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Case Number: T 1091/11 - 3.2.01

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Title of invention:
AIRCRAFT WITH ELLIPTICAL WINGLETS

Patent Proprietor:
Felker, Fort F.

Opponents:
Airbus Operations Limited(GB) / AIRBUS SAS(FR) / Airbus Operations SAS(FR) / Airbus Operations GmbH (DE) / Airbus Operations SL(ES)

Headword:

Relevant legal provisions:
RPBA Art. 13(1)
EPC Art. 54(1), 54(2), 123(2), 56

Keyword:
Admission of new evidence (yes)
Prior use made publicly available (yes)
Novelty (main request, auxiliary request I : no)
Inventive step (auxiliary request II : no)
Extended subject-matter (auxiliary request III : yes)

Decisions cited:

Catchword:

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European Patent Office
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Case Number: T 1091/11 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 2 July 2014

Appellants: (Opponents)	Airbus Operations Limited (GB) / AIRBUS SAS (FR) / Airbus Operations SAS (FR) / Airbus Operations GmbH (DE) / Airbus Operations SL (ES) New Filton House Filton Bristol BS99 7AR (GB)
Representative:	Ford, James Abel & Imray 20 Red Lion Street London WC1R 4PQ (GB)
Respondent: (Patent Proprietor)	Felker, Fort F. 2233 Tuscany Cir. Livermore, CA 94550 (US)
Representative:	Bartelds, Erik Arnold & Siedsma Sweelinckplein 1 2517 GK Den Haag (NL)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 28 March 2011 rejecting the opposition filed against European patent No. 1349778 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	G. Pricolo
Members:	C. Narcisi
	D. T. Keeling

Summary of Facts and Submissions

I. The opposition against European patent No. 1 349 778 was rejected by the Opposition Division with the decision posted on 28 March 2011. Against this decision an appeal was lodged by the joint Opponents on 10 May 2011 and the appeal fee was paid at the sane time. The statement of grounds of appeal was filed on 5 August 2011.

II. Oral proceedings took place on 2 July 2014. The Appellants (joint Opponents) requested that the impugned decision be set aside and that the patent be revoked. The Respondent (Patentee) requested that the appeal be dismissed or, in the alternative, that the patent be maintained in amended form on the basis of the auxiliary requests I, II (equivalent to former request 3, filed on 18 November 2010) or III (equivalent to former request 3a, filed on 2 June 2014), submitted during the oral proceedings. All further previously filed requests were withdrawn.

III. Granted claim 1 (main request) reads as follows:

"An aircraft, comprising:
a wing (200) having an inner end, an outer end, an upper surface (230), a lower surface (232), a leading edge (226), and a trailing edge (228); and a winglet (202) having an inner end, an outer end (214), an upper surface (236), a lower surface (238), a leading edge (233) and a trailing edge (234); wherein the inner end of said winglet is connected to the outer end of said wing (214); wherein the upper (236) and lower surfaces (238) of the winglet and the leading (233) and trailing (234) edges of the winglet are continuations of the upper (236) and lower (232) surfaces of the wing and

leading (226) and trailing (228) edges of the wing; and wherein said winglet curves as it extends from its inner end out to its outer end (214) and said curve has an increasing radius as it extends from the inner end of the winglet out to the outer end of the winglet."

Claim 1 of auxiliary request I differs from granted claim 1 in that the wording "and wherein said winglet curves ... to the outer end of the winglet" is replaced by the wording "wherein said winglet continuously curves in the y-z plane as it extends from its inner end out to its outer end (214) and said curve has a continuously and progressively increasing radius following generally an elliptical curvature from the inner end of the winglet out to the outer end of the winglet."

Claim 1 of auxiliary request II differs from granted claim 1 in that the wording "a wing (200) having an inner end ... and a trailing edge (228)" is replaced by the wording "a wing (200) having an inner end ... and a trailing edge (228), the wing (200) having a sweep angle (201);", and the wording "said winglet curves as it extends" is replaced by the wording "said winglet continuously curves in the y-z plane as it extends".

Claim 1 of auxiliary request III differs from granted claim 1 of auxiliary request II in that the wording "the wing (200) having a sweep angle (201);" is replaced by the wording "the wing (200) having a sweep angle (201) and carrying an underwing engine;".

