



International Society of Biomechanics Newsletter

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TABLE OF CONTENTS

ISB News:

Message from the President - Ron Zernicke	2
Affiliate Society News	3
Technical and Working Group Reports	3
ISB Publications	5

Announcements:

Conference News	6
Biomechanics Positions Available	7

Thesis Abstract Corner

9

Calendar of Scientific Events

11

ISB Membership News

12

AFFILIATE SOCIETIES OF ISB:

American Society of Biomechanics; British Association of Sports Science; Bulgarian Society of Biomechanics; Canadian Society of Biomechanics; China Sports Biomechanics Association; Czechoslovak Committee on Biomechanics; French Société de Biomécanique; Japanese Society of Biomechanics; Korean Society of Biomechanics; Polish Society of Biomechanics; Romanian Commission for Biomechanics, Engineering and Informatics.

ISB News

From the President - Ron Zernicke

The XIV Congress of the ISB in Paris was a resounding success. Certainly, it was the largest Congress ever and, of course, "Paris is Paris" (as Simon Bouisset is fond of saying). The scientific sessions were extensive, as more than 900 people attended the meeting. The Organizing Committee, headed by Simon Bouisset, Stephane Metral, and Hughes Monod, are to be congratulated! The work involved with organizing a Congress is enormous, but the personal and professional rewards and satisfaction are also great. We look forward to the XV Congress in Jyvaskyla, Finland (1995), being organized by Paavo Komi and colleagues, and we encourage other biomechanists to think seriously about whether a future ISB Congress could be organized in your city.

At the Paris Congress, there was a transition of Executive Council members. Some members left the Council, as others assumed their new duties. Among the Council members who finished their terms were Simon Bouisset (FRA), Minayori Kumamoto (JPN), Kurt Oberg (SWE), Reints Rozendal (NL), and Richard Stein (CAN); these members contributed significantly to the Society, and we sincerely thank them. In addition, Robert Norman (CAN) finished his multi-year service as an EC member - President-Elect, President, and Past President. A special vote of thanks goes to Bob; he was a strong, guiding force in the Society during his tenure, and his advice and guidance will be equally valuable in the future.

The new ISB Executive Council (1993-95) includes: Bruce Elliott (AUS), Micheline Gagnon (CAN), Francis Goubel (FRA), Mont Hubbard (USA), Toshio Moritani (JPN). Sandra Olney (CAN), Alf Thorstensson (SWE), Kit Vaughan (USA), Savio Woo (USA), and Fred Yeadon (UK). In addition to these elected members, there are two appointed members who serve on the EC: Graeme Wood (Treasurer/Newsletter Editor) and Paavo Komi (XV ISB Congress Organizer). In my opinion, the Society is very fortunate to have such a distinguished and representative group of scientists to lead the ISB. Congratulations to each of the EC members.

Completing the EC are Aurelio Cappozzo (ITL), the ISB Past-President, and Peter Cavanagh (USA), the ISB President-Elect. During the past two years, Aurelio was a superb leader of the Society. His reputation as a scientist reflected favourably on the ISB, and his enthusiasm and diplomacy were among the many talents that he generously gave to the ISB. As a Society we give him our heartfelt thanks, and we will value his continued contributions as a member of the EC. The new President-Elect of the ISB is Peter Cavanagh, the first recipient of the Muybridge Medal and the past Secretary General of the ISB. As a member of the new EC, Kit Vaughan has

also agreed to assume the duties of the ISB Secretary General. The EC and I are here to serve you - the members of the ISB. Contact us directly if you have ideas for improving the Society, suggestions for new ventures, or for airing complaints and problems.

Who, exactly, do you contact? Well, let me tell you... During Aurelio's term as President, the EC established "Officers" responsible for coordinating the Society's functions. On the current EC, here are some of the EC Officers: Bruce Elliott (Membership), Fred Yeadon (Sponsorships), Alf Thorstensson (Publications), Mont Hubbard (Technical and Working Groups), Sandra Olney (Education), Micheline Gagnon (Affiliate Member Societies), and Savio Woo (Awards). Each of these Officers will be forming a committee comprising members of the ISB. Thus, if you are interested in becoming more active in the Society, then contact the appropriate EC Officer, as soon as possible. For example, if you have strong feelings or opinions about:

- how the ISB should recruit more or different members;
- how sponsorships could be used to expand the activities of the ISB;
- what kinds of books the ISB should develop or promote in its "series";
- which new "working groups" are needed to serve the interests of members;
- what kinds of tutorial lectures or workshops should be given at the next Congress;
- how the ISB can become more effective in supporting biomechanists in affiliated societies, or
- whether new awards should be developed by the Society,

then contact the specific EC Officer who can coordinate your input on these matters - or better yet, ask to become a member of the committee. If you do not know which Officer would best address your concern, then contact me, and I will work with you to identify the most effective way for you to get involved with the Society.

