Welcome to the final issue of Ergonomics Australia for 1997 - hopefully it will reach you just as things are quieting down (if they do for you) and you can engage in some relaxed contemplation of matters ergonomic. It contains the usual assortment of news, views, and professional development resources, see especially the president’s message and Michael Patkin’s semi-regular thought provocation.

The issue has a physical flavour. Two major reports have recently been released in the USA, and summaries are contained in this issue (the full text is available electronically). The first, titled “Musculoskeletal Disorders (MSDs) and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back” released by NIOSH is, as the title suggests, a review of epidemiologic research. In the foreword to the document, the director of NIOSH (Linda Rosenstock) describes it as “...the most comprehensive compilation to date of the epidemiologic research on the relation between selected MSDs and exposure to physical factors at work.” and concludes that “... a large body of credible epidemiologic research exists that shows a consistent relationship between MSDs and certain physical factors, especially at higher exposure levels”. Of course the importance of the document is more political than scientific - perhaps someone should draw it to the relevant Australian
minister’s attention.

The second report is by the US General Accounting Office. The GAO is the investigative arm of the US Congress and is charged with examining all matters relating to the receipt and disbursement of public funds. In August, the GAO released a 140 page report which describes the results of an analysis of 5 case studies of private sector ergonomics programs - interesting reading indeed. The conclusion?

“Officials at all the facilities we visited believed their ergonomics programs yielded benefits, including reductions in workers' compensation costs associated with MSDs. These facilities could also show reductions in overall injuries and illnesses as well as in the number of days injured employees were out of work; in some cases, however, the number of restricted workdays increased as a result of an increased emphasis on bringing employees back to work. Facility officials also reported improved worker morale, productivity, and product quality, although evidence of this was often anecdotal.”

**Ergonomics Australia On-Line**

The download statistics for the first nine months of the electronic version of the journal are presented below. The steady increase is pleasing, only time will tell whether it continues.

![Graph showing EAOL Monthly Downloads (Feb-Oct 97)](http://www.uq.edu.au/eaol/dec97/dec97.html)

**Download statistics for EAOL index page by month.**

Finally, my very best wishes to all. Thanks for your support during my first year as EA editor. Please remember that contributions are always welcomed.

Robin Burgess-Limerick

Email: [robin@hms.uq.edu.au](mailto:robin@hms.uq.edu.au)
President’s Message

Dear Fellow Ergonomes

My apologies for not contributing any notes to the last two issues of EA, it's certainly not through lack of interest. By the time you read this the annual conference and AGM will have come and gone, and soon it will be time to start thinking about Melbourne in 1998. And on the subject of conferences, a generous donation from the WA branch enabled me to go to Kuala Lumpur in early November for the 5th South-East Asian Ergonomics Society (SEAES) Conference. A report on the conference is published elsewhere in this issue of EA so I won't repeat myself here, except to say that it was well worth the time and cost. Prior to the conference I attended the society's triennial general meeting - we often complain about lack of communication between people in different states in this country, but going to the TGM (it can't be an AGM, can it?) brought home vividly the problems of running a society that is spread across south-east Asia and beyond, and thus comprises members of many different nationalities. Most of the members are based in Indonesia and Malaysia, with sizeable numbers in the Philippines, Australia, Thailand and Japan; total membership is about 120. Graham Bates (of Curtin University) and Ian Mitchell have been doing some work on SEAES's constitution and this will be continued by the newly elected council (who will be in office until 2000). The new President and Secretary/Treasurer are based in Singapore (Dr Lim Kee Yong and Linda Herman, respectively) and I have been elected as one of the 5 ordinary council members, which I hope will help ESA to become more closely associated with ergonomic developments in IDCs and other countries in the region. I am very excited by the keeness of the new council to spread the ergonomic message throughout the region - one new initiative is to get a newsletter going in the new year - and I would like to warmly encourage ESA members to join SEAES; the annual subscription is only $US10. Please feel free to contact me for further information (my Email address is in the new membership directory).

It was good to meet Margaret Bullock at the SEAES conference; she ably chaired a panel discussion on Ergonomics Education and Training and gave a clear review of the IEA's work on core competencies for ergonomists, which parallels the sterling work done by Jim Carmichael and his Standing Committee for ESA. Margaret was nominated by ESA for Presidency of the IEA, but was just "pipped at the post" in the final round of voting by Ian Noy of Canada; I hope that she stands again in three years time.

In the June issue of EA I referred to the BHP Steel Awards - it was a privilege to be a member of the judging panel and we were greatly impressed by the quality of the entries. Selection of the winners was a most difficult task - I left for holiday in New Zealand immediately after the awards presentation in Newcastle in mid-September and don't know how much publicity the event received outside the local area. BHP hasn't had a very good press recently but I believe the company deserves due credit for fostering innovation in the use of steel, and I hope the awards received widespread publicity. We in the west were parochially pleased, nay proud, that the award for excellence in the architectural use of steel went to the designer of the tree-top walk, near Walpole in WA's south-west - well worth a visit for those attending the 1999 conference in Perth, but why wait until '99? In my
last message I also referred to the fact that, while BHP includes an ergonomist on the steel awards judging panel, this practice is by no means universal - I wrote to the organisers of a competition in WA for design students to design a 'commercial executive desking system', expressing concern that the judging panel did not include an ergonomist. So far, I have had no response, but I'll keep trying and hope to report in due course. I would be glad to hear of other people's experiences (both good and bad) in the area of what can perhaps be called 'public ergonomics', so that we can build up a dossier of supporting examples for use when promoting the wider role of ergonomists.

The February issue of EA will contain reports from the Gold Coast on the conference, Council deliberations, AGM and, hopefully, some more notes from myself. I'm sure our readers will wish to join with me in thanking Robin Burgess-Limerick for his efforts during his first year as editor of EA; congratulations, Robin, for a job well done. Finally, as we come towards Christmas and the end of the year, I would like to thank sincerely my colleagues on the Executive and Council, the Secretariat, Branch office-holders, and many other Society members for their personal support and contributions to the work of the Society. May I wish you and your loved ones a safe and joyous Christmas and a prosperous 1998.

Ian Gibson

Letter to the Editor

Dear Editor

I would like to express a personal opinion on some ergonomic aspects of the new Boeing 777, from the economy class passenger's point of view.

This aircraft was launched by Malaysia Airlines a few months ago as being the latest addition to their fleet, and I flew in one to and from the ASEAN 97 conference in Kuala Lumpur. Now, whilst this aircraft may be the best thing since sliced bread for the crew, it has two major disadvantages, for some passengers at least.

1. It is a wide bodied aircraft with two aisles, two seats along each side and a block of five seats in the middle. Therefore the poor soul in the middle of the centre block has to climb over two people to reach the aisle. Although he/she has the choice of two directions in which to clamber, one seems to be more hemmed in than when one is by the window in eg a Jumbo, where you still have to climb over two people to reach the aisle. The centre person also seems to be in a bit of a no-man's-land when it comes to cabin service, although this is more to do with crew training than simply ergonomics.