IV. The Appellants' submissions may be summarized as follows:

The evidence (filed on 28 November 2013) relating to the alleged public prior use of an example of a sailplane (or glider) of the type LS7-WL (serial number 7007, produced by Rolladen-Schneider Flugzeugbau GmbH) having UK registration G-CKMO should be admitted to the proceedings. This evidence comprises annexes D5-F (European Aviation Safety Agency (EASA) Type Certificate Data Sheet of the LS family of Sailplanes), D5-G (Technical Bulletin TB-7008 of Rolladen-Schneider), D5-H (scanned copy of the complete registration and maintenance history of the specific LS7-WL glider having UK Registration G-CKMO), D5-I (two images showing the serial Number 7007 on the end of the CKMO winglet), D5-J (letter from Mr Stefan Dornemann of DG Flugzeugbau GmbH), D5-K and D5-L (two reports by an independent third party (Sitec Group Limited) analyzing the LS7-WL geometry), D5-M and D5-N (respective declarations from Mr Timothy Rhys Davies (supplemented with declaration filed on 2 June 2014) and Mr Manish Raman Patel concerning the analysis of the LS7-WL geometry), and D12 (declaration from Dr. Mark Maughmer relating to the interpretation of technically unclear terms in the opposed patent). This evidence was filed in response to the objections raised by the Patentee and in response to the reasons given in the impugned decision essentially denying the relevance of the alleged prior use to the claimed invention. In effect, the Opposition Division did not consider D5 (technical drawing of LS7 sailplane with winglets ("Übersicht LS7 mit Winglets") to be sufficient proof of the shape of the LS7-WL sailplane winglet. Understandably, only at this point in time did the Appellants decide to undertake the difficult and burdensome task of obtaining sufficient evidence to prove the alleged public prior beyond the criterium of balance of probabilities and almost "up to the hilt". Thus, this

does not constitute a procedural abuse. Likewise, it does not take the Respondent by surprise and places no undue burden on the Respondent, given that the Respondent already knew about the alleged prior use right from the beginning of the opposition proceedings, given that the mentioned additional evidence was filed several months in advance of the oral proceedings before the Board (see above) and that ostensibly the evidence presented is clear and exhaustive. Also, on the face of it the relevance of this evidence is obvious, as it may be inferred from annex D5-L.

The alleged prior use of sailplane LS7 was public as this ensues in the first place from annex D5-F. The airworthiness of the basic version without winglets of sailplane LS7 was certified on 7 February 1989 (D5-F, page 93) and the airworthiness of the LS7-WL variant with winglets was certified on 22 December 1992 (D5-F, pages 97 and 98). According to technical bulletin D5-G of December 1992 a conversion of the sailplane LS7 into variant LS7-WL was possible (see also D5-F, page 100). In addition, the flight and maintenance manuals for the LS7-WL sailplane variant were issued in October 1992 and were available to the public from this date (see D5-F, page 100). This already provides a clear evidence of the prior use. Further, annex D5-H proves that the specific LS7-WL sailplane having UK registration G-CKMO and serial number 7007 was made publicly available before the relevant priority date of the patent (11 December 2000). In particular, this specific sailplane (originally an LS7 variant) was certified (by "Luftfahrt-Bundesamt") on 16 February 1989, it was sold to "Amsterdamse Club vor Zweevliegen" on 18 January 1989 and it was retrofitted with winglets in 1995 and thus converted into an LS7-WL sailplane (see invoice dated 7 December 1995 of Rolladen-Schneider

GmbH). Records of the retrofit include the winglet build number (BT-nr) 82 and "Werknummer" (W-nr) 7007, together with the test reports and the engineering drawings of the winglet installation. The serial number 7007 ("Werknummer") was inscribed on a metal plate and attached to each winglet (see annex D5-I). The sailplane was re-certified (by "Luftfahrt-Bundesamt") as LS7-WL variant of the LS7 sailplane (on 8 December 1995; see annex D5-H). The sailplane was returned to service with "Amsterdamse Club voor Zweevliegen" until 2005, when it was sold to Mr. Glenn Turpin in the United Kingdom. The log books show the use by many different users. No further evidence of changes to the winglets results from annex D5-H and annex D5-J confirms that no further changes occurred and that these would have necessarily been recorded in the sailplane's maintenance logs.

