

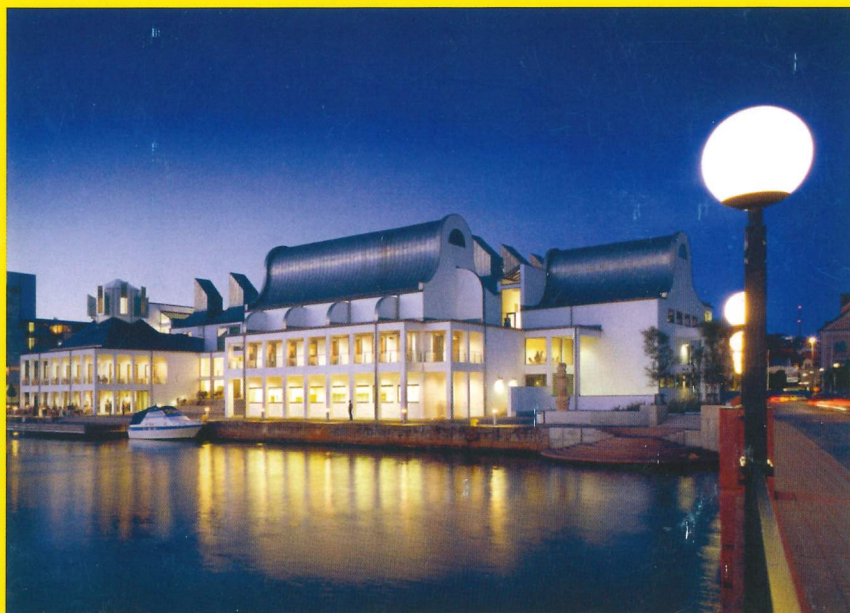
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Fem år i vibrationsintressets tjänst går snabbt

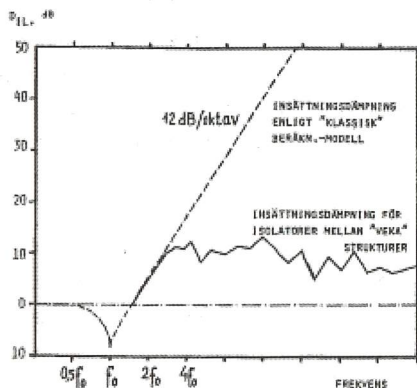
Tänk att det redan gått fem år. Jag tillträdde som ordförande i föreningen vid den trivsamma Vibrationsdagen i Köpenhamn i november 2001. Det har varit intressant att få vara med och skapa Vibrationsdagar, symposier och temadagar. Utelandet av föreningens vibrationspris Guldaccelerometern har varit en annan, för mig givande, del av mitt uppdrag som ordförande. Att skriva ledare i SVIB-Nytt har ibland känts betungande när presslägningsdagen närmar sig, men det känns också som att motionera. När det väl är utfört och ledaren är publicerad, infinner sig en behaglig känsla. Alf Olsson bad mig skriva en sista ledare som ett avslut.

Jag vill först säga några ord om konferensen Baltic Nordic Acoustic Meeting – Sound and vibration, som gick av stapeln 8 – 10 november 2006 i Göteborg. Konferensen var ett samarrangemang mellan Svenska Akustiska Sällskapet och Skandinaviska Vibrationsföreningen och jag tycker det blev mycket lyckat, inte minst tack vare Alf Olssons och hans SVIB Normtjänst som tillsammans med vetenskapliga kommitténs ordförande PA Hellström på något märkligt sätt (kanske intensivt arbete?) såg till att de praktiska arrangemangen fungerade. Vidare vill jag tacka utställaransvarige Lars Landström, "Man and Noise"-arrangör Ulf Landström och inte minst organisationskommitténs ordförande Leif Åkerlöf. Föreningens nye ordförande Ole Døssing höll ett plenarföredrag om "Sounds of vibration" som på ett intresseväckande sätt knöt ihop de två disciplinerna ljud och vibrationer. Jag skulle ju kunna tacka alla som var med, men nu får det räcka.

Bland medlemmarna i SVIB finns förstås ett intresse för att ta del av kunskaper och erfarenheter kring vibrationsfrågor. Specifikt har det efterlysts handledning ("tutorials") kring vibrationsisolering. Jag tycker att VIBRATIONISOLERING vore ett utmärkt ämne för ett symposium eller en temadag. Själv har jag haft mycket stor nytta, och fått insikt av, av Juha Plunts "Vibrationsisolering av maskiner. Dimensioneringsmetod, även för högfrekventa vibrationer" från juni 1981. (ASF projekt 77/181, IFM Akustikbyrå TR 8128.09).

Jag tror det vore nyttigt om denna kunskap förs vidare och kompletteras med nya vetenskapliga rön och nya erfarenheter. Följande diagram från Juhas rapport illustrerar en del av problematiken. Förluster, flera dimensioner och flera kontaktpunkter utgör ytterligare komplikationer att ta hänsyn till vid dimensionering.

Jag skulle gärna se exempel på beräkningsprogram för vibrationsisolering, redovisning av olika typer



av isolatorer, både gamla och nya och forskning om vibrationssisolering. Jag skulle gärna se återkoppling av lyckade och mindre lyckade installationer med vibrationsisolering. Vidare exempel på extrem vibrationsisolering som t ex vid FTF Nanolab i Lund.

Jag lämnar över denna boll till den nya styrelsen och önskar dem lycka till i fortsättningen. Jag vill gärna fortsätta som en aktiv föreningsmedlem för att utbyta erfarenheter med kollegor inom vibrationsområdet.

