

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
16 May 2002 (16.05.2002)

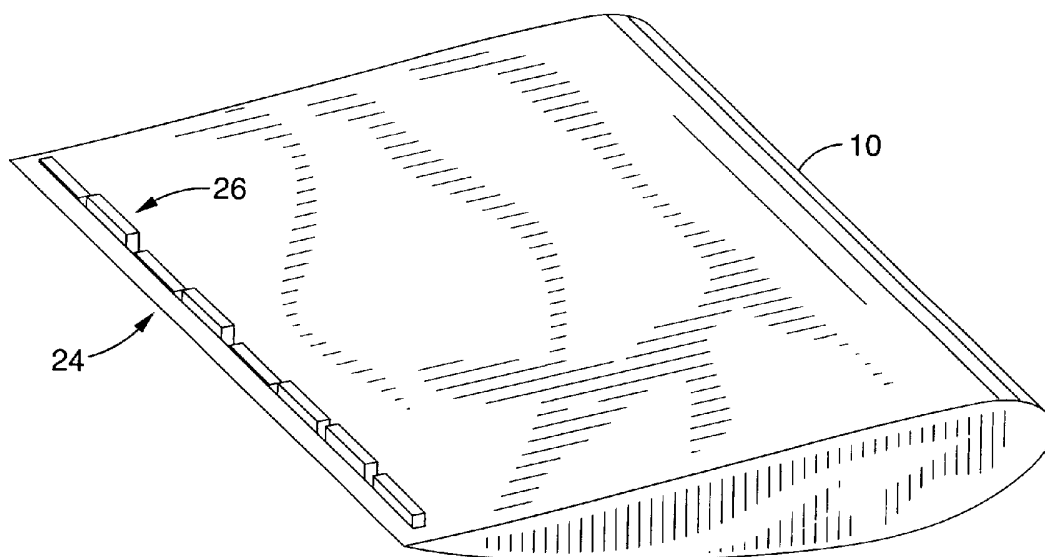
PCT

(10) International Publication Number  
**WO 02/038442 A3**

- (51) International Patent Classification<sup>7</sup>: **B64C 5/10**
- (21) International Application Number: PCT/US01/31667
- (22) International Filing Date: 9 October 2001 (09.10.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/239,427 10 October 2000 (10.10.2000) US
- (71) Applicant (for all designated States except US): **THE REGENTS OF THE UNIVERSITY OF CALIFORNIA** [US/US]; 1111 Franklin Street, 12th floor, Oakland, CA 94607-5200 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **VAN DAM, Cornelis, P.** [US/US]; 1263 Evans Court, Davis, CA 95616 (US). **YEN, Dora, T.** [US/US]; 2505 5th Street, #178, Davis, CA 95616 (US). **SMITH, Rosemary, L.** [US/US]; 311 Oyster Bay, Davis, CA 95616 (US). **COLLINS, Scott, D.** [US/US]; 3311 Oyster Bay, Davis, CA 95616 (US).
- (74) Agent: **O'BANION, John, P.**; O'Banion & Ritchey LLP, Suite 1500, 400 Capitol Mall, Sacramento, CA 95814 (US).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report

[Continued on next page]

(54) Title: MICROFABRICATED TRANSLATIONAL STAGES FOR CONTROL OF AERODYNAMIC LOADING



(57) Abstract: Micro-electro-mechanical (MEM) translational tabs (26) are introduced for enhancing and controlling aerodynamic loading of lifting surfaces. These microtabs (26) are mounted at or near the trailing edge (24) of lifting surfaces, deploy approximately normal to the surface, and have a maximum deployment height on the order of the boundary layer thickness. Deployment of this type of device effectively changes the camber, thereby affecting the lift generated by the surface. The effect of these microtabs (26) on lift is as powerful as conventional control surfaces such as ailerons. Application of this simple yet innovative lift enhancement and control device will permit the elimination of some of the bulky conventional high-lift and control systems and result in an overall reduction in system weight, complexity and cost.

WO 02/038442 A3



**(88) Date of publication of the international search report:**  
6 February 2003

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/31667

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : B64C 5/10

US CL : 244/198

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 244/198, 201, 204, 35R, 199, 130, 207, 34R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,755,408 A (Schmidt et al) 26 May 1998 (26.05.1998), Figure 3	1,2,4,5,7,8,9,11- 15,17,18,20-22,24- 27,29,30,32- 35,37,38,40- 43,45,46,48,57-62 ----- 3,6,10,16,19,23,28,31 ,36,39,44,47,49-56
Y	US 2,929,582 A (Munro) 22 March 1960 (22.03.1960), whole document	1-62
Y	US 4,039,161 A (Bauer) 02 August 1977 (02.08.1977), whole document	1-62
Y	US 5,205,519 A ( Creel) 27 April 1993 (27.04.1993), whole document	1-62
A	DE 3913678 C1 (Messerschmitt-Bolkow-Blohm GmbH) 5 July 1990 (05.07.1990), whole document	1-62
A,E	US 6,302,360 B1 (Ng) 16 October 2001 (16.10.2001), whole document	1-62



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

11 June 2002 (11.06.2002)

Date of mailing of the international search report

02 JUL 2002

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks  
Box PCT  
Washington, D.C. 20231

Facsimile No. (703)305-3230

Authorized officer

Timothy D Collins

Telephone No. 703-306-4180

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/31667

## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3,191,887 A (Minoru et al) 29 June 1965 (29.06.1965), whole document	1-62