The subject-matter of claim 1 as granted (main request) lacks novelty over the alleged prior use. As set out in annex D5-K the measurement of the winglets was performed with a high degree of accuracy by a 3D laser scan of the aircraft and by creating a 3D digital model of the aircraft using a CATIA V5 CAD-software package. In D5-L an analysis of the radius of curvature of the winglets was made. The analysis was performed on the following curves based on projected surfaces or lines of the wing and winglet: 1) the wing and winglet 1/4 chord line when projected onto a plane that is parallel to the sailplane YZ plane ("1/4 chord line"), 2) the wing and winglet leading edge line when projected onto a plane that is parallel to sailplane YZ plane ("leading edge curve"), 3) the wing and winglet upper surface when projected onto a plane that is parallel to the sailplane YZ plane ("upper surface curve"), 4) the wing and winglet lower surface when projected onto a

plane that is parallel to the sailplane YZ plane ("lower surface curve"); 5) the median line between the curves described in 3) and 4) ("median curve"). These curves were fitted with a 6th order polynomial expression and the radius of curvature R ($R=(1+(dy/dx)^2)^{3/2} / \left| d^2y/dx^2 \right|$) was then calculated as usual.

The issue of novelty of the subject-matter of granted claim 1 is centered and hinges on the sole disputed feature that (i) "said winglet curves as it extends from its inner end out to its outer end (214) and said curve has an increasing radius as it extends from the inner end of the winglet out to the outer end of the winglet", all remaining features of the claim being known from the prior use. Contrary to the opinion of the Opposition Division (see impugned decision) feature (i) by no means implies that the "radius of curvature progressively and continuously increases", since this further indication is merely given in the description of the contested patent (hereinafter designated as EP-B; see paragraph [0022]). Also, feature (i) gives no precise and clear indication as to the definition of the "inner end of the winglet" and therefore as to the specific region and location on the winglet where said winglet curves and the radius increases. In addition, the wording "as it extends from the inner end of the winglet out to the outer end of the winglet" is to be construed as solely defining a direction of increase of the radius and may characterize any appropriate region of the winglet extending in that direction. Finally, the transition region between the infinite radius of curvature of the essentially planar wing and the curved winglet is insufficiently defined. In effect, according to the description of EP-B "at intersection station 204 (see figure 6), the curvature of the winglet surfaces meets the wing surfaces substantially at a

tangent" (EP-B, paragraph [0018]), this representing at best an indication of the continuity of the first derivative of the curve, whilst no information is provided on the second derivative, which crucially contributes to the definition of the radius of curvature. Bearing all this in mind it ensues that the claim should not be given an unduly restrictive interpretation. Hence, the winglet of the prior use discloses feature (i), for a region with an increasing radius of curvature can be clearly identified for instance in figures 1 and 6 of D5-L and this region is also located in the immediate vicinity of what may be defined as the outer end of the wing and as the inner end of the winglet. Moreover, according to D12 it is possible to define the winglet inner portion as the region located past the planar wing portion and where the radius of curvature starts to increase (thus achieving the function of reducing induced drag).

Auxiliary request I should not be admitted to the appeal proceedings, given that the Appellant's objections were known to the Respondent long before the oral proceedings. In addition, claim 1 of this request appears to potentially include subject-matter infringing Article 123(2) EPC.

The subject-matter of claim 1 of auxiliary request I extends beyond the content of the application as filed. Indeed, the wording "continuously and progressively increasing radius" is based on paragraph [0022] of EP-B and it is mentioned only in connection with an MD-80 aircraft. Hence EP-B does not include a general disclosure of this feature.
Further, the technical teaching implied by the feature "continuously and progressively increasing radius ..from the inner end of the winglet out to the

outer end of the winglet" is not disclosed in a manner sufficiently clear and complete. Specifically referring to figure 6 of EP-B (see also paragraphs [0018], [0022]) it is not clear for the skilled person how the transition from an infinite radius of curvature of the essentially planar wing to a region of "progressively and continuously increasing radius" of the winglet should occur.