Martin Almgren

Före detta ordförande Skandinaviska Vibrationsföreningen SVIB 2001 - 2006

e-post: martin.almgren@ingemansson.se



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SVIB styrelse

Ordförande

Ole Døssing, civ ing
Rovsing Dynamics A/S
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Vice ordförande

Ylva Vidhög, civ ing
Forsmarks Kraftgrupp
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Saven EduTech har bytt namn och heter nu Axiom EduTech

BNAM 2006 – Några reflektioner från en deltagare

Akustik konferensen Baltic Nordic acoustics Meeting gick av stapeln i Göteborg den 8 – 10 november. Jag var där tillsammans med drygt 220 andra deltagare från de Nordiska och Baltiska länderna. Deltagandet från de Baltiska länderna föreföll dock ytterst sparsamt.



Chalmers konferenscenter

Som arrangör för konferensen stod Svenska Akustiska Sällskapet SAS och Skandinaviska Vibrations Sällskapet SVIB. I samband med akustikkonferensen ordnades ett satellitsymposium 'Man and Noise', som organiserades i samarbete med Arbetslivsinstitutet. Huvudsponsorerna för konferensen var ÅF-Ingemansson, Ecophon och SKF. Sista dagen av konferensen sammanföll också med att ÅF



Ingemansson AB 50-års jubilerade.

Onsdagen den 8/11 ägnades åt satellitsymposiet. 'Man and Noise' som var namnet på symposiet är också namnet på det nätverk av forskare som bildats för att uppmuntra tvärveten-skapligt samarbete inom områden som berör människa - buller problem-atiken. För närvarande består nätverket av ca 15 till 20 forskargrupper.

Idén att lägga denna typ av tematiska symposium i anslutning till en bredare konferens är utmärkt och bör uppmuntras. Det finns alltid områden som det finns anledning att belysa grundligare. En rad intressanta pågående och planerade forskningsprojekt presenterades, bl.a. om förmågan att förstå och minnas information som återges under akustisk påverkan av olika slag, autistiska barns känslighet

för ljud, förskolebarns reaktion på buller, för att bara ge en antydning om innehållet i några av föredragen.

Som en trevlig avslutning på konferensens första dag bjöd Sjöfärd Operan på en bejublad föreställning av Franz Lehárs operett Greven av Luxemburg. En härlig blandning av professionella och amatörer som på ett charmigt och informellt sätt framförde den klassiska operetten. Man måste beundra de eldsjälar som, i det något bistra svenska kulturklimatet, lyckas med konststycket att med små medel men desto större entusiasm uträtta stordåd.



Sjöföreläsning underhöll

På torsdagen startade själva konferensen med två parallella sessioner där den ena behandlade bullerbekämpning ur olika aspekter och den andra var inriktad mot hur vibrationer påverkar människokroppen. Dagen bjöd också på två inviterade föredrag där Ole Døssing från Røvsing Dynamics A/S talade om ljud och vibrationer och Stig Arlinger från Linköpings Universitet om taluppfattning i buller. Av dessa hade jag bara möjlighet att lyssna på Stig Arlinges föredrag som var mycket intressant. Arlinger sammanfattade forskningen genom att på ett pedagogiskt sätt visa både nya och gamla forskningsresultat i diagramform. Intressanta resultat presenterades som t.ex. att god taluppfattbarhet inte bara är en fråga om rumsakustik utan också åldersberoende effekter om människans förmåga att uppfatta tal i bullriga miljöer har betydelse. Under eftermiddagen genomfördes en 'workshop' om musikakustik organiserad av Stig Arlinger.

På kvällen bjöd 50-års firande ÅF Ingemansson på en trevlig reception varefter konferensmiddagen tog vid. Under kvällen

fick Christian Madshus ta emot utmärkelsen 'Guldaccelerometern' och ett gäng unga Chalmerister underhöll med sång och musik.

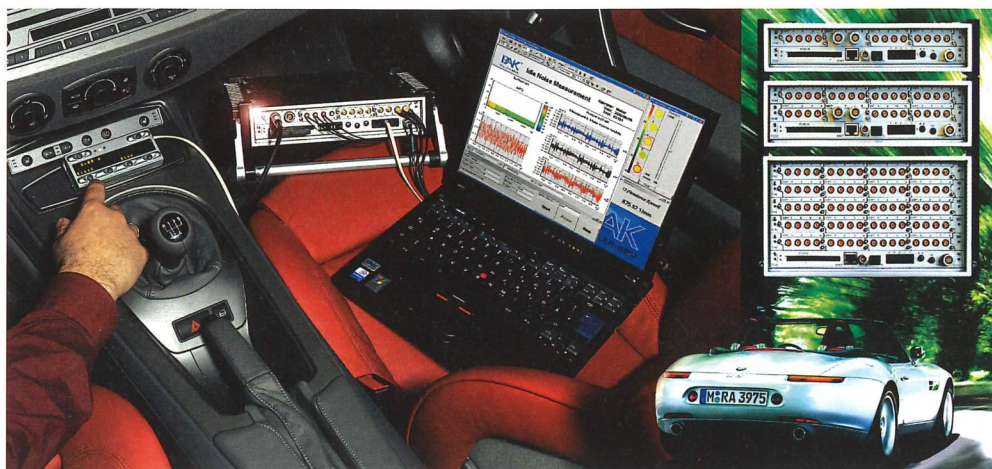


Christian Madshus med Guldaccelerometern



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Konferensens sista dag toppades med tre parallella sessioner och en 'workshop'. I två av sessionerna behandlades områden som rumsakustik, kartläggning av buller, fordonsakustik, psykoakustik, byg-gnadsakustik, kontroll och mätning av vibrationer i byggnader mm. Ett omväxlande program alltså, där praktiska tillämpningar varvades med nya forskningsrön. I en tredje session presenterade ÅF Ingemansson en exposé över 50 års verksamhet inom akustikområdet. Juha Plunt gav en föreläsning om 50 års tillämpad akustikforskning i Sverige utifrån en konsults perspektiv. Eftermiddagen innehåll också en 'workshop' om klassrumsakustik som jag själv hade nöjet att leda. Tack vara deltagarnas engagemang blev det en livlig och lärorik diskussion som pågick fram till avslutningsceremonin.

