CONTENTS - VOLUME 3

PREFACE

KEYNOTES	mathinam N kanesan
Cognitive ergonomics or the mind at work Erik Hollnagel	3
Human- and work-centered safety: keys to a new conception of management Michel Llory	6
Modern trends in accident prevention Dinesh Mohan	
1 COMPLEX SYSTEMS, COGNITIVE ERGONOMICS	gribusiansi Sasti Mare
1.1 MENTAL MODELS, HUMAN ERROR	
Maintenance error decision aid Allen JP, Rankin WL, Sargent RA	15
Ergonomic analysis of operator activity: cybernetic approach Anokhin AN	19
Co-operative work in distance educational environments Bagnara S, Marchigiani E, Parlangeli O	22
From cognitive ergonomics to CSCW: extension or reformulation? Bannon LJ, Karsenty L	25
Simulating micromethods of information-seeking tasks Buck JR, Wang MI	28
Error reduction in aviation maintenance Drury CG, Shepherd WT, Johnson WB	31
Measuring human reliability in aircraft inspection Drury CG, Spencer FW	34
How ergonomics contributes to the screen configuration of a Digital Control System (DCS) Duarte F, Santos P	37
Cognitive Ergonomics: a necessary compromise between a machine-centred and a human-centred approach Hoc JM	40
A systemic approach to the modeling of decision-making situations in the control of complex dynamic processes Hukki K, Norros L	43

Quantification of Human-System Compatibility (HUSYC): an application to analysis of the Bhopal accident Jamaldin B, Karwowski W	46
A virtual reality interface for navigation of unmanned underwater vehicles Lin Q, Kuo C	49
Human information chunking while classifying decision making Magazannik VD	52
Skill learning of model helicopter maneuvering Masuda K, Nagata M, Kanno T, Hayakawa S	55
Human factors and task procedures in aviation maintenance McDonald N, Daly C, Corrigan S, Cromie S	58
Analysis of control room operators' ways of acting in complex process control situations Norros L, Hukki K	61
Applied ergonomics in civil aircraft maintenance and dispatch O'Connor SL	64
Understanding and preventing human error in work with technical equipment in medical care Osvalder A-L, Broström J, Dahlman S	67
The regulator's unhappy lot Reason J	70
Neural network simulation of motivational behavior Ricken CE, Cabral RB, Tafner MA, Fialho FAP	73
Investigations on the influence of situational conditions on human reliability in technical systems Sträter O	76
Training of fishermen on bridge simulator Vion M, Dufresne R	79
Cognitive control behavior of the operator in the emergency Yoshida H, Takeda M, Hayashi Y, Hollnagel E	82
Vonanstnism nolitatvy ni	
1.2 CONTROL ROOMS, DISPLAYS, ALARMS	
Labelling and imagery in auditory warnings Edworthy J, Hards RAJ	87
Modeling the perceived urgency of multitone signals Haas E, Edworthy J	90
The design of an emergency service control room Hazell M, Murphy J, Proctor A	93
Control room philosophy and a control room design concept in Sweden Holmström CBO, Øyen Hol J, Lirvall P	96
Improvement of the acoustic characteristics of reverse alarms used on vehicles Laroche C, Lefebvre L	99