The subject-matter of claim of auxiliary request I is not new over the prior use. The feature (ii) reciting "continuously and progressively increasing radius following generally an elliptical curvature from the inner end of the winglet out to the outer end of the winglet" is shown for instance in figures 7, 8 of annex D5-L. It is stressed that the claim does not give any indication about the orientation of the major axis of the ellipse forming the elliptical fit. Also, the term "generally ..elliptical curvature" is vague and does not tell anything about the required accuracy of the elliptical fit. Bearing in mind these and the previous remarks (in respect of main request) relating to the interpretation of claim 1 it ensues that its subject-matter is not new over the LS7-WL sailplane of the prior use, for both the elliptical fit of figure 7 (with major axis of the ellipse not constrained) and of figure 8 (with major axis perpendicular to wing reference plane XY) disclose above feature (ii). The remaining features of the claim are undisputedly known from the prior use.

The subject-matter of claim 1 of auxiliary request II is not inventive over the LS7-WL sailplane of the prior use and over D13 (Jane's All The World's Aircraft 1987-88). In view of the above submissions, claim 1 differs from the LS7-WL of the prior use only by the

feature reciting "the wing (200) having a sweep angle". However, this feature cannot involve an inventive step since it is generally known in the art that sailplanes are usually provided with wings having a sweep angle (D13, see pages 745, 750, 757) to improve the general aerodynamic performance. Thus the skilled person would arrive at the subject-matter of claim 1 in an obvious manner.

The subject-matter of claim 1 of auxiliary request III extends beyond the content of the application as filed. The amendment reciting "carrying an underwing engine" is allegedly derived from figure 1 and paragraphs [0015] and [0022] of EP-B. However this amendment feature finds no unambiguous and clear basis in EP-B, given that paragraph [0022] mentions an MD-80 aircraft which actually carries fuselage engines. Also, paragraph [0015] refers to figure 1 and to winglets representative of both the prior art and the invention, but no mention of an underwing motor can be found. Thus, the added feature is shown solely in figure 1. However, the isolation of this feature from the remaining features shown in figure 1, such as for instance the specific configuration of the wings, has no justification in the light of the disclosure of EP-B. Indeed there is no technical teaching in EP-B to the effect that the claimed shape of the winglet is particularly beneficial to or advantageous for underwing motors. Moreover, this feature is evidently not limited to jet propulsion engines but may even comprise for example propeller engines.

V. The Respondent laid out that the evidence (filed on 28 November 2013) relating to the alleged public prior use of an example of a glider of the type LS7-WL (serial number 7007, produced by Rolladen-Schneider

Flugzeugbau GmbH) having UK registration G-CKMO should not be admitted to the appeal proceedings. The evidence relating to the prior use was filed in a piecemeal fashion, thus clearly contravening Articles 12 (1) and 12 (2) RPBA (Rules of procedure of the Boards of Appeal). Notably, the evidence was filed after submission of the statement of grounds of appeal. Similarly, during the opposition proceedings, document D5 (technical drawing "Übersicht LS7 mit Winglets") was filed for example with the notice of opposition, whereas annex D5A (Technical Bulletin TB-7008 of Rolladen-Schneider, "Umrüstung auf Winglets; Änderung des Typenschilds von LS7 in LSt-WL") was filed after expiry of the nine month opposition period established by Article 99(1) EPC. It is not acceptable that filing of evidence be deferred until a late stage of the appeal proceedings. Moreover, there was apparently no real justification or reason which might have led to said late submission of evidence. As to the measurements disclosed by this evidence their nature and significance is questionable, given that the measurements on the winglets were performed more than ten years after the claimed priority date of the contested patent. It cannot be ruled out that the shape or configuration of the winglets may have changed during this time period, for instance due to various hazardous and uncontrollable external factors or agents, such as temperature or inappropriate resting position while located in a storage hanger. Finally and more importantly, said evidence is no more relevant to claim 1 than the evidence and prior art already on file, since the figures of annex D5-L demonstrate that the radius of curvature of the winglet first decreases before increasing again.

The alleged prior use of said LS7-WL sailplane, even if the evidence were to support that it was made available to the public, does not furnish sufficient proof of the actual shape of the winglets before the priority date of the patent. Thus it is anyway neither clear nor proved to which technical object the alleged public prior use relates. Irrespective of the informations provided in annexes D5-H and D5-J it cannot be ruled out entirely that abuses may have occurred and that modifications to the winglets' shape or configuration were performed without any mention or record in the aircraft's logbooks. Likewise, changes due to unforeseen or uncontrollable external agents or factors may have occurred which would not be recorded in the logbooks either. In general, it is questionable whether assessing or measuring the physical characteristics of the winglets with today's state of the art equipment and more than 10 years after the relevant priority date of the contested patent is compatible with a reasonable standard of proof. In conclusion there is no sufficient evidence that a winglet having an elliptical curvature was made available to the public.