Utöver alla föredrag kantades konferensen av en utställning där 18 företag presenterade sina produkter där inte minst 'ny' mätteknik tilldrog sig stort intresse.

BNAM 2006 i Göteborg blev en lyckad och välorganiserad tillställning. Man skulle önska att fler tog tillfället i akt att uppleva denna mötesplats för verksamma inom akustikområdet i de Nordiska och Baltiska länderna.

Vid avslutningsceremonin och med bilder från det vackra Isländska landskapet hälsade Steindor Gudmundsson oss välkomna till Reykjavik för nästa BNAM år 2008. Så, kära läsare, gör en notering i almanackan så ses vi på Island.

Erling Nilsson
*Med tillåtelse ur SAS artikel från
Ljudbladet.*

The Gold accelerometer 2006 of the Scandinavian Vibration Society

is awarded to *Dr Christian Madshus* from Norwegian Geotechnical Institute in Oslo Norway and is donated by Brüel & Kjær and will be presented by Lasse Sandklef from Brüel & Kjær Sverige.

Christian Madshus has significantly contributed to vibration and geodynamic research in Norway, in the Nordic countries and internationally.

He has been active for several decades and has a lot of papers or reports in his publication list. Through participation in several conferences and as teacher in courses he has contributed to increased knowledge in the field. As an example, already in 1984, he held a course titled "Vibrations in Soil and Rock: Theoretical background, Sources of Vibration, Limits for acceptable Vibrations."

Examples of research areas which has drawn benefit from his work are:



Guldaccelerometern 2006

- Vibrations and ground-borne noise from trains including both numerical and statistically based prediction tools
- Models for ground vibrations from explosions in rock and ground impacts
- Models for air and ground coupling of impulsive noise

He has been responsible for the development of a Norwegian standard for ground and building vibrations from road and railway transportation. The approach in this standard should be used by other countries as well. He has also been involved in international standardization.

The design of low vibration laboratories for micro electronics is a field that has been received much attention the last years by Christian.

Christian, I hope that the award from the Scandinavian Vibration Society will encourage you to continue your participation in vibration research, conferences, vibration courses and standardization committees.



Lasse Sandklef överlämnar guldaccelerometern till Christian Madshus

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EFFECT OF TRANSIENT EVENT FREQUENCY CONTENT AND SCALE ON THE HUMAN DETECTION OF ROAD SURFACE TYPE

J. A. Giacomini

Brunel University School of Engineering and Design
Uxbridge, West London, UB8 3PH, UK

T. P. Berber-Solano

The University of Sheffield Department of
Mechanical Engineering Mappin Street,
Sheffield S1 3JD mep03tpb@sheffield.
ac.uk

ABSTRACT

This paper describes two laboratory-based experiments which evaluate the effect of transient event frequency content and scale on the human detection of road surface type by means of steering wheel vibration. This study used steering wheel tangential direction acceleration time histories which had been measured in a mid-sized European automobile that was driven over two different types of road surface. The steering acceleration stimuli were manipulated by means of the mildly non-stationary mission synthesis (MNMS) algorithm in order to produce test stimuli which were selectively modified in terms of the number, and size, of transient vibration events they contained. Fifteen test participants were exposed to both un-manipulated and manipulated steering wheel rotational stimuli by means of a steering wheel vibration simulator. For each road surface type a total of 45 vibration test stimuli were presented to each participant. Each participant was asked to state, by means of a simple "yes" or "no" answer, whether each individual stimuli was from a road surface which was being presented in front of the simulator as a picture on a large board. Using Signal Detection Theory as the analytical framework the results were summarized by means of the detectability index d' and by means of receiver operating curve (ROC) points. Improvements of up to 20 percentage points in the rate of correct detection were achieved by means of selective manipulation of the steering vibration stimuli. The results suggested that no single setting

of the MNMS algorithm proved optimal for both two road surface types that were investigated.

1. INTRODUCTION

The steering wheel is commonly considered the most important source of haptic feedback information for the automobile driver. This is due to the great sensitivity of the skin tactile receptors of the hand [1][2], as well as the lack of intermediate structures such as shoes and clothing which can act to attenuate the transmission of vibrational stimuli to the driver. In this context, the word 'stimuli' is taken to mean something external that elicits or influences a psychological activity or response on the part of the driver [3]. In order to produce road vehicles which have a high level of quality and comfort, automobile manufacturers dedicate significant attention to *noise and vibration suppression* [4]. This results in a suppression of stimuli. For many years, psychologists, cognitive scientists, cognitive psychologists, and others have established the relation between stimuli and information [5][6][7][8]. Given the above, the question of what information a road automobile subsystem should transmit to the driver is not a simple one. According to [9] vibrational stimuli help in the interpretation of many things including the type of road surface, the presence of water or snow, tyre slip and the dynamic state of subsystems such as the engine, the steering and the brakes.



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Giacomin and Woo [9] have stated that the haptic steering stimuli are perceived, compared to models from long term memory and interpreted, with the consequent interpretation then influencing decision making. With the advent of electronically assisted steering and 'by-wire' technologies the question of which stimuli should reach the driver assumes great importance [10][11][12]. From a comfort point of view, less steering vibration should be judged as better. This is not appropriate in the case of information, however, since scenarios can be imagined in which an increase in vibration level can help to clarify the nature of the road surface or the automobile dynamic state [9].