Design of an advanced control room based on human factors engineering criteria Manrique A, Nuñez J, Valdivia C, Garces I, Campos J, Torralba B, Corrales AG, Zamora S	102
The effects of display proximity on practice in a manual control task Murthy MR, Shalin VL, Drury CG	104
Operators communication with machines/plants - a case study Palo P, Harlin U	107
A theory of auditory affordances Stanton N, Edworthy J	110
Evaluation of the remote shutdown panel of an advanced boiling water reactor Torralba B, Valdivia JC, González MS, Garcia A, Solá R, Manrique A, Garceé I	113
Participation in the man-machine interface (MMI) design of the advanced boiling water reactor (ABWR) Valdivia C, Torralba B, Corrales AG, Garces I, Manrique A, Nuñez J, Martinez P, del Socorro Gonzalez M	116
Ergonomic design considerations for public area CCTV safety and security applications Wallace E, Diffley C, Baines E, Aldridge J	118
The ergonomics of closed circuit television (CCTV) systems Wood J	121
Ergonomic evaluation of control room layout Zamberlan MCPL, Santos VMC	124
1.3 MISCELLANEOUS Intelligent tutorial system based in virtual reality for acknowledge and training for management of high risk situations	129
Bridi VL, Casas LAA, Fialho FAP	
DIALOG, a software tool for experimental investigations of human reliability data Bubb H, Jastrzebska-Fraczek I	132
Accidents prevention in the electricity power industry: psychophysiological approach Burov A, Chetvernya Yu	135
Contribution to the study of temporal dimension in dynamic environments Carreras O, Cellier J-M	138
Human errors in customer service: a research framework Chen A-C, Drury CG	141
Initial environmental revision: a fundamental tool for the implementation of a coal thermo electrical power plant environmental management system Coelho CcdeSR, Fialho FAP	144
Mental representation and performance Coelho RS, Savi MR, Fialho FAP	147
Cognitive ergonomics as a work support security do Valle Pereira G, Bezerra LAH, Cristofolini V, do Valle Pereira VLD, da Silva Filho WF	150

Industrial maintenance, organizational design and workers' health. The example of nuclear power plants Doniol-Shaw G	153
The human-factors approach to automation for high risk technical systems Golikov Yu	156
Ergonomic analysis of operator adaptation to work in control centres Grozdanovic M, Pavlovi•-Veselinovic S	159
Ergonomic design of control centres Grozdanovic M	162
Development of a systematic checklist for the ergonomic evaluation of the critical function monitoring system of a nuclear power plant Han SH, Yun MH, Kwahk J, Hong SW, Lee YH	165
A model of human visual attention on recognizing objects in a factory Ishihara K, Ishihara S, Nagamachi M, Osaki H	168
Ergonomic expert system to the electrical operation Jarufe MS, dos Santos N, Benito GV	171
A study on error characteristics in human information processing – The exploration of the error occurrence caused by the fluctuation of working memory capacity Karashima M, Shimada K, Saito M	174
HERA: a computerised error analysis tool Kirwan B	177
Applications of artificial neural networks in safety engineering Kosinski RA	180
The mutual reservation of operator and automation for high risk technical systems Kostin AN	183
Control rooms: integration between work organisation, layout and lighting design Menezes JB, Mello A	186
Design of an interactive hypermedia system for power electronics instruction Muñoz AM, Medina JO, Alonso AP, de Castro Lozano C, Bencomo SD	188
Human factors in mechatronics Murthy MR, Drury CG	191
Ergonomics in the design process of control room – from contracting to implementation Santos VMC, Zamberlan MCPL	194
Ergonomics application on alarm handling at Santa Catarina Telecommunication State Company – an expert system for alarm correlation Scavone J, Fialho FAP	198
Design and evaluation of an advanced alarm prototype for light water reactors Torralba B, Senent A, Zamora S, Manrique A, González C, Valdivia JC, Muñoz A, Rodriguez JA	201
The role of instructions in rule-based level errors Veyrac H, Cellier JM	204
Psychophysiological condition of operators of rolling mill computer-added control system as a criterion of professional selection Zaracovsky G, Shevjakov A	207

2.1 SAFETY MANAGEMENT AND MONITORING SYSTEMS

An integrated information system for the assessment of work-related health risks in a large Finnish oil refinery Aaltonen M, Alander P, Luukkanen A, Miettinen J, Tölli A	213
Theoretical explanations for the non-use of safeguards Backström T	215
Health and safety standards, measurement and assessment in human resource management Beckmann J	218
Safety culture in offshore environments Cox SJ, Cheyne AJT, Alexander M	221
Safety implementation in manufacturing: implications for using virtual reality in the workplace Duffy VG, Su C-J, Hon CL, Finney CM	224
An application of the MCDA to improve safety in enterprises Ensslin L, Alberton A	227
A new method of collecting and reporting data to support the implementation of workplace changes Fitzgerald C	230
Insights into safety management and culture based on formal representational methods Hale A	233
The ecology of health and safety professionals Hale AR, Storm W	236
Education and training for prevention Jérôme F	239
The effect of new organisation structures on occupational health and safety Kern P, Freudenreich H	242
Company safety performance – case studies in Finland and in the USA Kuusisto A	245
Professional development of safety officers for health at work Kämäräinen M	248
The efficiency of quality audits at workplace Kääriä M	250
The effects of the TUTTAVA program on order and tidiness in a metal workshop Laitinen H, Kuusela J, Saari J	252
Evaluation of the comprehension of hazard communication phrases by chemical workers Lehto M, House T	255
Effects of feedback programs on team climate and performance: an intervention study	258