The subject-matter of claim 1 as granted (main request) is new over the LS7-WL sailplane of the prior use. The skilled person when reading claim 1 would have no doubt that said feature (i) (see above, point IV), implicitly includes the feature that the "radius of curvature progressively and continuously increases". Indeed, the claims have to be construed within the context of the description and of the embodiments of the invention which evidently disclose (see EP-B, paragraph [0016]) that the "radius of curvature progressively and continuously increases", as is moreover literally disclosed in paragraph [0022] of EP-B. The fact that no dependent claims were filed directed to this feature

renders obvious that it was never meant as being merely a further preferred feature of the invention and that on the contrary it is implicitly included in all embodiments of the invention. This is further confirmed by paragraph [0018] of the description, stating that "at intersection 204, the curvature of the winglet surfaces meets the wing surfaces substantially at a tangent". By contrast hereto, the figures shown in D5-L all illustrate that, at the junction between the wing and the winglet, the measured curvature of the winglet of the LS7-WL sailplane decreases first and then starts to increase again only after crossing the intersection between the wing and the winglet. Manifestly, this behaviour of the radius of curvature is different from the claimed feature (i), taking also into account that implicitly and necessarily the "radius of curvature progressively and continuously increases". Specifically, interpreting the claimed subject-matter such as merely requiring the existence of a region of the winglet having an increasing radius of curvature is hereby ruled out. Therefore the claimed subject-matter is new.

Claim 1 of auxiliary request I complies with the requirements of Article 123(2) EPC, there being no doubt that the amendment made to claim 1 (see feature (ii), point IV) relates to aspects of the invention which are not directly and inextricably tied to the MD-80 aircraft, which is only mentioned by way of example. Further, this amendment equally fulfils the requirements of Article 83 EPC, given that the skilled person would know how to design and manufacture a winglet having a continuously and progressively increasing radius of curvature.

The subject-matter of claim 1 of auxiliary request I is new over the prior use of the LS7-WL sailplane. As set out in connection with claim 1 of the main request, a "progressively and continuously increasing radius", "from the inner end of the winglet out to the outer end of the winglet", according to feature (ii) (see above, point IV) of claim 1 is not disclosed by the prior use. On the contrary, the prior use evidently shows a decrease of the radius of curvature starting from the inner end of the winglet.

The subject-matter of claim 1 of auxiliary request II involves an inventive step over the available prior art. The document US-A-5 275 358 (cited in EP-B, hereinafter designated as US-A) represents the closest prior art, and starting from this document the technical problem of reducing the induced drag arises. The skilled person would not envisage a combination of US-A with the LS7-WL sailplane of the prior use in order to solve this technical problem, since clearly no explicit technical teaching is derivable from the prior use. Thus, the skilled person would not arrive in an obvious manner at feature (ii) in view of US-A and the LS7-sailplane of the prior use.

Further, the subject-matter of claim 1 of auxiliary request II involves an inventive step in view of the LS7-WL sailplane of the prior use and D13. In effect, the sailplane of the prior use does not represent the closest prior art, due to the fact that the feature reciting "the wing (200) having a sweep angle (201)" necessarily implies and clarifies that the claimed aircraft is a high-speed motor-propelled aircraft, thus excluding a sailplane. Thus, the skilled person would would not consider the LS7-WL sailplane of the prior use as a valid starting point for solving the technical

problem of reducing the induced drag and much less would it envisage a combination with D13. Moreover, D13 should not be admitted to the proceedings since it was late filed without any valid justification.

The subject-matter of claim 1 of auxiliary request III does not extend beyond the content of the application as filed. The amendment "carrying an underwing engine" is based on paragraph [0015] and figure 1 of EP-B. Indeed, EP-B clearly states that figure 1 is "representative" of both the prior art and the present invention (paragraph [0015]). The above feature merely limits the claimed subject-matter without introducing any new information, for it is only intended to clarify that the claim is directed to a high-speed aircraft and it is not inextricably linked to other features disclosed in figure 1 or paragraph [0015] of EP-B.