Marcotte [13] states that "driving an automobile engages several cognitive abilities and although many driving behaviors are overlearned, drivers frequently need to respond to circumstances requiring intact attention, spatial processing, processing speed, and executive functioning (self-monitoring or judgment)". Studies have shown that the global performance of a coupled person-machine system can be improved when certain low level perceptual and cognitive functions are assigned to the machine [14]. Human information-processing characteristics are therefore central to the design of many modern systems. Examples of this trend include graphical displays that tailor to human perceptual characteristics [15][16][17], systems whose design involves the use of human performance models that enable explicit consideration of human memory and attentional constraints [18][19], and error tolerant systems developed to minimise human error [20][21][22].

The concept of Perception Enhancement Systems (PES) emerges from the observation that not all machine emissions are informative, and that only certain cognitively-relevant features from the environment have meaning for humans. One means of improving the flow of information to the driver, and thus of making the driving task easier, is to incorporate

a Perception Enhancement System into the design of the automobile steering as shown in Figure 1. Giacomin [23] has proposed the definition that an automotive steering Perception Enhancement System is any device which optimises the feedback to the driver of information about automobile interaction with the environment. Such systems treat the data from an information theoretic point of view, and optimise the person-machine interface so as to make the automobile feel more like an extension of the driver's body. Such a system might be composed of electronic systems which have the function of identifying the significant vibration stimuli (originating from the tyres and suspensions) which are required by the driver, and of transforming the stimuli in order to optimise detection and awareness [9].

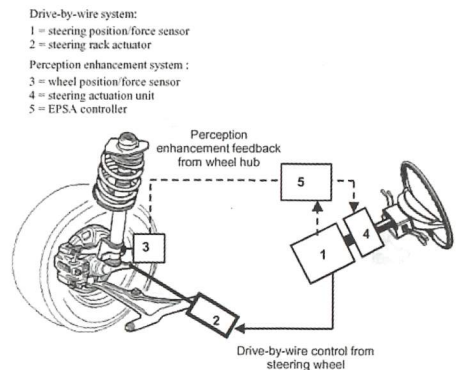


Figure 1. A Perception Enhancement System (PES) for use with "by-wire" automotive steering.

In a modern automobile, the electrical and electro-mechanical power assistance systems used for the primary controls (steering, acceleration and braking) make these controls obvious choices for the application of low level perceptual and cognitive functions such as a steering perception enhancement system. An example of research in this direction is the study by

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Giacomin and Woo [9], which investigated driver detection of road surface type. By measuring the sensitivity of the human detection task to changes in the primary characteristics (scale and bandwidth) of the vibration stimuli, the authors defined the basic dynamic specifications that an automotive steering system should have in order to be capable of applying low level perceptual assistance to the driver. The authors concluded that a single, fixed, feedback gain was not optimal. Rather, the data supported the view that the optimal steering feedback gain should be determined after automated classification of the road surface type. Further, the authors defined a minimum bandwidth requirement, of approximately 0 to 80 Hz, required by drivers for the detection task.

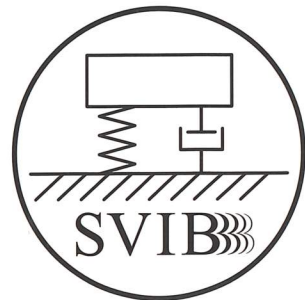
The study presented in this paper treats instead the problem of features [23], which can be defined to be the effect that individual vibrational transient events have on human cognitive response. A natural question which arises in the case of the steering system is whether short, sharp, transients of the kind that occur when driving over cracks or stones effect the detection of the surface type. The study presented here investigated the effect of the number of transient events, and the effect of the scale of the transient events, on the human detection of road surface type. The study was performed by means of laboratory-based experiments involving human participants, and involved digital manipulation of steering wheel tangential acceleration signals which were measured during road testing of a mid-sized European automobile.

2. THEORY OF SIGNAL DETECTION

Theory of Signal Detection (TSD) is an approach which facilitates the measurements and quantification of how people actually behave in detection situations [24]. TSD is described in detail in [25]. The starting point for signal detection theory is the assumption that nearly

all reasoning and decision making takes place in the presence of some uncertainty. The general approach finds direct application in terms of sensory experiments, and is often used to analyze different kinds of decision making [26]. There are many applications for the Theory of Signal Detection including Models of Visual Detection [27], Models of recognition memory [28] and as a source of monitoring [29].

Theory of signal detection is applicable in any situation in which a signal is to be detected while in the presence of background noise [25]. In the detection situation, the observer must therefore first make an observation (x) and then make a decision about the observation. On each trial, the observer must decide whether x is due to a signal added to the noise background or to the noise alone. According to Gescheider [30], as a weak signal is applied the decision becomes difficult and errors are frequent. Figure 2 represents graphically two distributions which describe the random variation of the noise, and of the signal plus the noise. Since the signal is added to the noise, the average sensory observation magnitude will always be greater for the signal-plus-noise distribution than for the noise distribution, but when the distributions are essentially the same, they greatly overlap, making the decision difficult.



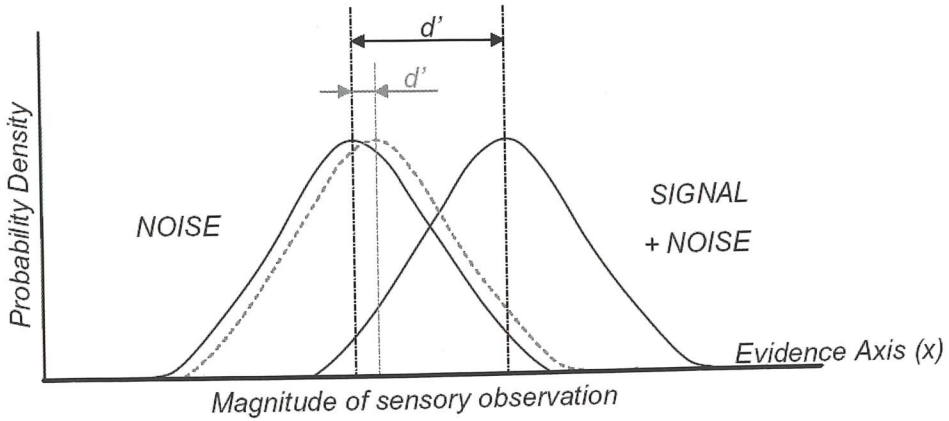


Figure 2. Theoretical frequency distributions of noise and signal noise for two different values of signal strength (Adapted from [31]).