As the ISB grows and the field of Biomechanics rapidly expands, it is vital that our Society develop "long-term" strategies and plans - for example, where is the ISB going, who do we want to be, how large should the Society grow, do we wish to merge with other societies, what is (should be) the focus of the ISB? In the first meeting of your new EC, Peter Cavanagh accepted the challenge to chair a Long-Range Planning Committee for the ISB. In the next months, Peter will be recruiting members from ISB to serve on this important committee. Again, let me encourage any member who has an interest in these issues to contact Peter Cavanagh.

Also at the first meeting of the new EC, there was a wide-ranging discussion about an issue that surfaced in the General Assembly meeting at the Congress. The issue focused on developing a coherent and proactive plan to support and foster our biomechanics colleagues in those

countries with severe economic conditions. There is no doubt that the members of ISB are aware of the existing problems and are eager to help - but what is the most effective way for the ISB as a whole or for individual members to help? Should this be in the form of financial help, faculty or student exchanges, visiting lectureships, lecture tours by visiting scholars, equipment loans or gifts, ISB-sponsored journal subscriptions, or used and new books? All of these ideas (and more) were posed at the EC meeting, in which Prof. Kazimierz Fidelius of Poland provided the EC members with his insights. As a result of the collective concern and interest of the Society's members, Sandra Olney (Education Officer) and Micheline Gagnon (Affiliated Societies Officer) will head a committee to develop concrete proposals and steps for the ISB to take. This special committee is currently being formed; contact either Sandra or Micheline if you are interested.

Finally, I wish to make an observation and issue a challenge. It is extraordinary that more than 40% of the registrants of the Paris Congress were students. This is exciting, because it means there is a host of young biomechanists with new ideas and visions entering the field. These students are the "life blood" of the ISB, and they should be strongly encouraged to become active members of the ISB. The challenge that I issue is to each of the student members - become involved, get organized, be vocal, make your ideas known and your concerns heard. Currently, there is no formal student organization in the ISB, but that should change in the next two years. By the next Congress in Finland, an ISB students' group should be formed. Someone needs to take the initiative and start the process; why not you?

As you can appreciate from just these few examples, there are many substantial challenges facing the ISB. The EC and I will work to meet those challenges. Thank you for giving us the opportunity to serve the ISB; we will strive to fulfil the trust that you have placed in us.

AFFILIATE SOCIETY NEWS

During the General Assembly of ISB, held in Paris during the XIVth Congress week, three new affiliate societies were formally accepted by unanimous vote. The new affiliates are:

- * Bulgarian Society of Biomechanics
- * Japanese Society of Biomechanics
- * Romanian Commission for Biomechanics, Engineering and Informatics

Please note that one outcome of a formal link between a national body and ISB is the exchange of membership lists. If you do not wish your name and address to be disseminated in this fashion please let the Secretary-General know.

TECHNICAL AND WORKING GROUP REPORTS



Report of Technical Group on Computer Simulation

A very pleasant and stimulating 4th International Symposium on Computer Simulation in Biomechanics was hosted in June by the Laboratoire de Biomecanique from E.N.S.A.M. in Paris and was coordinated by Professor Bernard Landjerit. More details of this meeting are included below. On behalf of the participants, I would like to thank Professor Landjerit and the E.N.S.A.M. staff who made the meeting such a success.

A general meeting of the TGCS was held in Paris during the ISB Congress. At that time two new Executive Council members were elected - congratulations to Krystina Gielo-Perczak and Bernard Landjerit.

One other item of general interest was discussed. It was suggested that the TGCS Secretary-General coordinate and make accessible to ISB members a list of simulation software which members are willing to share. This list would include the name of the software, a brief description of how it works, the owner/developer and their contact addresses. It would then be up to the interested party to contact the developer, discuss their needs and proceed from there. The TGCS Secretary-General would NOT store or distribute the software. This was agreed upon at the meeting, and I would thus ask researchers to contact me via electronic or regular mail with details (as above) of software which they would be willing to share with colleagues. A further note concerning this will be found below from Prof. Giovanni Legnani (Italy).

The TGCS Council is currently waiting for applications to host the 5th ISCSB, and has received expressions of interest from 3 laboratories.

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IV International Symposium on Computer Simulation in Biomechanics Report

As a satellite event of the 14th ISB Congress, the 4th International Symposium on Computer Simulation in Biomechanics was held at MONTLIGNON, near PARIS (FRANCE), from June 30th to July 2nd 1993. More

than 150 participants, from 22 countries were present.

The success of this Symposium was mainly due to the scientific quality of the 68 selected papers selected by an international Scientific Committee. 46 original Computer demonstrations, using workstations (Silicon Graphics, IBM RISC 6000, SUN SparcStations) and i486 PC Micro computers followed the oral presentations.

Four general topics were divided into 9 series of sessions: Movement (General considerations, Locomotion, Sport, Rehabilitation, Movement Control); Musculo-skeletal (with Finite Element Method, and without FEM); Cardiorespiratory; Tissues and Biomaterials studies. Because of the great number of papers and demonstrations, it was necessary to organise two parallel sessions for the first time.