Reasons for the Decision

1. The appeal is admissible.

2. The evidence filed during the appeal proceedings relating to the prior use of a LS7-WL sailplane was admitted into the proceedings. In the Board's view these further submissions substantially only corroborate the evidence filed during the opposition proceedings and do not introduce any fundamentally new aspects. Indeed, the technical drawings D5 and the Technical Bulletin Nr. 7008 (D5A) (filed during the opposition proceedings) already strongly support the allegation that the prior use of the LS7-WL sailplane was made available to public and the allegation

concerning the specific shape of its winglets, though possibly not furnishing a definitive proof. Moreover, the certification of airworthiness by the European Aviation Safety Agency occurred on 22 December 1992, i.e. long before the contested patent's relevant priority date, and it was obviously generally available to the public. Nevertheless the Opposition Division chose not to decide on whether the alleged prior use was public and concluded that anyway the the specific elliptical shape of the winglets was not sufficiently proven. In view of this situation and in response to the reasons given in the impugned decision the Appellant submitted said further evidence of the prior use. Hereby no procedural abuse occurred, as the amount and relevance of evidence produced make it abundantly clear that the Appellant undertook a serious and earnest attempt to overcome the objections set out in the impugned decision by trying, in the Appellant's own words, to prove its allegations beyond any reasonable doubt. The Appellant in addition essentially confined itself to further corroborating its allegations relating to public availability of the prior use and relating to the specific shape of the winglets, the evidence being presented in a clear, well structured and readily understandable manner, thus placing no undue burden on the Board or on the Respondent. Consequently, the admission into the proceedings of the further evidence did not lead to difficulties related to the complexity of the subject-matter, to procedural economy or to the state of the proceedings. Finally, the submitted evidence included subject-matter which was prima facie highly relevant, as none of the cited prior art discloses elliptically shaped winglets, and this evidence was filed well in advance of the oral proceedings before the Board, thus giving the Respondent enough time to prepare its case.

The Respondent's arguments did not convince the Board. Asserting that the evidence should and could have been produced earlier is not per se a sufficient reason for disregarding potentially pertinent prior art. The Appellant should be given a fair chance when trying to counter the objections in the impugned decision, particularly if its submissions are clear, to the point, and are compatible with procedural economy and with the Respondent's legitimate expectation not to be taken by surprise.

The arguments relating to the difficulty of establishing the winglets' shape more than ten years after the priority date of the contested patent cannot be considered as plausible. The sailplane was subject to regular maintenance and inspections (see annex D5-H) and if the winglet and the wing had undergone any significant change in shape this surely would have been noticed, for in this case material deformation and strain would almost certainly result. The likelihood of such an occurrence is to be considered as negligible and the Respondent did not provide any real example known in the technical field of aviation that this could actually happen, despite the inherent elasticity, strength and resilience of the materials employed.

As to the technical equipment used to perform the measurements it is obvious that on the basis of the claimed features it has necessarily to be assumed that technical equipment for measuring the winglets' radius of curvature existed already at the priority date of the contested patent. It ensues that the kind of equipment used is irrelevant for the present discussion, insofar as any equivalent technical means necessary for establishing the relevant facts at the priority date may be employed.

In view of the above reasons the Board decided to admit the mentioned evidence to the appeal proceedings pursuant to Article 13 (1) RPBA (Rules of Procedure of the Boards of Appeal).

3. The allegation that the prior use of the LS7-WL sailplane was public is sufficiently well established on the basis of the available evidence, at least according to the usual standard of proof of balance of probabilities and even beyond. The Appellant submitted extensive and compelling evidence supporting the allegation that the prior use of the LS7-WL sailplane was public, such as the certification of airworthiness (see D5-F) of both the LS7 and LS7-WL sailplane variants and the Technical Bulletin Nr. 7008 (see annex D5-G) stating that a conversion from the LS7 variant to the LS7-WL variant was possible. Further, the scanned copy of the complete registration and maintenance history (see annex D5-H) of the specific LS7-WL sailplane having UK Registration G-CKMO and serial number 7007 demonstrates (see for example log books of users in annex D5-H) that the prior use of this specific sailplane was indeed public. Also, annexes D5-H and D5-J confirm that after the conversion of the sailplane into the LS7-WL variant no further changes to the winglets took place. The measurements by Sitec Group Limited (see annex D5-L) were performed on this specific LS7-WL sailplane with serial number 7007 as confirmed by a photograph of the winglets (see annex D5-I, showing serial number inscribed) and by declarations of Mr Timothy R Davies (see annex D5-M, supplement filed on 2 June 2014). The Board thus considers that the allegation of public prior use is proved to the necessary standard and that the LS7-WL sailplane forms part of the state of the art (Article 54(2) EPC).