The combination of two stimulus and two response categories produces the 2x2 matrix shown in Figure 3. It involves four classes of joint events which are labelled as hits, misses, false alarms, and correct rejections.

		Responses	
		Yes	No
Stimulus	Signal + Noise	Hit (Correct detection)	Miss (Incorrect rejection)
	Noise	False alarm (Incorrect detection)	Correct rejection (Correct denial)

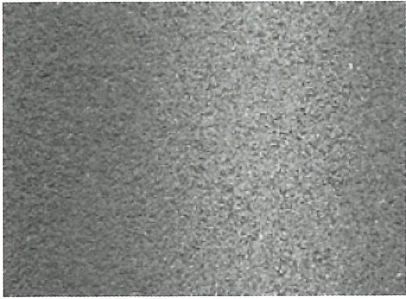
Figure 3. The four response outcomes of signal detection.

3. EXPERIMENTAL TESTS OF HUMAN COGNITIVE RESPONSE TO STEERING WHEEL VIBRATION

3.1. Test Stimuli

The experiments involved tangential direction acceleration time histories which were originally measured in an Audi A4 when driving over two road surfaces. The automobile used to provide the acceleration stimuli for the experiments can be considered an average European saloon with average mechanical characteristics. The road surfaces that were measured were a tarmac surface and a cobblestone surface. Figure 4 presents the two road surfaces, as viewed from directly above, and as seen from a distance as when driving. For each road surface a 2 minutes data recording was available from experimental testing (see reference [32]). From each 2 minutes recording a 10 seconds segment was extracted for use in the current experiments which was statistically representative of the complete 2 minutes recording. For purposes of illustration, 3 second segment of the acceleration time histories of the two base stimuli are presented in Figure 5, while the related global statistical properties are presented in Table 1.

Tarmac road (vehicle speed 96 kph)



Cobblestone road (vehicle speed 30 kph)



Figure 4. Road surfaces whose stimuli were chosen for use in the laboratory tests.

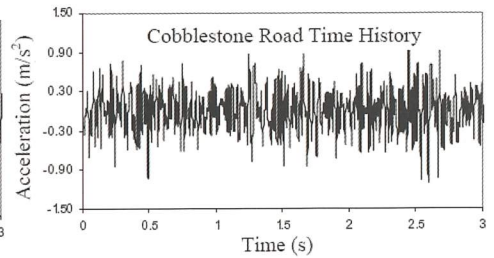
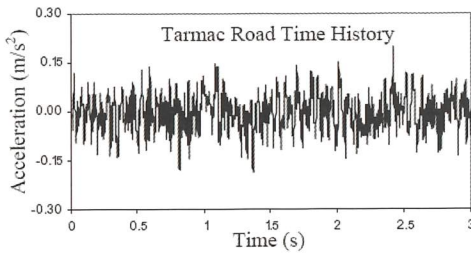


Figure 5. Steering wheel acceleration time history segments used the base stimuli.

Global Statistics & characteristic	Tarmac Surface	Cobblestone Surface
r.m.s. (m/s ²)	0.05	0.27
Kurtosis (dimensionless)	3.00	3.25
Speed (kph)	96.00	30.00

Table 1. Global statistics and characteristics of the two base stimuli used for producing the laboratory test stimuli.

The extraction of transient events from the base stimuli, and the reinsertion of modified (either in number or size) transient events into the test stimuli, was achieved by means of the mildly non-stationary mission synthesis (MNMS) algorithm [33]. MNMS acts as a compression tool to produce a shortened stimuli sequence starting from a long non-stationary time history. MNMS uses the discrete Fourier transform (DFT), the orthogonal wavelet transform (OWT) and transient event reinsertion procedures. By means of the MNMS algorithm it was possible to selectively manipulate the transient events which were present in the original steering vibration stimuli.

The mildly non-stationary mission synthesis algorithm splits an original signal into wavelet levels [34][35]. Wavelet levels consist of time histories which are obtained from the wavelet decomposition, and contain the signal energy which is specific to a specific frequency band. MNMS uses the orthogonal wavelet transform to divide the overall energy into individual signals, in a manner analogous to a parallel bank of band-pass filters. A feature which is specific to MNMS is a wavelet grouping stage which permits the user to group individual wavelet levels into larger regions of significant energy, as illustrated in the PSD plots of Figure 6, where each wavelet group (WG1, WG2, etc.) consists of two or more automatically generated wavelet levels. For the two acceleration stimuli used in the current study, the signal was automatically divided into 12 wavelet levels, which were then grouped based on user inputs into 4

wavelet groups for the cobblestone stimuli and 5 wavelet groups for the tarmac stimuli. As shown in Figure 6, the wavelet groups were ordered from the lowest frequency to the highest frequency for simplicity. In MNMS, transient events are defined as oscillations which have monotonic decay properties on either side of a central maximum. Two inversion points, one on either side of the peak value, define the temporal extent of the transient event, as shown in Fig. 7. Transient event identification is achieved in each wavelet group time history by means of a user selected trigger level that is specific to the wavelet group [33]. In the current study the wavelet group trigger levels were chosen to be in the range from 2.6 to 3.4 standard deviations. Table 2 presents the trigger level values chosen for each individual wavelet group, as well as the number of transient events that were extracted from the original stimuli (NBE) and the number of transient events that were reinserted into the test stimuli (NBR). Test signals were produced from each of the two experimentally acquired base signals using four time compression ratios of 1.0, 2.0, 3.0 and 4.0 and five transient event scale factors of 0.8, 1.0, 2.0, 3.0 and 4.0.