Included in the program were 2 general lectures: the first was related to blood cell biomechanics and included experimental preliminary studies and the beginning of numerical simulation work; and the second described a horse riding simulator which included both experimental and computer modelling. On Saturday, July 3rd a visit to the simulator was organised. Two round tables considered numerical problems in computer simulation and the relations between experimental and computer simulation. Many of the participants expressed their opinions during these sessions.

The Andrzej Komor Award for the best paper by a young researcher was established and was shared by two investigators for their excellent contributions. Congratulations to K. Gerritsen from Calgary for her paper "Direct dynamics simulation of the impact phase in heel-toe running" (co-authored by A.J. van den Bogert) and to G. Taga from Tokyo for his paper "Neuro-musculo-skeletal model of human locomotion" (co-authored by Y. Yamaguchi and H. Shimizu).

Finally, the Organising and Scientific Committee members were happy to find that the participants enjoyed the site, food and living arrangements of Montlignon. However, we must remember that the main reasons for the success were provided by the scientific quality of the contributions, which were printed in the 300 page Proceedings Book.

Many thanks again to all the participants, and see you in 1995 in Northern Europe at the 5th International Symposium on Computer Simulation in Biomechanics.

Bernard Landjerit
Chairman of the 4th ISCSB.

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Tel et Fax: +33/1-44 24 63 65
Email: landjer@ensam-paris.Fr

At the last meeting in Paris during the ISB congress I promised 10 lines for the newsletter. Here they are.

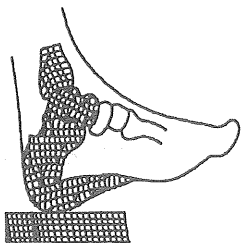
The TG on Computer Simulation in Biomechanics gathers a group of ISB members which are particularly interested in computer simulation approaches to solve various biomechanics problems. In the TGCS meetings organised as satellite events of the ISB congresses the focus has been always posed not only on the results obtained but also on the utilised methodologies. An extremely important part of that congress has always been the practical exhibition of the software which stimulated informal discussions among the participants.

Sometimes these contacts resulted in software and data exchange. For this reason I would like to support the proposal to establish a way to organise a free software and data exchange. This exchange should be "sponsored" by the TGCS and could take advantage of the internet facilities (FTP or BIOMCH-L). However, TGCS should not be responsible for improper use of the software and the data, or for mistakes contained in them. I suggest that software could be shared on the base of a "gentlemen's agreement" which states that the use of the software is free for any non-commercial activity. However the name of the author should be quoted in any report or publication which presents results obtained by a significant use of that software. It is obvious that the use of the software should be performed at "ones own risk" (no legal responsibilities of any kind for the author). Similar statements could be established for data exchange. Software and data should be supplied at least with a minimum level of documentation and with references about how to find further information.

Following this suggestion I remember that my software (the C-language library SPACE_LIB and the preliminary version of 3DL) for 3D analysis and simulation is available (information on them could be found in the abstract of the workshops on Computer Simulation in Biomechanics of PERTH 1991 and PARIS 1993).

Looking forward to hearing from someone.

Giovanni Legnani
Mechanical Engineering Department
University of Brescia
Via Branze 38
25123 BRESCIA - Italy
legnani@icil64.Cilea.It



Report of the Working Group on Functional Footwear

At the recent ISB Congress in Paris, a new ISB Working Group on Functional Footwear was formed. The goal of the Working Group is to provide a forum for ISB members interested in the biomechanics of Clinical, Athletic and other types of footwear.

The group currently has 60 members. Plans are currently being formed for a Symposium to be held in conjunction with a major international conference during 1994. A Working Group meeting or conference will also be held in conjunction with ISB'95 in Jyvaskula. In addition to formal meetings, the group encourages and facilitates direct contact between members.

The working group is open to all ISB members and no additional membership fee is required. If you are interested in joining the Group, please contact Martyn Shorten by fax (+1 503 774 7868) or by electronic mail (73700.263@compuserve.com).

Working Group on Three Dimensional Analysis of Human Movement

This working group was approved by the executive council as a formal structure within ISB during its meetings in Paris. The officers are presently: Paul Allard (coordinator), Aurelio Cappozzo, Joannes Dimnet and Ian Stokes. The coordinator's contact address is:

Dr Paul Allard
Department of Physical Education
University of Montreal
CP 6128, Station A
Montreal, Quebec, CANADA

ISB PUBLICATIONS

The following Society publications can be obtained at the special rates shown by writing to the person concerned with sales and distribution.

BOOK OF ABSTRACTS, XIVth Congress of the International Society of Biomechanics.

Price: 550 FF plus postage
Supplier: Professor S. Metral
Explorations Fonctionnelles du Systeme
Nerveux
C.H. Bicetre
78 Avenue du General Leclerc
94275 Kremlin Bicetre, FRANCE
Fax: (33.1) 45.21.27.14

BOOK OF ABSTRACTS, XIIth and XIIIth Congresses of the International Society of Biomechanics.