2. Each seat is fitted with its own TV screen mounted on the back of the seat in front. It is compact, with a flat screen (adjustable for tilt and brightness) and a good quality display. BUT (a) it does increase the thickness of the seat back, so that when the seat back is partly reclined there is very little room for people in the row behind to squeeze past, and (b) for geriatrics like myself who suffer from presbyopia the screen is at the wrong distance - it is too close for me to be able to
achieve a sharp focus and when I put on my reading glasses I have to lean forward because it is then too far away. I didn't think to bring my computer specs, which are set at a longer distance than for normal reading, but they would have been just about right. I think this is a major ergonomic shortcoming, because there are many people like me (visually, that is) and our number in the population is increasing!

3. The control unit for the audio-visual entertainment system is located in the armrest and its use is clearly described in the manual tucked away in the seat pocket. You have to pull the control unit away from the armrest on what seems to be a rather flimsy cable and I wonder how long it will last before needing repair, it certainly does not appear to be passenger proof. On the plus side, there is the choice of several films (so you don't have to watch the prescribed in-flight movie), lots of music channels, and interactive computer games! You can also make phone calls, either to other passengers or overseas (at $10+ a minute).

I hope other ESA members will join the debate, either for or against my comments on the Boeing 777, or share their views on "consumer" products that have caught their attention.

Yours sincerely

Ian Gibson

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**ESA Council News**

**Membership Directory:**

Because of the change of ESA’s membership year to coincide with the financial year, the Directory for 1997 was published in the latter half of the calendar year (October) instead of the first half as was customary in previous years. This change, however, meant that much of the information in the 1997 edition will be out of date within a few weeks of its publication. For example, the Branches will have had their AGMs and the Committee membership changed; the Society AGM may agree to some Constitutional changes; and so on.

The only way to obviate the problems of a Directory being out of date as soon as it is published is to return to printing it early in the succeeding year. There will still be changes (of people’s addresses, retirements, new SIGs, etc) but at least the bulk of material, such as the Constitution, the Code of Practice, the Guidelines and so on will remain current.

The disadvantage is that the members’ names will be listed late in the year and could change from the next July.

It was recommended to Council that there be no Directory for 1998 but that it await the AGM and the Branch Committee changes for printing early in 1999. Instead of taking a decision, Council resolved to ask for membership opinions via the medium of Ergonomics Australia. · Do you want another Directory printed in early 1998? (Obviously soon after the 1997 edition it will be very expensive and an additional charge in this financial year.) · Are you agreeable to waiting until
early 1999? (15 months away but up-to-date)· Would you prefer to receive the next Directory late in 1998? (This will not include any changes made in the 1998 AGM)

If you have any views on when the next Directory should be printed, please advise the Council, through the Secretariat? If your ideas are received before the end of the year, they can be collated and considered at the first Council meeting in 1998.

Monitoring Government Performance

At its May meeting the Council discussed a project which would monitor the Government's performance on regulating and administering legislation on children's playground equipment.

Initially Margaret Head, Chair of the ACT Branch volunteered to convene the group to develop this project but has advised that she is unable to continue due to other pressures.

At the last Council meeting, it was agreed to call for volunteers to continue the program. Margaret is willing to assist anyone who will take on the project.

Any volunteers please? Talk to Margaret; contact your Councillor; then notify the Secretariat. Thanks in advance to the thousands who will accept the challenge.

Ian Mitchell

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Executive Officer: Ian Mitchell
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IEA News: Ergonomics International

IEA 2000

Put IEA 2000 on your calendar. It is 29 July-4 August 2000 in San Diego, California, USA. It will be held in conjunction with the 44th annual meeting of the HFES at the San Diego Marriott. For information, contact IEA/HFES 2000, HFES, PO Box 1369, Santa Monica, CA 90406-1369, USA; Email: HFES@compuserve.com
Liberty Mutual prize

The Liberty Mutual Group, in conjunction with the International Ergonomics Association, has established an annual Liberty Mutual Prize recognising laboratory, field, or invention research that promotes understanding of ways to avoid or mitigate occupational accidents or ways to promote rehabilitation and return to work. Relevant disciplines include, but are not limited to, ergonomics, epidemiology, biomechanics, cognitive and behavioural psychology, design, physiology, anatomy, economics, and optimisation. The annual prize is $5000; every third year the three previous winners will be evaluated and ranked, and the best entry will receive the Liberty Mutual Research Prize Medal in Ergonomics and Occupational Safety and an additional $15,000 prize. The 1st prize of $5000 will be awarded in Capetown, South Africa in September 1998. The submission deadline is 1 April 1998. Applications should be accompanied by a 30 page report. For information, contact Martin Helander, Division of Industrial Ergonomics, Linkoping institute of Technology, S-581 83 Linkoping, Sweden. email: mahel@ikp.liu.se.

Hospital ergonomics

An IEA Technical Group on "Hospital Ergonomics" is being formed. Topics of interest include:
* hospital technical design (buildings and layout, operation rooms, technical departments)
* hospital organizational design
* hospital furniture design
* hospital computerization design
* hospital worker's health
* quality of hospital services.
The group will work only through email. Contact: Francois Daniellou; email: francois.daniellou@ergo.u-bordeaux2.fr

Teaching material

An IEA Task Force has been formed on "Internet Ergonomics Education". If anyone knows of any ergonomics teaching material on the Internet (or conventional media such as CD-ROM), please send the information concerning the information (including address) to: Johannes Springer, Inst. of Industrial Engineering and Ergonomics, Aachen Univ. of Technology, Bergdriesch 27, D- 52062, Aachen Germany; Email: j.springer@iaw.rwth-aachen.de

Ergonomics Checkpoints

Ergonomics Checkpoints, prepared by the Int. Labour Office in collaboration with the IEA, has 128 checkpoints in a 273 page book, divided into:
* Material handling and storage
* Hand tools
* Productive machine safety
* Improving workstation design
* Lighting
* Premises
* Control of hazardous substances and agents
* Welfare facilities
* Work organization

Each checkpoint indicates an action, why it is necessary and how to carry it out. The concept that many ergonomics concepts require little capital cost has been validated by use of Ergonomics Checkpoints in Thailand, Indonesia, Iran, Tanzania and South Africa. Contact: ILO Publications, ILO, CH 1211, Geneva 22, Switzerland; email: publns@ILO.org

Warnings

The American National Standards Institute (ANSI) has updated their standards on Safety Signs and Colors. The revised standards are: Z535.1 Safety Color Code ($40)
Z535.2 Environmental and Facility Safety Signs ($40)
Z535.3 Criteria for Safety Symbols ($80)
Z535.4 Product Safety Signs and Symbols ($40)
Z535.5 Accident Prevention Tags (for Temporary Hazards) ($40)

Postpaid copies (shipping charge is extra) can be obtained (Visa and Mastercard are accepted) from NEMA Customer Service, 1300 N. 17th Street, Rosslyn VA 22209 USA; Email: jim_hoy@NEMA.org

STEPHAN KONZ

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Branch News

NSW

1997 has been a good year for the NSW Branch which has enjoyed a lively and co-operative committee and a varied and well attended series of meetings. It has been a feel good year all round as more people interact and there is a growing sense of corporate achievement within ESA at large. The PAB and Competence activities have heightened the sense of direction in what remains a very diverse group of people coming from many basic disciplines. While there is much contemporary talk of multi-disciplinary approaches in various situations, perhaps ergonomists represent a genuine experiment in this type of trans-disciplinary professionalism and are at last starting to feel comfortable and confident in their role.