What you don't know can hurt you: I. Control settings Leonard SD, Wogalter MS	261
Cost effective methods of evaluating safety and injury control measures Mohan D	264
Safety map – a health and safety audit system Rankin P	267
Improvement of the work environment and safety in the metal industry: experiences from case studies Saarela KL	270
Outsourcing and occupational health and safety: new challenges for the developers of OHS programs Saari J	273
Participatory feedback programs – comparative experiences from Finland and Canada Saari J	276
Successful safety management in small and medium-sized companies Salminen S	279
Safety monitoring system using picture navigation tool & risk visualisation Schallier P	282
Safety management and accident prevention: safety culture in 14 small and medium-sized enterprises Seppälä A	285
Characteristics of successful safety management strategies Simard M	288
Counselling of small and medium-sized enterprises in the field of safety engineering and occupational medicine Strothotte G	291
The evolution of behavioral safety: its roots; answered and unanswered questions Sulzer-Azaroff B	294
Modeling environment, safety and health costs Veltri A	297
An integrated approach towards safety management Zimolong B, Elke G	300
The state of the s	
2.2 DESIGNING FOR SAFETY	
Development of a system of signs for warning of natural hazards Arthur P, Dewar R, Kozachenko B	305
Pictorial information on variable message signs: road safety issue Bruyas MP, Pauzie A, Adham A	308
The impact of warning color and signal word on children's interpretation of hazard level Edworthy J, Warren CA	312
Welding visors – the acceptance of an invention for reduction of carbon dioxide retention Eklund J	315

Ergonomics and effective personal protective equipment Graveling RA	318
Considering manual handling in the design of machinery Haslegrave CM	321
Ergonomics and safety in machine design; workstations Hildén H, Honkanen A	324
Hand anthropometry in relation to hand tools and personal protective equipment Johnson JE, Rapp G	327
Reducing the ELF magnetic field in working environment Keikko T	330
European standard based safety information system for machine designers Kivistö-Rahnasto J	333
New European machine safety regulations: practical experiences in design Kivistö-Rahnasto J	336
Integration of human machine analysis through intraweb technology Leamon TB	339
Evaluation of hearing protection devices Miguel AS, Arezes PM	341
Hazards of SHE machines in agriculture Saran J	345
Modyficatory influence of protective clothing with thermal insulation different from 0,6 clo on thermal load, permissible time of exposure and recovery time Soltynski K, Konarska M, Kurkus-Rozowska B, Sobolewski A	348
Symbols for child-care products Trommelen M, Akerboom S	350
Connoted hazard of Spanish and English warning signal words, colors, and symbols by native Spanish language users Wogalter MS, Frederick LJ, Herrera OL, Magurno AB	353
2.3 FROM RESEARCH TO STANDARDS	
Interviews with slip, trip and fall accident-involved postal delivery employees Bentley TA, Haslam RA	359
Overstepping the mark – Practical difficulties in maintaining a slip resistance standard Bowman R	362
The effect of surface roughness on measurement of slip resistance Chang W-R, Leamon TB	365
Bridging the gap between mechanical and biomechanical slip test methods de Lange A, Grönqvist R	368
Experimental analysis of main test devices used for evaluation of skid resistance Dutruel F, Degas G	371