Price: \$AUS 40 plus postage
Supplier: Graeme A. Wood
Department of Human Movement
The University of Western Australia
Nedlands, WA 6009, AUSTRALIA
Fax: +61 9 380-1039

BIOLOCOMOTION: A CENTURY OF RESEARCH USING MOVING PICTURES, edited by A. Cappozzo, M. Marchetti and V. Tosi (ISB Book Series-Volume 1; Hard-bound, 356 pages, 180 b&w and 7 colour figures).

Price: \$AUS 65 plus postage
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Announcements

2ND ANNOUNCEMENT AND CALL FOR PAPERS IVth EMED USER GROUP MEETING

June 30 - July 2, 1994
in Ulm, Germany

Organized by Dr. D. Rosenbaum & Dr. H.P. Becker for the Department Unfallchirurgische Forschung und Biomechanik, Universitaet Ulm, Germany (Director: Prof. Dr. L. Claes) in cooperation with Department of Surgery, Bundeswehrkrankenhaus Ulm.

SCIENTIFIC PROGRAM

Oral presentations, poster sessions and workshops concerned with the following topics will be held during the two-day scientific program:

- pressure distribution measurements in sitting and reclining.
- clinical applications of pressure distribution measurements in gait analysis.
- pressure distribution measurements in sports biomechanics.
- shoe construction/orthotics design with the help of in-shoe measurements.
- unusual applications.

For the best paper in pressure distribution measurements the NOVEL-AWARD will be presented at this meeting for the second time. Applications will be reviewed by an international jury of specialists in the field of medicine and biomechanics.

- First prize: 10000 DM
- Second prize: 3000 DM
- Third prize: 1000 DM

A registration fee of 150 DM will include a welcome reception, daily lunches, coffee breaks and the concluding banquet. In order to support the communication and contact between investigators and users the number of participants will be limited to 150.

For accomodation please contact tourist information: Verkehrsverein Ulm/Neu-Ulm, Muensterplatz, 89073 ULM (Phone: (0)731 - 64161)

DEADLINE

Submissions for award papers (15-20 pages) and free presentations (one page abstract) shall be submitted before March 31, 1994. The next announcement will include authors instructions for the submissions and some detailed information about possible accomodations.

For further information please contact:

D. Rosenbaum, H.P. Becker
Abteilung Unfallchirurgische Forschung & Biomechanik
Universitaet Ulm, Helmholtzstr. 14
D-89072 ULM, GERMANY

Phone: (country code) 731-502 3492 or 3481
Fax: (country code) 731-502 3498
E-mail: diro@sirius.medizin.uni-ulm.de

or

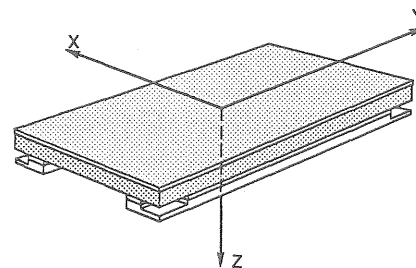
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Biomechanics Division
Kistler Instrument Corp.
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Amherst, NY 14228-2171
or
Fax: +1 716 691-5226

REEBOK INTERN POSITION AVAILABLE

The Human Performance Engineering Lab at Reebok International Ltd. has an immediate opening for an intern. This is a one year position, and does not include benefits. The duties include primarily data collection and analysis for studies of footwear design using both material tests and human subject tests. There will be opportunities for exposure to the various stages of the footwear design and development process. Experience in human subject research, and proven organizational and communication skills required. Masters preferred.

Send resumes to :

Bob Rich
Reebok International Ltd.
100 Technology Center Drive
Stoughton, MA 02072
Tel: +1 617 341-7635
Fax: +1 617 297-4310

RESEARCH FACULTY and POSTDOCTORAL FELLOWS

Research faculty and postdoctoral fellows with expertise in neurophysiology and/or biomechanics are sought to carry out research on vestibulospinal control of head position and posture in a newly established Center for Vestibular Research supported jointly by NIH and NASA. A five year plan of research involves the latest methods for single neuron recording and behavioral analysis in moving animals, biomechanical analysis of human postural and head movement systems and computer modeling ranging from neural network models to realistic biomechanical simulations.

Research opportunities are available with the following investigators:

James F. Baker, Northwestern University Neural and behavioral analyses of linear vestibular-neck reflexes in alert primates. Emphasis will be placed on recording and modeling the patterns of neural activity that underlie these reflexes and their adaptive modulation.

Barry W. Peterson, Northwestern University and Rehabilitation Institute of Chicago Analysis of neural and biomechanical contributions to human head stabilization. Emphasis will be placed on understanding the contribution of vestibular otolith organs to stabilizing responses.

Scott L. Delp, Northwestern University and Rehabilitation Institute of Chicago - Biomechanical modeling of the neuromusculoskeletal system. Emphasis will be placed on building anatomically based models of the human head-neck system.