The Annual General Meeting and Dinner of NSW Branch will be held on November 19 at the Rattlesnake Grill, Neutral Bay where it is hoped to build on past successful events of this nature. As there seems to be a growing number of enthusiastic people willing to offer, rather than be dragooned, into serving on the committee, there is no need to indulge in evasive action for an AGM!

Best wishes to Queensland for a successful 1997 Conference and Season's Greetings to all. May 1998 be a marvellous year for everyone!
Shann Gibbs
NSW Correspondent

Professional Affairs Board News

Although it’s been some time since I last wrote, we have not been idle. The Committee (or the Board — I’m never quite sure of what to call us) has achieved several major advances during its first year of office. The following matters will, I hope, be of interest to you and some of you will be vitally as well as professionally concerned. There are two sets of issues about which I’d like to advise you: Those about which the Board has already decided after input from CPEs and those about which we feel quite positive but would like feedback and suggestions from you before progressing.

The matters already decided:

1. Recertification or certification maintenance: For the many of us who are due or overdue for Recertification, the final format and point scoring system has been decided and your triennial return will be due early next year. If you haven’t already received the request for completion of the required information you will be receiving it shortly. Obviously, it will be a much less onerous task to complete the information if we keep annual records of our performance and output in the various categories of activity that are weighted.

2. Professional Certification Application Forms: The main application form has been redesigned to accommodate the same criteria as are specified for recertification. One of the major complaints about the original form was that it did not give enough guidance to applicants or their referees about the criteria for certification. We have now spelled these out in exactly the same terms as for recertification, with the requirements for the initial application actually matching those for recertification with the one exception that new applicants are allowed five years to accumulate the required 60 points which CPEs seeking recertification must accumulate in three years. The other requirements remain the same.

3. An appeal mechanism in the case of rejection of recertification: Federal Council has endorsed our suggestions for an appeal mechanism in the unlikely event that a CPE’s application for recertification is rejected. Ultimately, if the PAB could not be satisfied by the application, the appeal would be considered by a specially convened committee of Council, chaired by the President of the ESA.

The matters still under consideration:

1. For some time Stephen Hehir and Gerard Hendricks, two of our Victorian CPEs have been collecting and evaluating various sets of professional society disciplinary/professional ethics rules and guidelines, and are hoping to have a draft for our and subsequently Council’s consideration before the end of the year. The disciplinary procedures currently incorporated in our Code of Practice, which was compiled without regard to the CPE category of membership, are recognised as inadequate to cope with such issues as, for example, dissatisfaction expressed by a client about the professional performance of a CPE. We look forward to discussing
Stephen and Gerard’s information over the next couple of months.

2. The role of CPEs within the Society: Increasingly there is an expectation that CPEs, as well as deriving greater benefit by virtue of their perceived status as ergonomists, should be making a proportionally greater contribution to the professional development of the Society. Certainly we can point to such facts as the number of CPEs who are heavily involved in Society affairs at Federal or Branch Committee or other ad hoc committee levels — two Branch chairpersons, two of the last three Society presidents including the incumbent, and two of the last three Newsletter editors, including the incumbent, are CPEs, for example. With only 33 CPEs currently on the register in a total membership of around 600, this is fairly good representation. One suggestion for more direct and personal involvement is that we might actively encourage a “mentoring” program of some kind, with each CPE accepting responsibility for some formal involvement with a “junior” member. What are your thoughts?

3. Obvious presence of the PAB and CPEs at conferences and similar Society functions: I have not made a count of the number of CPEs attending conference or the number of papers or workshops offered by CPEs. There was a comment made at a Federal Council meeting earlier this year that the contribution to the conference by CPEs was somewhat less than might have been hoped for, but I do not know how well founded in fact that comment was. I suppose that, as with many things, appearance is as important as actuality. The thought arising from this is that perhaps at future conferences the PAB might look to offering a full half day program of professionally oriented topics directed towards the general membership. How does the session heading: “How to increase your income from $50,000 to $500,000 a year through truly professional activity” sound? Seriously, we should be able to put together a set of professionally oriented papers based on practical experience and client feedback that would be of immense value to less experienced ergonomists. Suggestions and offers? ....

If you can’t get to conference, have a good Christmas and a prosperous and professionally rewarding new year. Do send me your ideas. All the best.

Neil Adams

Grapevine

From Leon Straker:

"Kim Gurr died on 26th October. Kim was a consultant ergonomist in Perth. Kim was probably in his mid 30s and to my understanding had no forewarning of the heart attack which killed him. His recent postgraduate research work on the Western bias in ergonomics research, using the area of seating as an example, had stimulated international discussion on the assumptions in ergonomics knowledge. He was in the process of preparing several papers on this issue, to follow on from his paper at CybErg 1996 (URL http://www.curtin.edu.au/conference/cyberg/centre/paper/gurr/paper.html). His insights will be sadly missed, especially by the WA Branch."

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Timing, tension, skill, ergonomics and “RSI”

Occasional Essay by Michael Patkin

There is all the difference in the world between a graceful movement which looks relaxed and a movement which is jerky and strained. You see this difference when a weedy-looking person lifts a heavy weight - perhaps a bag of wheat - gracefully, while someone of more mesomorphic build struggles to lift a lighter weight.

During the height of the RSI epidemic in the 1980s, one of my patients was a tense middle-aged middle-European base-grade office worker. With the squeeze on employment at local heavy industry, he was transferred to light labouring work, chipping off the lining of a furnace during a maintenance shut-down.

I saw him because of forearm pain becoming much worse over a couple of weeks. Standard medical examination showed no abnormality, but when I went on to ask him to mime his action with the chipping hammer, his movements were short and stiff, It was obvious he was using excess force to grip, move, and check the hammer, and it seemed due partly to his resentment at doing "dirty" work instead of more sedate work of higher status in an office.

Such excessive muscular action and jerkiness are common features at work, in sport, music, surgery, and other activities, but not when carried out by those who are most skilful. Some years ago I read an article about workers building one of the big American railway lines. The writer reported a skilled fettler describing how he used the recoil of the sledge hammer off the railway spike to lessen the effort to swing it up for the backstroke. He economised on effort. He would have looked graceful, like a skilful paperhanger or glazier, violinist, or tennis-player.

A more familiar example of grace in action is pushing a child on a swing. If you accelerate the swing nicely at the end of its swing, you can get it going high with a few pushes. A shorter child might catch the swing as it swings back, to be lifted off the ground a few inches. (Inches? It just sounds better here than centimetres. We are talking about a primitive gut feeling about human scale, measured in widths of a thumb, not in trillions of the Earth's circumference measured so indirectly by physics and then calculated by atomic vibration).