The NIST workshop on "Evolution of Slip-Resistance Standards": a combined effort by the US government, industry, and academia to reduce the slip and fall problem Fendley A, Marpet MI, Brungraber R	374
Test of anti-skid devices Gard G, Lundborg G	377
Research and quality labels for slip resistance of floors and footwear in Switzerland Gauglhofer J	380
On transitional friction measurement and pedestrian slip resistance Grönqvist R	383
Slip and fall – A major, serious and expensive cause of accidents Körpert K	386
"Universal specification/test method for slip resistant walkways & footwear, in the field & laboratory, as measured by a drag type friction tester" – A bridge between U.S. and European test methods Meserlian D	389
Events and exposures related to slips, trips and falls in industry Murphy PL, Leamon TB	393
Safety study on emergency stopping methods for moving walkways and escalators Nagata H, Kasuya S, Saitoh C	396
The static coefficient of friction Norman Jr. LA	399
Recent HSE research into the interface between work place flooring and footwear Rowland FJ	402
Comparison of seven methods for the evaluation of the slip resistance of floors: contributions to development of standards Tisserand M, Saulnier H, Leclercq S	406
2.4 MISCELLANEOUS	
Occupational injuries in different industries of Bangladesh Ahasan R, Quddus R, Rahman T	411
Consequences of the occupational risk prevention law in order to qualify as preventionist Beltrán DLM	415
Work safety and human resource management: global theories and Brazilian industrial practices Cabral S, Camarotto JA, Santos FCA	418
Italian accident prevention laws Cipolla N, Di Benedetto F, Fratini L	421
Preventive analysis of safety related human factors and cognitive factors in the work place Greenshpan Y, Weil M, Gopher D	424
Occupational health hazards for urban underground drivers Grigoriu I, Seracin M, Petreanu V	427

Applying the ergonomic principles to the personal protective equipment and clothing Herman H	429
A profile of competency – a new tool for safety activities. Case: Linjebuss Finland Hyttinen M, Rantala E	432
Occupational safety improvement process at workplace Isomäki J	435
Preventing violent injury in the retail trade Isotalus N, Saarela KL	438
SAMIR® – occupational safety audit and follow-up system Johansson K	441
An investigation of work injuries in warehousing and trucking: identification of root causes through detailed incident investigations Keyserling WM, Monroe KA	444
Safety of children on farms Kivikko J	447
A low cost approach for reducing accident risk in substations of electrical transmission systems Kurt M, Dizdar EN, Ceylan H	449
Occupational safety in paper machines maintenance Lewandowski J	452
Internal control in SME – bureaucracy and self-regulation Lindøe P	455
The development of "The Safety Training Program for 'IKI IKI' (Vivid) Five Senses" Masada W, Shin HS	458
A benchmark study for evaluating the validity of using groups of workers for identifying hazards and reducing accidents Montero R	461
Ergonomics and validation in the pharmaceutical industry: The Finlay Institute case Montero R, Agüero B, Cadalzo Y, Rodriguez M, Fernandez M.	464
Accident characteristics and accident reporting procedures: a critical overview of the Portuguese situation Paz Barroso MFC, Miguel ASSR	467
Technical and cultural considerations for the prevention in hydrocarbons transportation Tairi A, Benmehidi Z	470
Outlining the problems associated with work safety for security guards and developing solutions Tammi M	473
Safety promotion in Estonia Tint P	475
Effect of warning signal word and source on perceived credibility and compliance likelihood Wogalter MS, Kalsher MJ, Rashid R	478