For further information, contact: Barry W. Peterson, Director, Center for Vestibular Research, Northwestern University Medical School, M211, Chicago, IL 60611. E-Mail: barry_peterson@plato.nwu.edu

FELLOWSHIPS IN BIOMECHANICS

Post-doctoral researchers in the field of biomechanics with some research experience, who are citizens of a EC-country may apply for an individual bursary to participate in projects carried out at the Biomechanics laboratory of the University of Vienna, Austria, under the leadership of Prof. Hatze. Eligible persons interested in such a position are kindly invited to submit a curriculum vitae and a list of publications to the e-mail address (contact person Dr. A. Baca) given below.

Successful applicants will work on an interdisciplinary research project entitled "Modelling and simulation of myomorphometric, myodynamic, and myocybernetic properties of human skeletal muscle with the view of applications in orthopaedics, rehabilitation, and sport biomechanics".

The duration of the applicants' fellowships will be one to two years.

For successful applicants the bursaries will be granted by the Commission of the European Communities under the Human Capital and Mobility Program. The appropriate application forms are to be completed by the prospective research fellows, our laboratory as the host organization, and the home organization (if applicable), and returned in a single package to the Commission of the European Communities (deadline November 15, 1993). The decision of the commission will be made known by March 1994.

Our E-mail address is:

A6251DAA@AWIUNI11.EDVZ.UNIVIE.AC.AT

Our Telefax number is: 0043-1-9822661-131

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September 10, 1993

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Ariel pioneered the development and has been the leader in computerized systems for quantifying, movement (APAS) and the computer controlled exercise/diagnostic systems (CES) for rehabilitation, muscle performance diagnostics and enhancement, training, conditioning, and research. Ariel has been developing its technology for service since 1968 and introduced its first commercial product in 1979. Last week the Ariel technology was adapted by NASA to fly space missions. Ariel decided to lower their product prices to a level where everyone can afford the product. Our current and future customers will benefit directly by more easily maintaining their technological edge at more affordable prices and with improved customer service.

Be assured the Ariel companies have a secure financial foundation on which it's basic technology and business has been built. Our continued support and updating of our technology demonstrate our commitment. If you have any questions concerning new or upgrade releases and prices, service, or education, please don't hesitate to call us.

Sincerely, Gideon B. Ariel, Ph.D.

ARIEL PERFORMANCE ANALYSIS SYSTEM (APAS) NewPRICE LIST

ITEM #	QTY	ITEM DESCRIPTION	PRICE (US\$)
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100	1	Ariel Performance Analysis System (APAS-Premium) Premium APAS Configuration includes: AST 486 Computer, 16 Meg. RAM, 500 Meg. Hard Disk * S-VHS VCR (one) * S-VHS VIDEO CAMCORDERS (two) * MODEM COMMUNICATIONS (Pkg); * ARIEL DELTA (Software module); * ARIEL GAIT (Software module); * ARIEL ANTHROPOMETRIC (Software module); * ARIEL ANALOG - 16 A/D Channels for EMG & Force Plate (Pkg).	\$42,500.00 Included Included Included Included Included Included Included
Additional Video Options			
153	1	Tripod	250.00
155	1	Industrial Camera Light (300 W, 110 V)	250.00
165	30	Reflective Markers	300.00
168	1	1000 Double-Sided Stickers for Markers	75.00
163	1	Calibration Cube (180cm track) with carrying case	950.00
178	1	Additional S-VHS Video Camcorder	2,300.00
170	1	Additional S-VHS VCR	2,500.00
220	1	VRG - Video Report Generation (Package)	3,500.00
228	1	PANORAMA (mount-head, tripod, software, 2 day training)	5,000.00
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316	1	HP IIIP, 2MB exp. memory, cable, software driver	2,000.00
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313	1	EMG Preamplified Electrode	495.00
216	1	Force Plate with Ariel software and Interface	15,000.00
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Thesis abstract

THE OPTIMAL PLACEMENT OF BOXES ON THE SHELVES OF A FOOD PRODUCT WAREHOUSE AND PREDICTION OF LUMBAR LOADINGS DURING MANUAL MATERIALS HANDLING TASKS

by
Gilmen Smyth

A Thesis in Biomechanics submitted to the Faculté des études supérieures

Université de Montréal

in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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Supervisor: Micheline Gagnon

The manual materials handling of boxes is an important activity of workers in food product warehouses and appears as an important cause of injuries to the back and to the shoulders. The main objective of the study was to develop a method that would reduce joint loadings when placing boxes on the shelves of a food product warehouse. Another objective was to develop statistical equations to predict lumbar loadings for lifting and lowering tasks. A dynamic segmental model was used to estimate net muscular moments at main body joints, the compression force at L5/S1, and the mechanical work when lifting and lowering five boxes from 3.3 to 22.0 kg at five shelf heights ranging from 15 to 185 cm. The muscular utilization ratio was also estimated at each joint. The subjects were eight professional workers of a food product warehouse.