Here, then, is a definition of one kind of timing. Good timing at work is the application of force at a rate which maximises the transfer of energy from one part of a system, in this case the human operator, to another part of the system, in this case the swing and the child on it. Or it might be a sledge-hammer, or a chipping hammer. Let the hammer, or the axe, "do the work". Let its built-up momentum do the job, and not a jerky shove.

You can measure this skilful speed or rate of increase of acceleration. John Gormley, a sports ergonomist at the University of South Australia, had weight-lifters stand on a force platform and recorded simultaneous EMGs, and found that skilled ones had a consistent pattern of smooth application of force.
This is much of what I identified in the 1980s as a problem of "RSI". Of 133 subjects, either patients or referred for medico-legal assessment, whom I studied for a NIOSH project at that time, 15 had pain with handwriting at work. Thirteen were cured by reducing the force they exerted while handwriting - gripping the pen too hard, pushing it too hard, and "co-contracting" - tensing up agonist and antagonist muscles, like pressing on the accelerator and brake pedals at the same time. You can find this described in the conference proceedings of the IEA in 1988 in Sydney.

There is another aspect of timing I am familiar with from surgery, which refers to structural properties of the material being worked on rather than its inertia. If you are pulling to separate structures along a tissue plane, comparable to the plane for peeling a mandarin but flat or straight rather than curved, all you often have to do is avoid doing it quickly. Do it quickly, and the tissue tears on one or both sides.

Here is a simple illustration. Take an ordinary business card and split one corner a couple of millimetres - or a tenth of an inch. Pull the two corners apart slowly, and you can split the whole card. Do it quickly, and you fail. While you are pulling the two parts slowly apart, hold the card close to one ear. Listen hard, and you will hear a slow crackle, 5 or 10 crackles a second. Then look at the card carefully and you can see little paper fibres across the cleavage plane giving way.

Each fibre takes a finite time, probably measurable in tens or hundreds of milliseconds, to stretch and pull apart. Taken slowly, only a few are being pulled on at any instant. Pull quickly, and the area over which pull is exerted is bigger and there is no longer a clean split. Here is the rationale for good slow timing, whether it is paper, surgical tissue, glass being scored by a glazier, wood being sawn, or some other material being worked on.

The basis for timing might be say, thermal rather than mechanical. Twice in recent years I have dealt with expensive flexor tendon injuries of the fingers (expensive for the patient in terms of weeks off work that is). Each was a novice in a deli told to cut sausage straight out of the frig, when it was hard so the knife skidded off. Ouch.

The basis for timing might be chemical. It takes time to simmer food to taste. It might be the benefit of lathering one's beard, doing something else like tooth-brushing or taking vitamin pills, and then shaving once the bristles are softer. The basis might be biological, like ripening in autumn, or social, like waiting for public opinion to mature in favour of an Australian republic.

I am confident there are other useful aspects of timing to be think about, ones relevant to ergonomics. For example, for a more detailed analysis of timing in operative surgery, see my review in the Annals of the Royal college of Surgeons of Edinburgh for April 1995).

What's the conclusion? Ergonomic models are most often represented as diagrams or other static models. It is true that video systems are now a routine tool for ergonomists, but usually to give a succession of static pictures and not a sense or measurement of rhythm. In another context Einstein referred to time as the fourth dimension. At risk of another bad metaphor like confusing the Heisenberg...
principle of quantum physics with the phony Hawthorne principle beloved of kindly management theorists.

The conclusion here? Time is the fourth dimension for ergonomists. But while you are at it, don't forget the fifth, sixth, and seventh dimensions of Trust, Values, and Belief. Over the holidays you could do worse than read Fukayma on Trust. He's the American writer better known for his book on The End of History, where he may have been wrong.

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**Case Study - Risk Assessment of Maintenance Task**

Robin Burgess-Limerick (The University of Queensland) and Elizabeth Bunker (Elizabeth Bunker & Associates)

These materials were prepared with support from the Tertiary Education Institute of the University of Queensland and the Australian Occupational Health & Safety Trust and are designed for use with advanced undergraduate students. Copyright remains with the authors. Permission is given to use these materials for non-profit educational purposes provided the source is acknowledged. A hypertext version of this case study complete with colour graphics and video clips (if you are patient) is available via [http://www.uq.edu.au/~hmrburge/](http://www.uq.edu.au/~hmrburge/)

This case study begins by describing general manual handling risk factors, before proceeding to an examination of the risks involved in a specific maintenance task.

**GENERAL MANUAL HANDLING RISK FACTORS**

Injuries occur when loads on anatomical structures are either instantly, or over time, greater than the structures can withstand. The general problem with assessing the risks posed by manual tasks is that both the loads on structures, and the capabilities of structures, are difficult to estimate. Biomechanical models are used to estimate loads on anatomical structures (e.g., McGill & Norman, 1985; McGill, 1992; Granata & Marras, 1993), mechanical testing of cadaveric specimens is used to estimate capabilities (e.g., Adams et al., 1994; Adams & Dolan, 1995), and epidemiological data is used to infer the links by assessing the relationship between tasks and subsequent injuries (e.g., Marras et al., 1993). The outcome of this research is an incomplete knowledge of the mechanisms of injury and contributing factors (e.g., McGill & Norman, 1993).

Manual handling typically requires large joint moments to manipulate the loads involved. The joint moments in turn require large amounts of tension in muscle, tendon, and ligaments, and cause large compressive and shear forces between the bony structures of the vertebral column.

The postures in which loads are handled contributes to the risk of injury in a number of ways. If forces are applied at a large horizontal distance from the body the moments, and thus the muscle forces required, are much greater. Moderate forward inclination of the trunk (trunk flexion) places the centre of gravity of the trunk some distance from the base of the spine which thus requires muscular effort
to maintain against gravity. Extreme trunk flexion, in addition, places some ligaments of the back (the posterior interspinous ligaments) in tension which increases the chance of strain. Extreme trunk flexion also reduces the compressive strength of the lumbar vertebral bodies. Other postural risk factors identified by epidemiological research include lateral and rotational movements.

Acute, sudden injury can occur, particularly in muscles, tendons, or ligaments, if a large load is rapidly applied which causes forces greater than the structures can withstand. More commonly, injuries occur slowly, over long periods of time. The mechanism for causation of these injuries is believed to be microdamage to anatomical structures caused by the forces involved. The body is normally able to repair this damage, resulting in stronger tissues (this is the mechanism by which strength gains occur with weight training). However, if the microdamage accumulates faster than the body is able to repair it, injury occurs. Frequency of lifting, and exposure to manual handling in general, is thus a strong predictor of injury.

Other risk factors which contribute to cumulative damage include whole body vibration, and prolonged muscular contraction in the absence of movement (isometric contractions). Isometric contractions occur when muscles are contracted to maintain a static position against some force, often gravitational. In this situation blood flow through the tissues is restricted and fatigue occurs if the contraction is prolonged. Wearing of protective equipment, especially gloves, increases the muscular effort required to apply force.

Individuals differ widely in the strength of their bones, muscles, tendons and ligaments, and in their capacity to repair damage. This, in part, accounts for the difficulty in predicting with any accuracy the likelihood of injury to any particular person.