The Respondent's arguments relating to modifications in the winglets' shape due to abuse or to unpredictable and uncontrollable external factors are extremely unrealistic and not plausible. Further to the reasons already set out above (see point 2) it is not seen how abuse or hazardous external factors could result in a winglet surface having a perfectly regular shape and curvature (as demonstrated by the measurements in annex D5-L) and in any event corresponding to industrial manufacturing and engineering standards, the probability of such an occurrence or event being almost non-existent. Finally, there are no fundamental doubts as to the legitimacy of determining or measuring physical properties of physical objects even several years after the relevant priority date, if it is established that the possibilities of changes having occurred is remote.

4. The subject-matter of claim 1 (main request) lacks novelty over the public prior use. Novelty of the subject-matter of claim 1 depends exclusively on said feature reciting (i) "said winglet curves as it extends from its inner end out to its outer end (214) and said curve has an increasing radius as it extends from the inner end of the winglet out to the outer end of the winglet" (see above, point IV), the remaining features being undisputedly known from the public prior use. From the wording of feature (i) (in conjunction with the remaining features of the claim) the following conclusions as to its interpretation may be drawn :(a) there is no explicit or implicit requirement for the radius of curvature to increase "progressively" and "continuously", as these features are only present in the embodiment described in EP-B (see paragraph [0022]), which refers to a winglet generally shaped as

a conical section; moreover in mathematical terminology an "increasing" function is generally understood as "monotonously increasing", thus for instance not excluding ranges or regions where the function stays constant and even on physical grounds there is no reason that would make it necessary to require a progressively and continuously or strictly increasing radius of curvature; (b) the claim and the description fall short of giving any definition of the "inner end" of the winglet, thereby failing to define the specific location where the curvature starts to increase; in this respect it is noted that according to the embodiment of figure 6 "at intersection station 204, the curvature of the winglet surfaces meets the wing surfaces substantially at a tangent" (see EP-B, paragraph [0018], thereby merely indicating the substantial continuity of the first derivative but remaining silent on the behaviour and variation of the radius of curvature (which also depends on the second derivative) and which radius of curvature is necessarily decreasing in the transition region between the wing and the winglet (to match the essentially planar section of the wing with the curved section of the winglet) or possibly even discontinuous; strikingly, at the "intersection station 204" and beyond (in a direction outboard of the aircraft) figure 6 clearly shows that the radius of curvature undoubtedly and necessarily decreases (since the planar wing has to match the curved winglet section), thus contradicting feature (i) stating that the "curve has an increasing radius as it extends from the inner end of the winglet out to the outer end of the winglet"; (c) even if "the inner end" of the winglet were defined, the wording "has an increasing radius as it extends from the inner end of the winglet out to the outer end of the winglet" merely implies the existence

of a region with increasing radius on the winglet surface extending in the indicated direction with no statement concerning the specific location of the inboard and outboard limits of this region.

The above conclusions (a), (b) and (c) being duly taken into account, the public prior use of the LS7-WL sailplane takes away the novelty of the subject-matter of claim 1. In effect, figures 1 to 5 (see annex D5-L, corresponding to measured curves 1) to 5)) (see above, point IV) and figure 6 (summary of figures 1 to 5) illustrate that there exists a region, located in the immediate vicinity of the transition between the planar section of the wing and the curved section representing the winglet, where feature (i) is fulfilled. In particular, in said region the winglet has an increasing radius of curvature in an outboard direction. This holds irrespectively of whether the "leading edge geometry", the "upper surface geometry", the "lower surface geometry", the "median curve geometry" or the "1/4 chord geometry" of the wing is chosen. The subject-matter of granted claim 1 therefore lacks novelty (Article 54(1) EPC).