The effects of the task (lifting and lowering), of the height of placement, and of the mass of boxes on the maximum muscular moments at all joints and the maximum compression force at L5/S1 were examined in the first part of the study. The same effects were examined in the second part of the study using mechanical work and the process of energy expenditure. Lifting boxes was more demanding than lowering them, but the nature of eccentric efforts suggested that lowering tasks could be hazardous. The effect of height varied at different joints. For handling below the waist, the hip and the lumbar region displayed the largest absolute loadings while for handling above the waist, the analysis of muscular utilization ratios and mechanical work indicated that the demands on the shoulders were relatively higher. The third part of the study examined the optimal placement of boxes on the shelves in a food product warehouse by minimizing joint loadings. The results showed that lumbar loadings could be reduced by placing the heavier boxes on the top shelf and the lighter ones on the bottom shelf of a two-shelf rack. Though the

minimization of shoulder loadings indicated that the net muscular moments were not sensitive to different placement of boxes on the shelves, the integration of all the results suggested to limit the height of placement to the shoulder level, with the heavier boxes placed between waist and shoulder level.

In the fourth part of the study, mathematical models were developed using easily measured variables to predict compression forces at L5/S1 when handling boxes. The field and laboratory models developed permitted to predict the compression force for lifting and lowering boxes of various masses at various heights; the equations were valid and reliable.

The last part of the study examined dynamic factors related to three methods of lifting boxes from the floor to maximum reaching height. The results showed that net muscular moments, lumbar loadings, mechanical work and muscular utilization ratio increased with acceleration without increased benefits in energy transfers. The lifting of heavy boxes should be executed at slow speed, with reduced acceleration, and no pause during the movement.

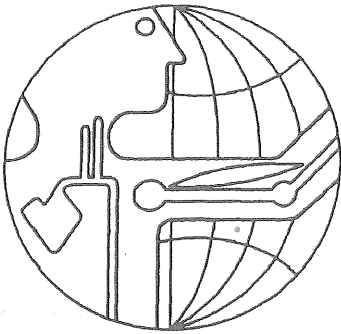
Published material:

- Gagnon, M. and Smyth, G. (1992). Biomechanical exploration on dynamic modes of lifting. *Ergonomics* 35, 329-345.
- Gagnon, M. and Smyth, G. (1991). Muscular mechanical energy expenditure as a process for detecting potential risks in manual materials handling. *J. Biomechanics* 24, 190-203.
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- Smyth, G. and Gagnon, M. (1990). Loads on body joints and the lumbar spine when lifting and lowering boxes. In *Advances in Industrial Ergonomics and Safety II* (Edited by Das, B.), pp. 651-654. Montréal, Québec.
- Smyth, G. and Gagnon, M. (1989). Loads on the lumbar spine and the shoulders when handling loads. In *Proceedings of ASB*, pp. 64-65. Burlington, Vermont.

This thesis is available in French only. The complete reference is:

Smyth, Gilmen (1992). Optimisation du placement de caisses de produits alimentaires dans un entrepôt et prédiction des chargements lombaires lors d'activités de manutention. Thèse de doctorat, Université de Montréal, 375 pp.

SECOND WORLD CONGRESS OF BIOMECHANICS



in conjunction with

9th Meeting of the European Society of Biomechanics
8th International Conference on Mechanics in Medicine and Biology

July 10-15, 1994

Free University, Amsterdam, The Netherlands

Following the first Congress of Biomechanics in San Diego, 1990, the Second World Congress will be held in Amsterdam, July 1994. As the first one, this Congress was initiated by the World Committee for Biomechanics and monitored by an International Steering Committee, consisting of experts from all Biomechanics related fields and from all parts of the world. The Congress is patronized by the American (ASB), European (ESB) and International (ISB) Societies of Biomechanics, the Society for Biomaterials, the International Committee on Mechanics in Medicine and Biology (ICMMB), the International Society of Biorheology, the Cardiovascular System Dynamics Society, the US National Committee of Biomechanics and others. The 9th Meeting of the European Society of Biomechanics and the 8th International Conference on Mechanics in Medicine and Biology are merged with this Congress.

The Congress will include Plenary Lectures, Society-patronized Symposia, Tutorials, State-of-the-Art Lectures, Free Papers and Posters in a five-day program. Satellite meetings, Pre and post Congresses are planned by some of the patronizing Societies.

List of Symposia

1. Cardiovascular artificial organs
2. Orthopaedic implant design & materials
3. Bone trauma & fracture fixation
4. Biomechanics of joints & ligaments
5. Biomechanics of sport
6. Blood flow & large vessel mechanics
7. Cardiac mechanics & function
8. Cell mechanics
9. Characterization & measurement of motion
10. Microcirculation
11. Skeletal muscle mechanics
12. Respiratory mechanics
13. Biomechanics & rehabilitation
14. Transport in connective tissue
15. Tissue engineering & biomaterials
16. Motor control
17. Co-ordination of multi-joint movement
18. Bone structure & remodeling
19. Biomaterials: considerations for implants

Other topics

Acoustical and auditory biomechanics; Biorheology; Hemorheology, Blood and gas flow; Bone and cartilage mechanics; Dental mechanics; Image and signal processing; Medical instrumentation for biomechanics; Models in biomechanics; Molecular biomechanics; Orthopaedics; Physical therapy, Prosthetics; Rehabilitation engineering; Sensory organs; Skin mechanics; Animal locomotion.