AN EXAMPLE

The task takes place on top of a scrubber plant where airborne contaminants (an unwanted by-product of a minerals process) are removed. The air is filtered by being passed through five metre long filter bags which are suspended from in cassettes at the top of the scrubber plant. A cassette is pictured below being lifted from the top of the scrubber plant by an overhead crane.

These filter bags are held in place by wire cages which fit inside the filter bags. The filter bags deteriorate and periodically require replacement, a task which
involves considerable manual handling.

Pulling Cages

After the cassette has been moved, each individual cage is lifted from the cassette manually. Each cage is gasped by bending to place one hand within the cage (below the level of the feet). Various postures are adopted involving varying degrees of trunk flexion. In general the postures adopted to lift the cages involve a moderate degree of knee flexion. The cage is lifted very rapidly as the worker extends knee, hip, and trunk.

Although the mass of the cage is not large (6 kg), the inertial forces which accompany the large accelerations involved result in large joint moments, and consequently, large muscle forces and lumbar vertebral compressive and shear forces. Microdamage to vertebral structures is caused by such forces and this may lead to injury if the microdamage accumulates faster than the body is able to repair it.

Grasping the cages tightly with the gloved hands requires large forces to be produced, and maintained isometrically, by the small intrinsic muscles of the hand and larger long finger flexors. The finger flexors are muscles of forearm which cross the wrist and provide the majority of power for the hand grip. Frequent, high force hand grip requirements are likely to result in local muscle fatigue and subsequent injury, especially if exacerbated by gloves or awkward wrist postures.

The function of the rapid initial lifting movement is to allow the worker to impart sufficient velocity to the cage to allow time to stand and grasp the cage again in preparation for continuing to lift the 5m cage. Two techniques are adopted to lift the cages from this point. The first involves a continuous cyclic hand-over-hand movement of the arms, while the second involves both hands simultaneously lifting the load in a series of steps. The hand over hand method reduces the accelerations (and thus the resultant force and any point in time) required by maintaining the cage moving continuously. However, force is applied to the cage through one hand at a time rather than two, and the trunk is loaded asymmetrically because of the out
of phase movement of the upper limbs.

Either method involves sustained isometric contractions of the back muscles which is likely to lead to fatigue with repeated lifting. The load on the shoulders, although dynamic in some cases rather than static, is considerable, and may cause shoulder fatigue and subsequent injury.

Sometimes the cages unexpectedly jam early in the lift, and workers jerk the cage, rapidly exerting maximal forces whilst in the full flexed posture in an attempt to dislodge the cage. Such rapid high force movements have potential to cause acute injury to paravertebral ligaments and muscles, as well as contribute to cumulative damage to these, and other, structures. Given the large number of cages involved, lifting these cages is very likely to contribute to musculoskeletal injuries, especially of the back, hands, and forearms.

After the worker has tried without success to lift a cage, a 11 kg jack with long lever arm is employed to apply greater forces. Using the jack is a source of injury risk. The jack is an awkward object which must be manipulated into position (and removed after use) while the worker is in a posture of extreme vertebral flexion. As with other manual handling tasks, the forces involved are likely to contribute to cumulative damage to the vertebral structures.

Once the jack is in place the worker exerts large downward forces using the abdominal, shoulder, and arm muscles. If the forces are large, and applied very quickly, there is a risk of acute muscles, tendon, or ligament strain. In addition, the forces are exerted from a posture involving extreme trunk flexion which must be maintained by sustained isometric contraction of the back muscles contributing to local muscle fatigue.
After being lifted, the cages are shaken to remove dust from the lower end. This task involves sustained isometric contraction of the back muscles while the shoulders provide the large forces necessary to maintain the 5 m cage balanced while being shaken with sufficient vigour to dislodge the dust. The cages are then stacked vertically at one side of the cassette. Apart from the fatigue caused by isometric contraction, and cumulative damage caused by the loads on vertebral structures, this task component also poses a risk of acute damage to structures should any unexpected perturbation (e.g., wind or, slipping) occur which requires the worker to exert maximal forces to maintain balance of the cage.

Placing new bags in the cassette involves the worker performing fine motor tasks at floor level for extended periods involving extreme trunk flexion (durations from 10 - 30 seconds were observed). Extremely flexed trunk postures place the posterior longitudinal ligaments of the back in tension. Biological tissues differ from many engineering materials in that they are viscoelastic, and their properties change with changes in the rate of loading. Sustained extreme flexion positions effectively load the ligaments with a slow rate of change and the ligaments continue to stretch during this loading. There is some evidence that the integrity of the spine is temporarily impaired by this stretching, and consequently the spine may be at increased risk of injury after a period of extreme flexion.
After the bags are replaced the cages are carefully lowered into the cassette. This care is required to avoid tearing of the bags. While the task involves manual handling, the load is held close to the body, and can be achieved for the most part without bending. However, the task involves significant backward neck bending (extension) to view the upper end of the cage while it is being disengaged from the stack, and then lowered. Prolonged or repeated neck extension is associated with discomfort and injury.

In summary, the largest risks of acute injury due to the manual handling involved are associated with the large forces employed in attempting to release jammed cages by jerking upwards from a flexed posture. There are a large number of risks of cumulative injury, the most important of which is the frequent rapid lifting of cages from a extreme flexed posture.

References


Musculoskeletal Disorders (MSDs) and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back

U.S. National Institute for Occupational Safety and Health, Cincinnati, OH

July 1997

Edited by: Bruce P. Bernard, M.D., M.P.H.

Complete document available in both HTML and PDF format from http://www.cdc.gov/niosh/ergosci1.html

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EXECUTIVE SUMMARY

The term musculoskeletal disorders (MSDs) refers to conditions that involve the nerves, tendons, muscles, and supporting structures of the body. The purpose of this NIOSH document is to examine the epidemiologic evidence of the relationship between selected MSDs of the upper extremity and the low back and exposure to physical factors at work. Specific attention is given to analyzing the weight of the evidence for the strength of the association between these disorders and work factors.

Because the relationship between exposure to physical work factors and the development and prognosis of a particular disorder may be modified by
psychosocial factors, the literature about psychosocial factors and the presence of musculoskeletal symptoms or disorders is also reviewed. Understanding these associations and relating them to the cause of disease is critical for identifying exposures amenable to preventive and therapeutic interventions.

MAGNITUDE OF THE PROBLEM

The only routinely collected national source of information about occupational injuries and illnesses of U.S. workers is the Annual Survey of Occupational Injuries and Illnesses conducted by the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor. The survey, which BLS has conducted for the past 25 years, is a random sample of about 250,000 private sector establishments and provides estimates of workplace injuries and illnesses on the basis of information provided by employers from their OSHA Form 200 log of recordable injuries and illnesses.

For cases involving days away from work, BLS reports that in 1994 (the last year of data available at the time this report was prepared) approximately 705,800 cases (32%) were the result of overexertion or repetitive motion. Specifically, there were:

- 367,424 injuries due to overexertion in lifting (65% affected the back);
- 93,325 injuries due to overexertion in pushing or pulling objects (52% affected the back);
- 68,992 injuries due to overexertion in holding, carrying, or turning objects (58% affected the back).