3 MATERIALS HANDLING

Development of a voluntary standard for the control of work-related cumulative trauma disorders in the United States: ANSI Z365 Armstrong T	48
An ergonomic comparative evaluation of a conventional carrying bag and a wheeled case for the transportation of money Beauchamp Y, Brosseau M, Vilkki M	48
NIOSH's review of the epidemiologic evidence of work-related musculoskeletal disorders: use, standards, and guidelines Bernard B, Putz-Anderson V, Grant K, Hurrell J, Sweeney MH, Tanaka S, Fine L	489
Effects of speed of lift on statically and dynamically determined joint moments Bernard TM, Ayoub MM	493
European standardization – activities of CEN TC122/WG2 Ergonomic design principles Bjurvald M	496
Reduced physical load during manual lifting activities after introduction of mechanical handling aids Burdorf A, Vernhout R	499
Torso modelling of peak exertions required when using materials handling devices Chaffin D, Nussbaum M, Baker G, Foulke J, Stump B, Woolley C	502
IEA TC activity: introductory presentation to the special session: "upper limb repetitive movements exposure assessment" Colombini D	505
The effects of muscular fatigue on weight perception Deeb JM	508
PrEN 1005-4 'Safety of machinery - Human physical performance - Evaluation of working postures in relation to machinery' Delleman NJ, Boocock M, Kapitaniak B, Schaefer P, Schaub Kh	511
Manual handling regulations and guidance in Britain: 4 years on Dickinson CE	514
Manual high-repetitive packaging Engström S, Rosenblad T	517
Considerations and remarks by Latin American countries Facci R	520
Assessing effects of lifting tasks Hastings S, Haslegrave CM	522
The influence of packages on ergonomics in Swedish retail trade Henriksson L, Johnsson M	525
Handling of packages in shops Hermansson A, Tiliander L	528
The effects of grasp conditions on weight estimation in virtual environment 124	531

Changes of body height in stooped lifting Janik H, Kankel A, Müenzberger E, Schultz K	534
Comparison of biomechanical cost functions with weighting factors for posture prediction of human load lifting Jung ES, Park W	537
Measurement of strains arising during baggage handling at a major airport Kaiser R, Leidhold M, Landau K	540
Package handling. Ergonomic aspects of the distribution of frozen groceries from producer to customer. A pilot study Karlsson MA, Wikström L	543
Grasp force: how dependent is it on the load grasped? Kim B, Bishu RR	546
Assessment of biomechanical loads in asymmetric manual lifting – a pilot study Leskinen T, Waters T	549
Physiological responses to load lifting in different heights and frequencies Majumdar D, Purkayastha SS, Majumdar D, Kumar R, Selvamurthy W	552
The effects of box features on spine loading in warehouse operations Marras WS, Granata KP, Davis KG, Allread WG, Jorgensen MJ	555
Effects acute and chronic originated by handling and moving loads by the worker – Ergonomics application to work - case study Merino E, Gontijo LA, Abel L	558
Forecasting of heart rate profile with spline function and neural network in materials handling Nabeta T, Nakamura R, Yoshida K, Kitaoka M	561
Pushing and pulling analysis. Proposal of exposure indices for the whole manual handling task and operating outcomes Occhipinti E, Colombini D	564
CEN-ISO international standards Ringelberg JA, de Vlaming PM	567
Background of prEN 1005, part 2: manual handling Ringelberg JA, Schaub KG	570
Regulation in Norway on the subject "manual handling" – "Directive on heavy load and repetitive, monotonous work" Samdahl Høiden L	571
Manual handling of machinery and component parts of machinery Schaub KG	574
OSHA efforts to develop standards and guidelines to prevent work-related musculoskeletal disorders Silverstein B	577
Packaging for frozen food Terrazas EF, dos Santos JL, da Gama Reis D, Portela CB, Baldacci LG, Cortes MC	580
Evaluation of the revised NIOSH lifting equation: a cross sectional epidemiological study Waters T, Baron S, Haring-Sweeney M, Piacitelli L, Putz-Anderson V, Wall D, Skov T, Fine L	583

IEA TG proposed procedures for evaluating manual lifting tasks Waters T	586
The revised NIOSH lifting equation: current status Waters T, Putz-Anderson V	589
State of implementation of Directive 269/90 in the European Union Vogel L, Gibellieri E, Strambi F	592
Development of manual material handling guidelines for the catering industry – The Chinese restaurant kitchen Yeung SS, Ferguson RA, Siu ZK, Lee RY	595
A biomechanical model of the human musculoskeletal system as a tool for designing workplaces Zabiuk J, Wittek A, Kedzior K, Zagrajek T	598
Annisand a funite annul a manulant sanda in as de assuminanten de	

AUTHOR INDEX

601