Abstracts

Instructions for abstracts and the full announcement can be obtained from the Congress Office. Submission deadline of abstracts is November 1, 1993. The selection of papers for presentation will be made by the Program Committee. The abstracts of accepted papers will be published in a bound volume at the time of the meeting.

For further information and inclusion in the mailing list contact the congress office

Second World Congress of Biomechanics
Institute of Orthopaedics
P.O. Box 9101
6500 HB NIJMEGEN
The Netherlands
Telefax +31-80-540555

Calendar of scientific events

October 21-23, 1993

17th Annual Meeting of the American Society of Biomechanics, University of Iowa, Iowa City, USA. Contact: Vijay K. Goel, PhD, Professor and Chair, Department of Biomedical Engineering, University of Iowa, 1202 Engineering Building, Iowa City, IA 52242-1527, USA. Tel: 319/335-5638; Fax: 319/335-3533.

December 1-3, 1993

Fifth Brazilian Biomechanics Congress, Santa Maria, Brazil. Congress Office: Secretaria do V Congresso Brasileiro de Biomecânica, Centro de Educação Física e Desportos, Universidade Federal de Santa Maria, Faixa de Camobi Km 09, Santa Maria -RS- CEP97119-900, Brazil. Fax: +55(055) 226-2238.

April 7-9, 1994

International Conference on Biomedical Engineering (BME'94), Hong Kong. Contact: BME'94 Conference Secretariat, c/o Rehabilitation Engineering Centre, Hong Kong Polytechnic, Hunghom, Kowloon, Hong Kong. Tel: 852-766-7683; Fax: 852-362-4365; E-Mail: PCRS@HKPCC.HKP.HK.

April 16-17, 1994

Thirteenth Southern Biomedical Engineering Conference. Engineering Research Institute, University of the District of Columbia, Washington, DC, U.S.A. Contact: Jaar Vossoughi, PhD, 4401-A Connecticut Ave., NW, Suite 327, Washington, DC 20008, USA. Tel: +1 202 282-2388; Fax: +1 202 282-2389.

June 21-24, 1994

Tenth Congress of International Society for Electrophysiology and Kinesiology (ISEK), Charleston, South Carolina, USA. Contacts: Richard Shiavi, Biomedical Engineering, Vanderbilt University, Nashville, Tennessee 37235, USA; Tel: (615) 322-3598; Fax: (615) 343-7919; E-mail: rgs@use.vanderbilt.edu, or Steve Wolf, Rehabilitation Medicine, Emory University School of Medicine, Atlanta, Georgia 30322, USA; Tel: (404) 727-4801; Fax: (404) 727-5895.

July 10-15, 1994

Second World Congress of Biomechanics, Amsterdam, The Netherlands. Congress Office: Biomechanics Section, Institute of Orthopaedics, University of Nijmegen, PO Box 9101, 6500 HB Nijmegen, The Netherlands. Tel: +31-80-613366; Fax: +31-80-540555.

August 9-11, 1994

International Congress on Applied Research in Sports, Helsinki, Finland. Contact: The Finnish Society for Research in Sport and Physical Education, Stadion, torniporras, SF-00250 Helsinki, FINLAND.

August 21-26, 1994

World Congress on Medical Physics and Biomedical Engineering. Rio de Janeiro, Brazil. Secretariat: Congrex do Brasil S/A, 20040-030 Rio de Janeiro RJ, Brazil. Tel: +55-21-224-6080; Fax: +55-21-231-1492.

July 2-6, 1995

XVth Congress of the International Society of Biomechanics. Jyväskylä, Finland. Contact: XVth ISB Congress, Jyväskylä Congresses, P.O. Box 35, FIN-40351 Jyväskylä, FINLAND.

EDITOR'S NOTE

This Newsletter is published quarterly: February-March (Spring); May-June (Summer); August-September (Autumn), and November-December (Winter). Deadlines for material and articles are the first day of each first named month, and the Newsletter is mailed to members early in the second named month.

Members can submit *Letters, Special Articles, Affiliate Society News, Laboratory Features, Reports, or Announcements of Meetings, Conferences, and Jobs Available*. Also, *Short Abstracts* from biomechanics society meetings and *Thesis Abstracts* can be published. In special circumstances a complete edition of the Newsletter can be devoted to the publishing of a Society's "Proceedings".

Submitted material must be in letter-quality print and computer scannable, or on a computer disk as a text-only file, and in English. Graphics or complex equations must be in camera-ready art form, and photographs must be black and white.

Society abstracts should not be more than 250 words in length. They should be submitted with full details of the conference, and accompanied by any conference or society logos which could be printed as well.

Thesis abstracts should be submitted with full details of: Title, Student's Name, Department, Name of Degree and Conferring Institution, together with Supervisor's Name.

Thesis abstracts should not be more than one Newsletter page in length.