Totaled across these three categories, 47,861 disorders affected the shoulder.

- 83,483 injuries or illnesses in other and unspecified overexertion events.
- 92,576 injuries or illnesses due to repetitive motion, including typing or key entry, repetitive use of tools, and repetitive placing, grasping, or moving of objects other than tools. Of these injuries or illnesses, 55% affected the wrist, 7% affected the shoulder, and 6% affected the back.

Data for 1992 to 1995 indicate that injuries and illnesses requiring days away from work declined 19% for overexertion and 14% for repetitive motion. The incidence rate of overexertion (in lifting) declined from 52.1 per 10,000 workers in 1992 to 41.1 in 1995; the incidence rate for repetitive motion disorders declined from 11.8 per 10,000 workers in 1992 to 10.1 in 1995. These declines are similar to those seen for cases involving days away from work from all causes of injury and illness.

The reasons for these declines are unclear, but may include: a smaller number of disorders could be occurring because of more intensive efforts to prevent them, more effective prevention and treatment programs could be reducing days away from work, employers or employees may be more reluctant to report or record disorders, or the criteria used by health care providers to diagnose these conditions could be changing.

IDENTIFICATION AND SELECTION OF STUDIES

The goal of epidemiologic studies is to identify factors that are associated (positively or negatively) with the development or recurrence of adverse medical conditions. This evaluation and summary of the epidemiologic evidence focuses
chiefly on disorders that affect the neck and the upper extremity, including tension neck syndrome, shoulder tendinitis, epicondylitis, carpal tunnel syndrome, and hand-arm vibration syndrome, which have been the most extensively studied in the epidemiologic literature. The document also reviews studies that have dealt with work-related back pain and that address the way work organizational and psychosocial factors influence about the relationship between exposure to physical factors and work-related MSDs. The literature about disorders of the lower extremity is outside the scope of the present review.

A search strategy of bibliographic databases identified more than 2,000 studies. Because of the focus on the epidemiology literature, studies that were laboratory-based or focused on MSDs from a biomechanical standpoint, dealt with clinical treatment of MSDs, or other non-epidemiologic orientation were eliminated from further consideration for this document. Over 600 studies were included in the detailed review process.

METHODS FOR SYNTHESIZING STUDIES

For the upper extremity studies included in this review, those which used specific diagnostic criteria, including physical examination techniques, are given greater consideration than studies that used less specific methods to define health outcomes. The review focused most strongly on observational studies whose health outcomes were based on recognized symptoms and standard methods of clinical examination. For completeness, those epidemiologic studies that based their health outcomes on reported symptoms alone were also reviewed. For the low back studies included in this review, those which had objective exposure measurements were given greater consideration than those which used self-reports or other measures. For the psychosocial section, any studies which included measurement or discussion of psychosocial factors and MSDs were included.

No single epidemiologic study will fulfill all criteria to answer the question of causality. However, results from epidemiologic studies can contribute to the evidence of causality in the relationship between workplace risk factors and MSDs. The framework for evaluating evidence for causality in this review included strength of association, consistency, temporality, exposure-response relationship, and coherence of evidence.

Using this framework, the evidence for a relationship between workplace factors and the development of MSDs from epidemiologic studies is classified into one of the following categories:

Strong evidence of work-relatedness (+++). A causal relationship is shown to be very likely between intense or long duration exposure to the specific risk factor(s) and MSD when the epidemiologic criteria of causality are used. A positive relationship has been observed between exposure to the specific risk factor and MSD in studies in which chance, bias, and confounding factors could be ruled out with reasonable confidence in at least several studies.

Evidence of work-relatedness (+). Some convincing epidemiologic evidence shows a causal relationship when the epidemiologic criteria of causality for intense or long duration exposure to the specific risk factor(s) and MSD are used. A
positive relationship has been observed between exposure to the specific risk factor and MSD in studies in which chance, bias, and confounding factors are not the likely explanation.

Insufficient evidence of work-relatedness (+/0). The available studies are of insufficient number, quality, consistency, or statistical power to permit a conclusion regarding the presence or absence of a causal association. Some studies suggest a relationship to specific risk factors but chance, bias, or confounding may explain the association.

Evidence of no effect of work factors (-). Adequate studies that consistently show that the specific workplace risk factor(s) is not related to development of MSD.

The classification of results in this review by body part and specific risk factor are summarized in Table 1.

### Table 1. Evidence for causal relationship between physical work factors and MSDs

<table>
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<tr>
<th>Body part</th>
<th>Strong evidence (+++)</th>
<th>Evidence (+)</th>
<th>Insufficient evidence (+/0)</th>
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<td>Neck and Neck/shoulder</td>
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<td>Hand/wrist</td>
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<td>Carpal tunnel syndrome</td>
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CONCLUSIONS

A substantial body of credible epidemiologic research provides strong evidence of an association between MSDs and certain work-related physical factors when there are high levels of exposure and especially in combination with exposure to more than one physical factor (e.g., repetitive lifting of heavy objects in extreme or awkward postures) [Table 1].

The strength of the associations reported in the various studies for specific risk factors after adjustments for other factors varies from modest to strong. The largest increases in risk are generally observed in studies with a wide range of exposure conditions and careful observation or measurement of exposures.

The consistently positive findings from a large number of cross-sectional studies, strengthened by the limited number of prospective studies, provides strong evidence (+++ for increased risk of work-related MSDs for some body parts. This evidence can be seen from the strength of the associations, lack of ambiguity in temporal relationships from the prospective studies, the consistency of the results in these studies, and adequate control or adjustment for likely confounders. For some body parts and risk factors there is some epidemiologic evidence (++) for a causal relationship. For still other body parts and risk factors, there is either an insufficient number of studies from which to draw conclusions or the overall conclusion from the studies is equivocal. The absence of existing epidemiologic evidence should not be interpreted to mean there is no association between work factors and MSDs.

In general, there is limited detailed quantitative information about exposure-disorder relationships between risk factors and MSDs. The risk of each exposure depends on a variety of factors such as the frequency, duration, and intensity of physical workplace exposures. Most of the specific exposures associated with the strong evidence (+++ involved daily whole shift exposure to the factors under investigation.

Individual factors may also influence the degree of risk from specific exposures. There is evidence that some individual risk factors influence the occurrence of MSDs (e.g., elevated body mass index and carpal tunnel syndrome or a history of past back pain and current episodes of low back pain). There is little evidence, however, that these individual factors interact synergistically with physical factors. All of these disorders can also be caused by nonwork exposures. The majority of epidemiologic studies involve health outcomes that range in severity from mild (the
workers reporting these disorders continue to perform their routine duties) to more severe disorders (workers are absent from the workplace for varying periods of time). The milder disorders are more common. A limited number of studies investigate the natural history of these disorders and attempt to determine whether continued exposure to physical factors alters their prognosis.