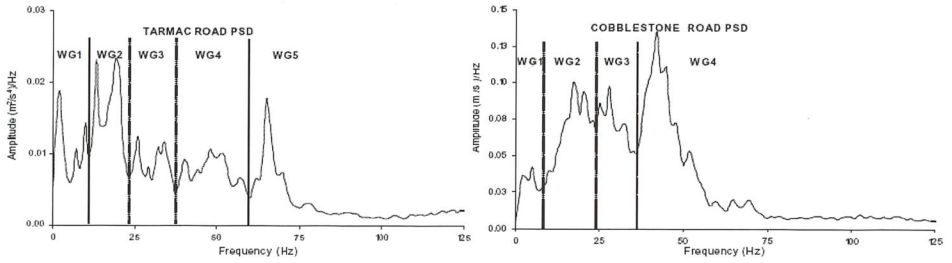


Figure 6. Power spectral densities of the steering acceleration time histories, showing the wavelet group boundaries chosen for use in the current study.

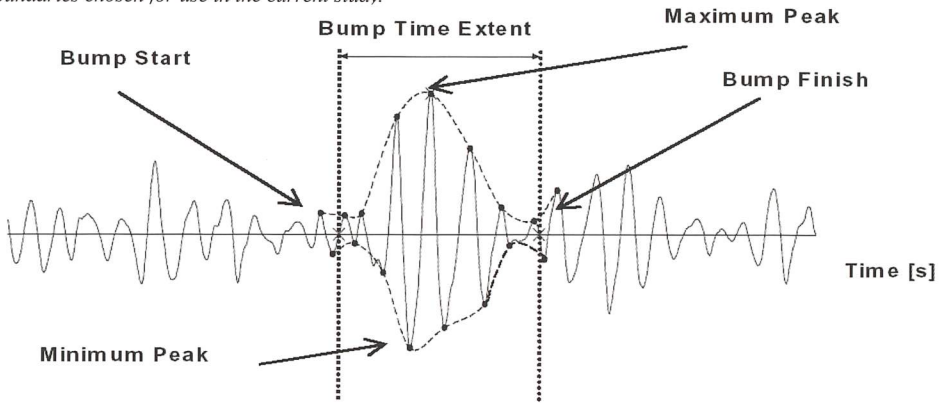


Figure 7. Example of a typical transient event identified by the MNMS algorithm.

SIGNALS	CR	WG1	WG2	WG3	WG4	WG5	NBE	NBR
TARMAC	1.0							53
	2.0	2.60	3.10	3.30	3.40	3.50	53	53
	3.0							49
	4.0							44
COBBLESTONE	1.0							53
	2.0	2.80	3.30	3.10	3.00	-	53	53
	3.0							53
	4.0							52

WG= Wavelet Group

NBE= number of transient events extracted.

NBR= number of transient events reinserted.

Table 2. Wavelet group transient event trigger levels used in the current study.

3.2. Test Facility

The steering wheel rotational test rig that was used is presented in Figure 8. The rotational system consisted of a 325mm diameter aluminium wheel attached to a steel shaft which was in turn mounted to two bearings. The shaft was connected to the electrodynamic shaker head by means of a copper stinger-rod. Table 3 presents the main geometric dimensions of the test rig, which were chosen based on data from a small European automobile. The seat was fully adjustable in terms of horizontal position and back-rest inclination as in the original vehicle. Rotational vibration was applied by means of a G&W V20 electrodynamic shaker driven by PA100 amplifier [36]. The steering wheel tangential acceleration was measured by means of an Entran EGAS-

FS-25 accelerometer attached to the top left side of the wheel. The accelerometer signal was amplified by means of an Entran MSC6 signal conditioning unit [37]. Control and data acquisition are performed by means of

the LMS TMON software system coupled to a DIFA SCADASIII unit [38].

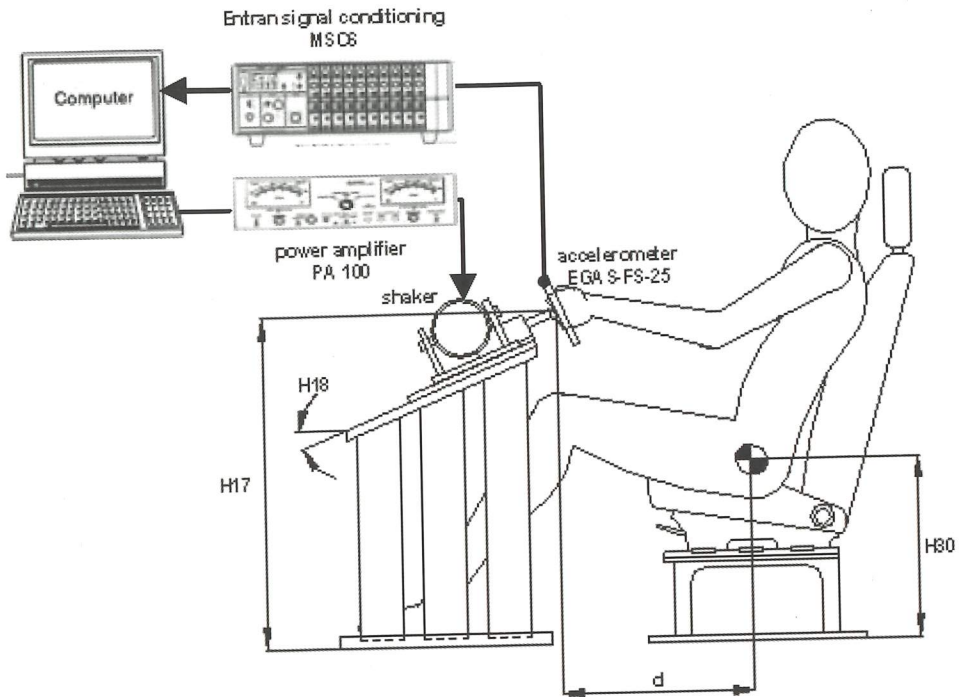


Figure 8. Steering wheel rotational vibration test facility.

