroplane and install the new carbon brake standard, P/N 90000583-5PR (ERJ 170) or P/N 90002340-4PR (ERJ 190), as applicable, in accordance with approved aeroplane modification instructions.

Table 1 – Carbon Brake Replacement

Brake Assembly	Compliance Time
P/N 90000583-3PR (ERJ 170)	Before 31st January 2015
P/N 90002340-2PR (ERJ 190)	Before 31st December 2015

Modification of the affected brakes to the new carbon brake standard, P/N 90000583-5PR (ERJ 170) or P/N 90002340-4PR (ERJ 190), as applicable, can be accomplished during brake overhaul in accordance with the instructions of MABS SB 90000583-32-08 (ERJ 170) or MABS SB 90002340-32-09 (ERJ 190), as applicable.

- (4) Modification of an aeroplane as required by paragraph (3) of this AD constitutes terminating action for the repetitive inspections as required by paragraph (1) of this AD."

Item 5 should be removed, since we understand that it can only add on the number of aircraft eventually grounded. without a significant contribution to flight safety:

- (5) Do not install on any aeroplane carbon brakes having P/N 90000583-3PR (ERJ 170) or P/N 90002340-2PR (ERJ 190), as specified in paragraph (5.1) or (5.2) of this AD, as applicable.**

(5.1) For aeroplanes that have P/N 90000583-3PR (ERJ 170) or P/N 90002340-2PR (ERJ 190) carbon brakes installed: After modification of the aeroplane as required by paragraph (3) of this AD.

(5.2) For aeroplanes that do not have P/N 90000583-3PR (ERJ 170) or P/N 90002340-2PR (ERJ 190) carbon brakes installed: From the effective date of this AD.

EASA response:

Comments partially accepted. See answer to Comment #1.

Commenter 18: Virgin Australia – Adele Swarts – 22/04/2014**Comment # 18**

With reference to the Carbon Brake damage reports addressed in the referenced PAD:

Virgin Australia would like to advise that we do not experience any reliability issues with Brake Assemblies PN 90002340-1PR; 90002340-02PR and 90002340-3PR.

Please find attached removal data for PN 90002340-2PR and -3PR for period Mar-12 to Feb-14. We have included shop findings where available for all removals except worn to limits (WTL) and removal performed at C6. [referenced attached shop findings and removal data have been made available to EASA]

The average cycles since installation (CSI) for removals mentioned in category above is 2379FC. Average cycles since installation (CSI) for worn to limits (WTL) brake removals are 3381FC.

Additional info:

- VA only had 1 each unscheduled removal of PN 90002340PR and PN 90002340-1PR, both due to leaking brake assemblies.
- Nil history of events or brake removals due rotor channel looseness
- Nil brake incidents that have resulted in FOD
- MABS SB 90002340-32-09 will be carried out on all brake assemblies during next shop visit.

Hope the provided information is sufficient to rule out the possibility that any AD issued due to the carbon brake damage issue will affect our operation.

EASA response:

Comments partially accepted. See answers to Comments #1 and #9.

Commenter 19: Air Europa – Bartolomé Quetglas – 22/04/2014**Comment # 19**

Air Europa (Spanish AOC reference E-AOC-004) currently operates eleven Embraer 190-200LR, all with carbon brake P/N 90002340-2PR installed (44 units). Nine spares to support operation are also P/N 90002340-2PR. Only 5 brakes have less than 700 CSI. We would like to provide following comments:

1. Carbon brake shop records revised for the last two years show that no brake has been found with missing material.
2. The term 'FC accumulated by the carbon brakes' as described in table 1 should be clarified because it could mean cycles since new, since installation, since last heat pack replacement or since overhaul.
3. Air Europa operates an average of 160 FC per month per airplane. Grace period of only 100 FC, taking into consideration current lead-times to deliver Brake Stack Replacement Kits P/N 90009483, will force us to ground the 80% of the fleet within one month after the effective date of the AD if PAD wording is not revised. This is an extremely severe compliance time and the airline will be seriously penalized. Described risks in the PAD do not justify such expeditious action from the Authority: debris on the runways have multiple causes and the EASA level of reaction to the potential debris from P/N 90002340-2PR is not consistent with permissiveness shown to airport operators for other sources of FODs that may imply equivalent risk.

EASA response:

Comments partially accepted. See answer to Comment #1.