The number of jobs in which workers routinely lift heavy objects, are exposed on a daily basis to whole body vibration, routinely perform overhead work, work with their necks in chronic flexion position, or perform repetitive forceful tasks is unknown. While these exposures do not occur in most jobs, a large number of workers may indeed work under these conditions. The BLS data indicate that the total employment is over three million in the industries with the highest incidence rates of cases involving days away from work from overexertion in lifting and repetitive motion. Within the highest risk industries however, it is likely that the range of risk is substantial depending on the specific nature of the physical exposures experienced by workers in various occupations within that industry.

This critical review of the epidemiologic literature identified a number of specific physical exposures strongly associated with specific MSDs when exposures are intense, prolonged, and particularly when workers are exposed to several risk factors simultaneously. This scientific knowledge is being applied in preventive programs in a number of diverse work settings. While this review has summarized an impressive body of epidemiologic research, it is recognized that additional research would be quite valuable. The MSD components of the National Occupational Research Agenda efforts are principally directed toward stimulation of greater research on MSDs and occupational factors, both physical and psychosocial. Research efforts can be guided by the existing literature, reviewed here, as well as by data on the magnitude of various MSDs among U.S. workers.

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**Worker Protection: Private Sector Ergonomics Programs Yield Positive Results**

US General Accounting Office

The US General Accounting Office is the investigative arm of the US Congress and is charged with examining all matters relating to the receipt and disbursement of public funds. In August 1997 the GAO released a 140 page report which describes the results of an analysis of 5 case studies.

The complete paper is available in text and PDF from [http://www.gao.gov/AIndexFY97/abstracts/he97163.htm](http://www.gao.gov/AIndexFY97/abstracts/he97163.htm). For paper version you could try fax: 202 512 6061, or PO Box 37050 Washington DC 20013.

**Results in Brief**

Experts, research literature, and officials at our case study facilities generally agreed that effective ergonomics programs must have the following core set of elements to ensure that ergonomic hazards are identified and controlled to protect workers: management commitment, employee involvement, identification of problem jobs, development of solutions (that is, controls) for problem jobs, training and education for employees, and appropriate medical management. The literature identifies a wide array of alternatives through which employers can
implement these elements that require varying degrees of effort from employers and employees.

Although the ergonomics programs at all of the case study facilities displayed each of these elements, there was often significant variety in how they were implemented. This variety typically resulted from factors such as differences in the facilities' industries and product line, corporate culture, and experiences during the programs' evolution. Also, the processes used by the case study facilities to identify and control problem jobs were typically informal and simple and generally involved a lower level of effort than was reflected in the literature. Controls did not typically require significant investment or resources and did not drastically change the job or operation.

Officials at all the facilities we visited believed their ergonomics programs yielded benefits, including reductions in workers' compensation costs associated with MSDs. These facilities could also show reductions in overall injuries and illnesses as well as in the number of days injured employees were out of work; in some cases, however, the number of restricted workdays increased as a result of an increased emphasis on bringing employees back to work. Facility officials also reported improved worker morale, productivity, and product quality, although evidence of this was often anecdotal. Demonstrating overall program performance was complicated by uncertainties associated with determining what types of injuries should be considered MSDs and analyzing the program's effect on injuries in light of other complicating factors, such as limited information collected by employers on the costs to implement the programs.

Our work revealed that positive results can be achieved through an approach incorporating certain core elements that are implemented in a simple, informal, site-specific manner. Federal and state-operated OSHA programs have undertaken a number of initiatives that can provide employers flexibility, consistent with these case study experiences; however, questions remain as to whether these efforts alone are sufficient to protect employees from ergonomic hazards. Our findings suggest that as OSHA proceeds with its efforts to protect workers from ergonomic hazards, it may be useful for it to consider an approach that sets a framework for a worksite ergonomics program while providing employers the flexibility to implement site-specific efforts and the discretion to determine the appropriate level of effort to make, as long as the efforts effectively address hazards.

PROFESSIONAL INDEMNITY INSURANCE

Available to Members of ESA Inc.

The ESA has recently re-negotiated highly competitive rates with lower policy excess and additional extensions for Professional Indemnity Insurance with international insurance brokers, Aon Professional Services, South Australia. The scheme is open to all ESA Members, Professional members and Life Members but not Affiliates.

Set out below is an example of the competitive rates.
Gross annual income  Annual premium
up to $150,000  $600 + Stamp duty
$150,001 - $250,000  $750 + Stamp duty
$250,001 - $500,000  $1,100 + Stamp duty

Note: The insurer has agreed to allow a 20% discount for part-time practitioners where their income is less than $10,000.

Limit of Indemnity is $1 million, any one claim and $2,000,000 in the aggregate. Cover is also available for a Limit of Indemnity of $2,000,000 to $10,000,000.


For further information and proposal forms contact:

Lynn Parry  
Products & Services  
Ergonomics Society of Australia Inc  Ph: (02) 6242 1951  
Canberra Business Centre  Fax: (02) 6241 2554  
Bradfield St  Email: esa@ozemail.com.au  
DOWNER ACT  2602

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**Professional Development Resources**

A selection of electronic resources.

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Semi-monthly column by Jakob Nielsen, Sun Microsystems Distinguished Engineer.

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**UK Health and Safety Executive** pages.  
In its early stages. Full text of HSE leaflets on Information about Risks at Work and Information about Different Workplaces are being progressively being made available.

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A list of manufacturers of **mouse alternatives** - adaptive or ergonomic devices for controlling cursor/pointer location on a computer screen,  
[http://www.ics.com/~diana/mouse.htm](http://www.ics.com/~diana/mouse.htm) maintained by Diana Carroll
The Complete Guide To The Alexander Technique -
http://www.alexandertechnique.com/

see also http://www.axess.com/feld/felden.html

Greg Hart - Human Effort Calgary, Alberta, Canada
http://www.humaneffort.com/research.html

Papers titled:
SYSTEMS LEADERSHIP & MACROERGONOMICS: An Effective
Interdisciplinary Matrix For Prevention And Management Of Injury

The Role of Quantitative Biomechanics in Understanding and Preventing
Pathological Adaptations to Cumulative Work in the Upper Limbs

Being Human: Approaching the Human Context

http://disability.com/ - Linking people with disabilities and chronic health
conditions to resources, products and services that promote active, healthy,
independent living.

Art Kuo's page (http://www-personal.engin.umich.edu/~artkuo/) has PDF preprints
of recent papers and presentations on state of the art Biomechanics and its interface
with movement control and coordination. Applications in the are of falls, especially
in elderly.