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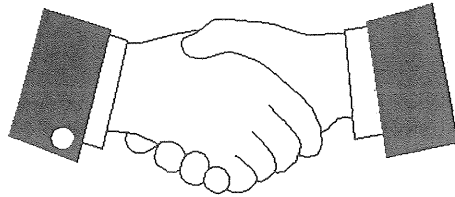
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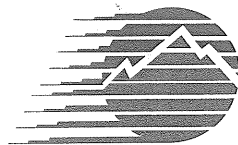
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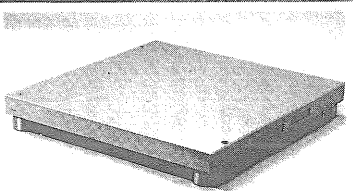
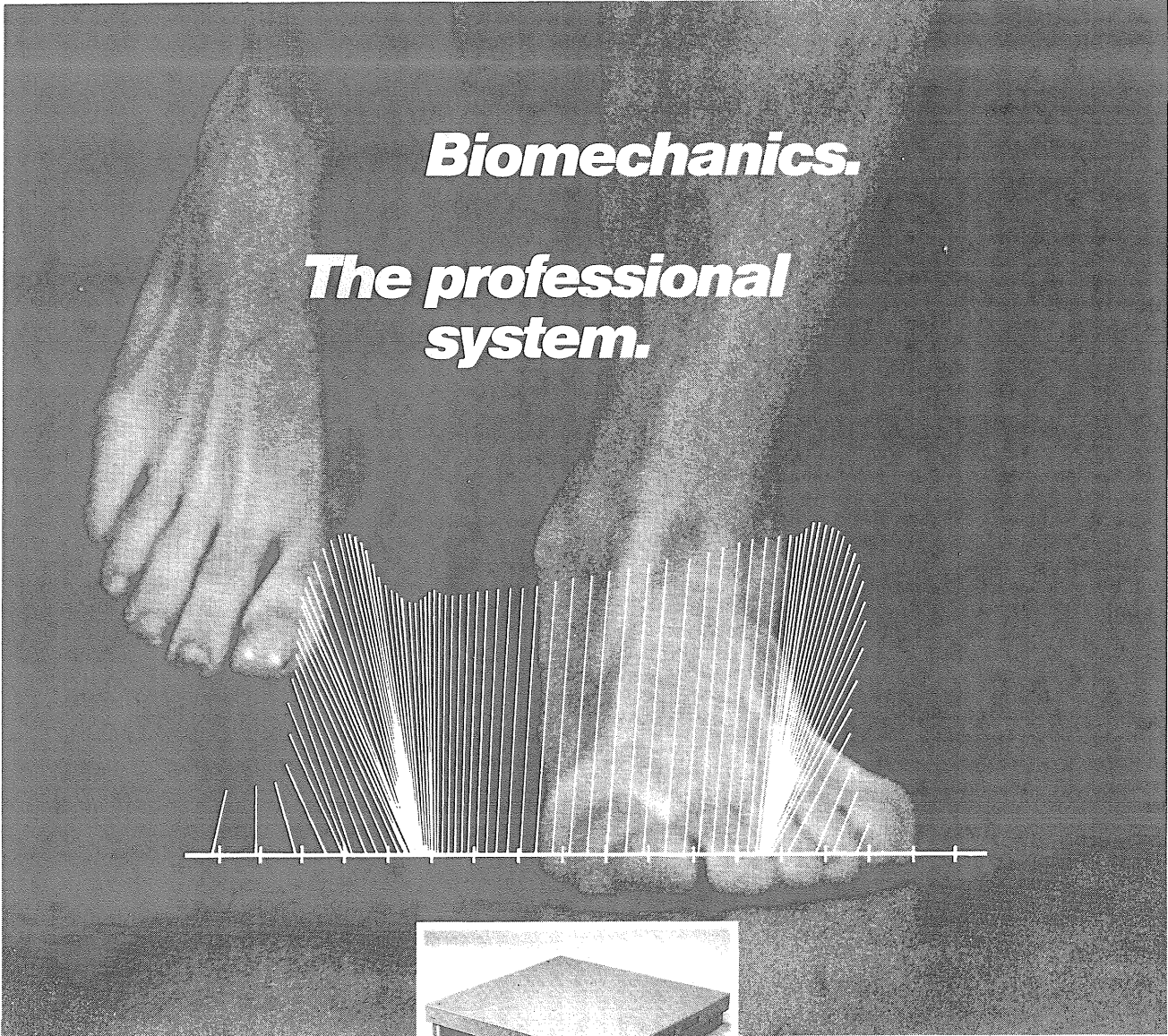


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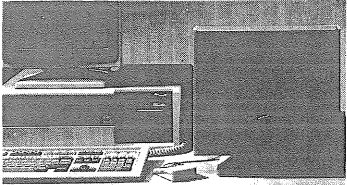
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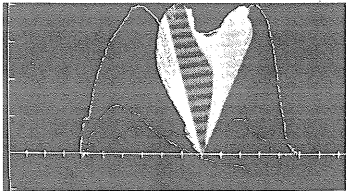
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