Geometric Parameter	Value
Steering column angle (H18)	23°
Steering wheel hub centre height above floor (H17)	710 mm
Steering wheel diameter (W9)	325 mm
Steering wheel tube diameter	12.5 mm
Horizontal distance from H point to steering wheel hub centre (d= L11-L51)	390–550 mm
Seat H point height from floor (H30)	275 mm

Table 3. Geometric dimensions of the steering wheel rotational vibration test rig

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3.3. Test Subjects

15 university staff and students participated in the laboratory experiments (9 males and 6 females). The mean age for the group was 28.2 years, while the mean height was 1.72 m and the mean mass was 72.6 kg. No participant declared any condition which might effect the perception of hand-arm vibration, and none declared having ingested coffee prior to testing.

3.4. Test Protocol

Upon arriving in the laboratory, each subject was asked to sit in the test rig and to adjust the seat so as to achieve a realistic driving posture. He or she was then asked to fix his or her eyes on a board directly in front of the bench, which displayed a picture of a road surface. Prior to commencing formal testing, the subject was provided an example of each of the two stimuli types which would be used

later, in order to become acquainted with the detection task.

The detection task was to state, by means of "yes" or "no", whether each vibration stimuli that was actuated during the course of the experiment was from the road surface that was illustrated by the picture on the board directly in front of the test bench. When the actuated vibration stimuli had been produced using the base stimuli from the displayed road surface, the response was taken to be a correct detection. False alarms, on the other hand, were taken to be those situations when the participant responded "yes" to a stimulus which was not derived from the displayed road surface. No feedback was provided by the experimenter to the test participant regarding whether the identifications were correct or incorrect.

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Two laboratory experiments were performed. A single road surface was displayed in front of the participant during each experiment. The stimuli actuated at the wheel during each experiment consisted of an ensemble of 10 second test stimuli, each of which was either an original base stimuli or a modified derivative which has been defined starting from the two experimentally measured acceleration time histories. Three different series of 15 tangential acceleration stimuli were applied to evaluate each road surface type. In each series, each stimulus was separated from each other stimulus by a 5 second gap in which the participant was asked to state his or her judgment of road surface type. The order of stimuli presentation was fully randomised for each participant in each experiment.

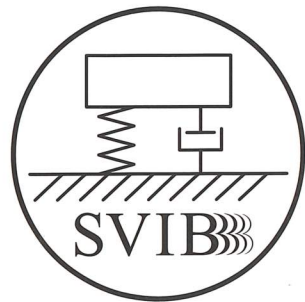
4. RESULTS

Figure 9 presents the results obtained from the experiment to determine the effect of the number of transient events on the human ability to detect road surface type. The results are presented in terms of percent correct detection, from 0 to 100 percent. Percent correct detection is presented along the ordinate, while the ratio of signal compression (the increases in the number of transient events) is presented along the abscissa. The original base stimuli are labelled as O, and the four compressed test stimuli are labelled as +1, +2, +3 and +4 to indicate compression ratios from 1 to 4. Figure 9 also presents the detectability index d' values [31], from -1 to 3, determined from the hit and false alarm rates obtained from the tarmac and cobblestone sessions. Both the detection rate and the detectability results suggest similar human response to both stimuli types. For both road surfaces the result suggests that optimal detection does not occur at the natural number of transient vibration events measured in the road vehicle. Significant increases in correct detection occurred for all compression ratios greater than 2 for the cobblestone stimuli, and

for the compression ratios of 1 and 2 for the tarmac stimuli.

The performance of each participant, specified as a hit rate and a false alarm rate, can also be represented as a single point on a receiver operating curve (ROC). Figure 10 presents the ROC points for the tarmac surface. The data confirms the improvement in detection where occurred for the compression ratios of 1 and 2.

Figure 11 presents the results obtained from the experiment to determine the effect of transient event scaling on the human ability to detect road surface type. The stimuli used in this experiment had a compression ratio of 2.0, which was chosen because it was the mean compression ratio considered in the current study. The results are again presented in terms of percent correct detection, from 0 to 100 percent, and in terms of detectability index values, from 0 to 3. The scale factors applied to the individual transient events (0.8, 1.0, 2.0, 3.0 and 4.0) by means of the MNMS algorithm are presented along the abscissa.



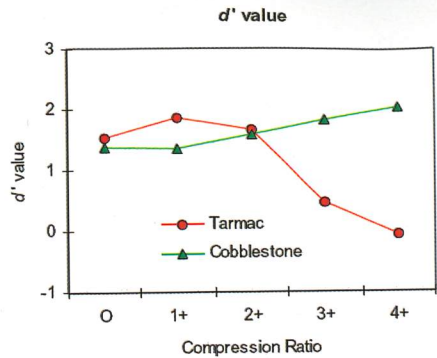
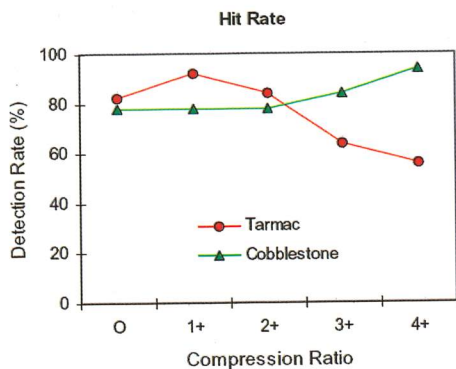


Figure 9. Results of the laboratory experiment to measure the effect of the number of transient events on the human detection of road surface type.