Ergonomic Test of Two Hand-Contoured Mice
Wanda Smith, Bob Edmiston, and Dan Cronin
Global Ergonomic Technologies, Inc.,
Palo Alto, CA
http://www.contourdes.com/ergotest.htm

Ergonomic Analysis of a Telemarketing Operation
http://www.ergo.engin.com/chadwick.html
Robert O. Andres, Ph.D., CPE, David D. Wood, M.S.I.E & Nancy E. Laurie,
M.S.

http://turva.me.tut.fi/cgi-bin/wilma/erghf
Extensive Ergonomics/Human factors links maintained by Institute of
Occupational Safety Engineering at the Tampere University of Technology,
Finland
Links to resources related to keyboards
http://www.dmb-ergonomics.com/resource.htm

NIOSH publications are available at http://www.cdc.gov/niosh/pubs.html

In particular:

Ergonomics: Effective Workplace Practices and Programs
Transcripts of Presentations From the Conference Held January 8 and 9, 1997,
Chicago Illinois http://www.cdc.gov/niosh/ecagenda.html

Musculoskeletal Disorders (MSDs) and Workplace Factors: A Critical Review of
Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of the Neck,
Upper Extremity, and Low Back http://www.cdc.gov/niosh/ergosci1.html (more
details earlier in this issue)

Abstracts of 56 Extramural research projects funded by NIOSH to be undertaken

and

Tractor Safety - TRAC-SAFE
http://www.cdc.gov/niosh/pdfs/tracsafe.pdf (5Mb)

And the Editor’s most recent discovery - a pictorial history of Vacuum cleaners!


The author, Karl Anderson, writes: “Portland, Oregon (USA) is the home of
Stark's Vacuum, which is itself the home of Stark's Museum of Vacuum Cleaners,
which houses over 100 vacuum cleaners from the past to the present. As a part-time
janitor, vacuum maintainer, and afficionado of humankind's endless fight against
entropy, I am thrilled to state that I have smuggled a camera inside this museum,
and can now relate the sights to you.”

Conference Report

ASEAN Ergonomics 97 - 5th SEAES Conference, Kuala Lumpur, 6-8 November
1997

Because of our close proximity to SE Asia, the ESA has been looking for ways of
becoming more closely associated with ergonomic societies in other countries in the
region. A good opportunity for furthering these aims arose when I was asked to be
a member of the International Scientific Advisory Committee for ASEAN
Ergonomics 97 - a prestigious (because it's good to see one's name at the front of
the proceedings), rather than onerous, appointment requiring the refereeing of
several submitted papers, some of which covered interestingly unfamiliar topics,
and chairing a session (in my case on Environmental Stress). Since I was
presenting a paper in that session I was in the unfamiliar position of chairing my
own presentation, which meant that I could run over time and the chairman
couldn't do much about it! The conference's theme was "Human Factors Vision - Care for the Future" and there was a good mix of keynote addresses, panel discussions (on topics such as: Manual Materials Handling, Ergonomics Education and Training, Human Factors in Transportation, Human Factors in Product Development) and parallel paper sessions. The paper sessions were grouped into 5 sections under the headings: 'Care for the Worker', 'Care for the People', Care for the New Technology' (ie people using the new technology, not how to look after your virtual keypad!), Care for the Quality and Productivity of Work', and 'Care for the Environment and Nation', and each section had several sub-groups. Some of the papers obviously fitted their group's theme, others were a less comfortable fit, but this was not a major problem. There was a definite effort to make the contributions relevant to the region - one of the sessions was titled 'Bali ergonomics' and included papers on improving the productivity of wood carving, the workload of refuse collectors, and improving the effectiveness of a hotel's management team in Bali.

Among notable overseas speakers at the conference were Hal Hendrick (President of the Human Factors & Ergonomics Society) who gave a keynote address on Good ergonomics is good economics in which he presented a number of cases where the cost-benefits of ergonomics were well documented, and Tom Leamon (Liberty Mutual Research Centre) who spoke on Global ergonomics: opportunities and barriers to research and applications. I have mentioned Margaret Bullock's contribution in my Presidents Message, and among other Australian contributors was Tom Triggs (from Monash) who gave a keynote address on Intelligent transport systems for developing countries. Altogether over 100 papers were delivered and participants totalled about 150. The facilities at the convention centre were good although the slide projector tried to gobble up my slides - fortunately I was well prepared with back-up overheads just in case, and in this case they were needed! The lunches were better than any I have had at conferences in Australia or overseas and the Chinese banquet at the conference dinner was worthy of the description "banquet", although some of the components of the various dishes were unfamiliar to western eyes, and in deference to our Moslem hosts alcohol was not served at the dinner. We were also entertained by groups of beautifully costumed and very skilful dancers from different countries in the region. The well bound and printed conference proceedings include all the papers that were accepted and totals nearly 700 pages.

I am certainly looking forward to the 6th SEAES conference in 2000, but it will have a hard act to follow.

Ian Gibson

Conference Calender

1998

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http://www.ait.ac.nz/news/conf/biomech/


- April 1-3, UK Ergonomics Society Annual Conference, Cirencester, UK. Contact Sandy Robertson Ph. +44 171 391 1589
http://www.ergonomics.org.uk/cfp.htm

- September, 9-11 Global Ergonomics Conference, Cape Town, South Africa. Information from Bob Bridger UCT Medical School, Observatory 7925, South Africa; fx +27 21 4486263. email: deborah@medicine.uct.ac.za. Abstracts due 30 Nov, 1997.

- May 11-15, Fifth International Congress - Australian Physiotherapy Association, Hobart, Tasmania; Contact: APA (Tas), PO Box 432, Moonah 7009, Australia.

- June 14-17, FUTURESAFE, OHS Congress and Safety Exhibition, Sydney. Ph. 02 9241 1478; Fx 02 9251 3552; email Fsafe@icmsaust.com.au

- July 5-8, Sixth International Conference on Human Aspects of Advanced Manufacturing: Agility and Hybrid Automation. Hong Kong. Contact: http://www.spd.louisville.edu/~ergonomics/haamaha98.html


- August 2-8. Third World Congress of Biomechanics. Sappora, Japan. Fax: +81-6-850-6171 E-Mail: office@wcb98.me.es.osaka-u.ac.jp, http://wcb98.me.es.osaka-u.ac.jp/

- August 14-18, The Third North American Congress on Biomechanics, University of Waterloo, Ontario, Canada; Contact Stuart McGill email mcgill@health.waterloo.ca

- September 15-18th, IFPS'98 International Fall Protection Symposium, Wuppertal, Germany. Abstracts due August 1, 1997. Contact Roger Kahler,
The InterSafe Group, PO Box 7338, East Brisbane, 4169. Ph. (07) 3895 8111; Fx. (07) 3895 8222.

- September 22-26th, 41st Annual Meeting of the U.S. Human Factors and Ergonomics Society, Albuquerque, New Mexico. Contact http://hfes.org; P.O. Box 1369, Santa Monica, CA 90406-1369 USA; 310/394-1811, fax 310/394-2410, email: hfes@compuserve.com.

**Information to contributors**

The preferable form of submission is via email, either in the body of a message, or as an attachment. Files may also be mailed on floppy, (or Zip disc if very large). Virtually any format of files can be accommodated. Otherwise contributions should be printed in a large (14 pt preferred) non-serif font (such as Helvetica) and faxed to +61 07 33793545. Printed pages of similar specification may also be sent by post. Handwritten submissions will only be accepted in exceptional circumstances.

Intending contributors are invited to contact the editor to discuss potential submissions.

All enquiries or feedback should be addressed to the editor, Robin Burgess-Limerick PhD. Email: robin@hms.uq.edu.au

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