5. The Board decided to admit auxiliary request I to the appeal proceedings since it was clearly filed in response to the further evidence relating to the public prior use submitted by the Appellant during the appeal proceedings (Article 13(1) RPBA (Rules of Procedure of the Boards of Appeal)).

6. The Board considered that the objections raised against claim 1 of auxiliary request I pursuant to Article 83 EPC are actually based on arguments relating substantially to the issue of clarity (Article 84 EPC) of which account was taken when dealing with the

interpretation and construction of the claim during the discussion of novelty (see below) of the claimed subject-matter.

It was likewise not necessary to decide on the Appellant's allegation that the amendment to claim 1 of auxiliary request I implies a generalization of the content of the application as filed, for the request anyway fails, as discussed hereinafter, on the grounds of lack of novelty.

7. The subject-matter of claim 1 of auxiliary request I lacks novelty. The introduced amendments explicitly state that the "winglet continuously curves" and that said "curve has a continuously and progressively increasing radius following generally an elliptical curvature from the inner end of the winglet out to the outer end of the winglet" (see above, point IV, feature (ii)). As set out above (see conclusion (b), point 4), the "inner end" of the winglet is not clearly defined in EP-B and the behaviour and variation of the radius of curvature in the transition region between the wing and the winglet is unclear and contradictory. Therefore the above wording of the claim can only be construed as implying that there is an inner end of the winglet, somewhere comprised in between the planar wing section and the curved winglet section, and that starting from said inner end of the winglet the radius of curvature continuously and progressively increases following a generally elliptical curvature. However, these features are disclosed for instance in figures 1, 7 and 8 (for the 1/4 chord geometry) of annex D5-L, figure 8 and figure 7 illustrating an ellipse whose major axis is constrained, such as to intersect the wing plane perpendicularly, and respectively not constrained. Both these ellipses of figure 7 and 8 manifestly provide an

accurate fit of the illustrated winglet shapes. Bearing in mind that the claim only requires a "generally elliptical curvature" and that the degree of accuracy of the elliptical fit is nowhere defined in EP-B it ensues that the claimed subject-matter is not new.

8. The Board decided to admit document D13 (filed with letter dated 28 November 2013) pursuant to Article 13(1) RPBR (Rules of Procedure of the Boards of Appeal) to the appeal proceedings. This document was submitted to prove the skilled person's general knowledge and its admission did not add to the complexity of the technical aspects involved in the discussion of the case in point and was compatible with procedural economy at the given state of the proceedings.

9. The subject-matter of claim 1 of auxiliary request II is not inventive over the LS7-WL sailplane of the public prior use. Specifically, the introduced amendments reciting "the wing (200) having a sweep angle (201)", whilst distinguishing the invention from said public prior use, cannot involve an inventive step in combination with the remaining features of claim 1. Indeed, as demonstrated by document D13 (see pages 745, 750, 757), the above technical measure is already implemented in a variety of prior art sailplanes and is generally known to the skilled person. Consequently, the skilled person would adopt this technical measure in order to improve the overall aerodynamic performance of the LS7-WL sailplane of the prior use, thus arriving in an obvious manner at the claimed subject-matter (Article 56 EPC).

10. The subject-matter of claim 1 of auxiliary request III extends beyond the content of the application as filed,

contrary to Article 123(2) EPC. The amendment reciting "the wing (200)... carrying an underwing engine;" is not supported by the application as filed. There is in EP-B (or equivalently in the application as filed) no specific technical teaching relating to "underwing motors" and much less a teaching linking "underwing motors" to any specific shape of the winglets. The only disclosure of an underwing engine is in figure 1, showing a commercial aircraft with underwing jet engine. However, the broad term "underwing motors" evidently includes propeller engines too, which however find no mention in EP-B. In addition, figure 1 and paragraph [0015] in EP-B (or the equivalent parts of the application as filed) do not provide any basis for extracting "underwing motors" from the given technical context and isolating them from other features disclosed in figure 1 (see for instance specific configuration of the wings, which is clearly in structural relationship with the type of engine and its location) and paragraph [0015]. Consequently, this amendment leads to additional information being provided over the content of the application as filed.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

A. Vottner G. Pricolo

Decision electronically authenticated