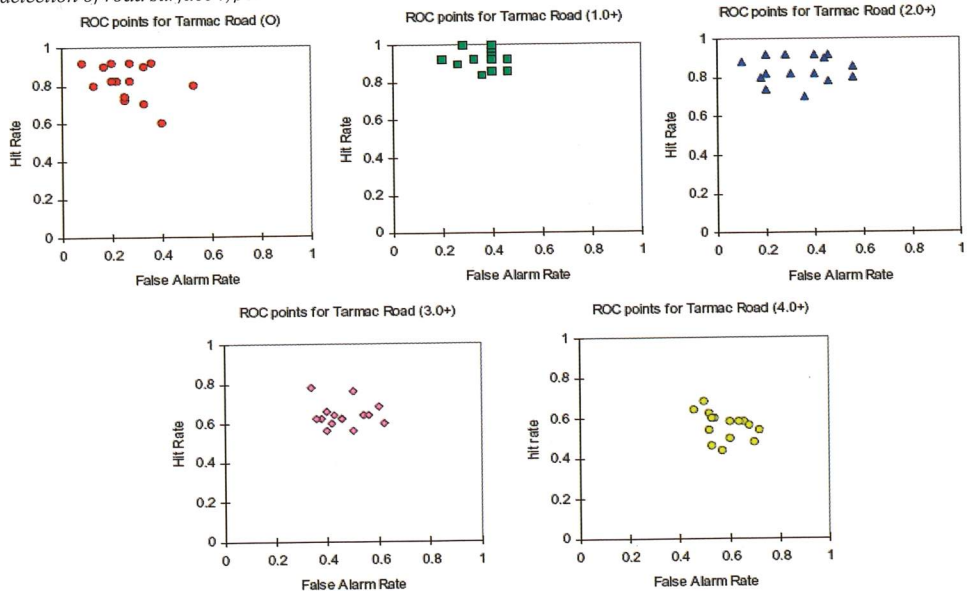


Figure 10. ROC points of tarmac surface for the laboratory experiment to measure the effect of the number of transient events.

For the stimuli involving transient events which were maintained at their natural scale ($\times 1.0$), the percentages of correct detection were 78% for the cobblestone stimuli, and 92% for the tarmac stimuli. In the case of the

cobblestone stimuli the optimum detection was achieved at the largest scale that was tested ($\times 4.0$), while for the tarmac stimuli optimal detection occurred for the smallest scale value tested ($\times 0.8$). For both road surface

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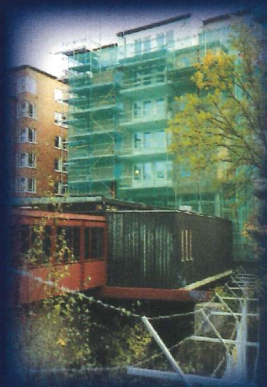
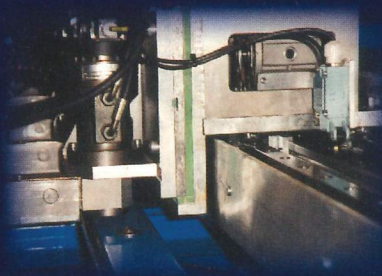
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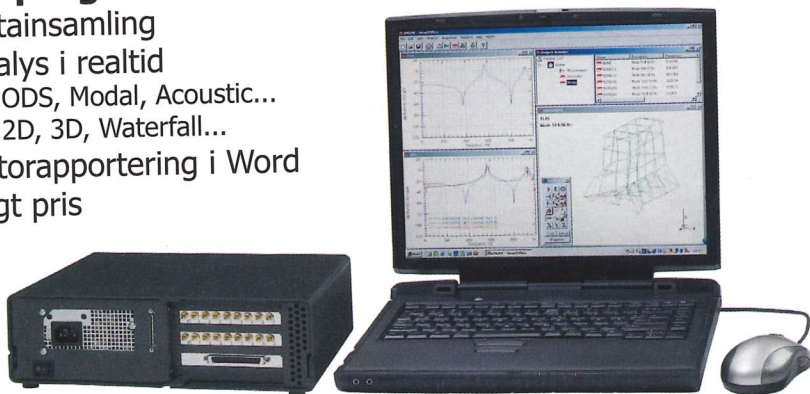
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types, optimal detection occurred for stimuli having transient events which were different

in size from those occurring naturally in the original stimuli.

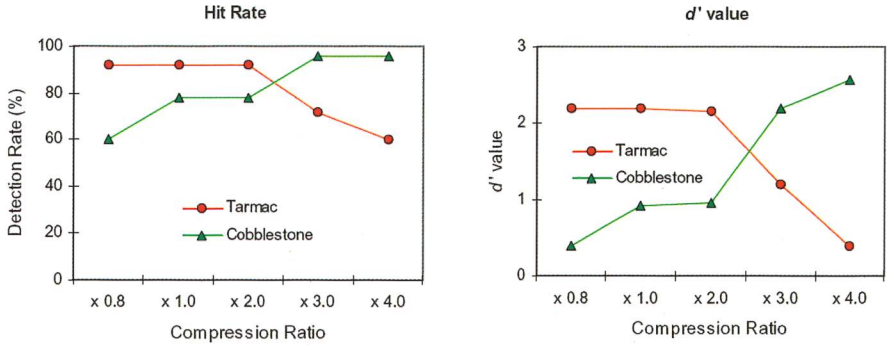


Figure 11. Results of the laboratory experiment to measure the effect of transient event scaling on the human detection of road surface type.

Figure 12 presents the receiver operation curve points for the group of subjects who performed the bump scaling experiment for

the cobblestone road surface. It can be seen that the data also confirms the improvement in detection where occurred at the largest scale tested.

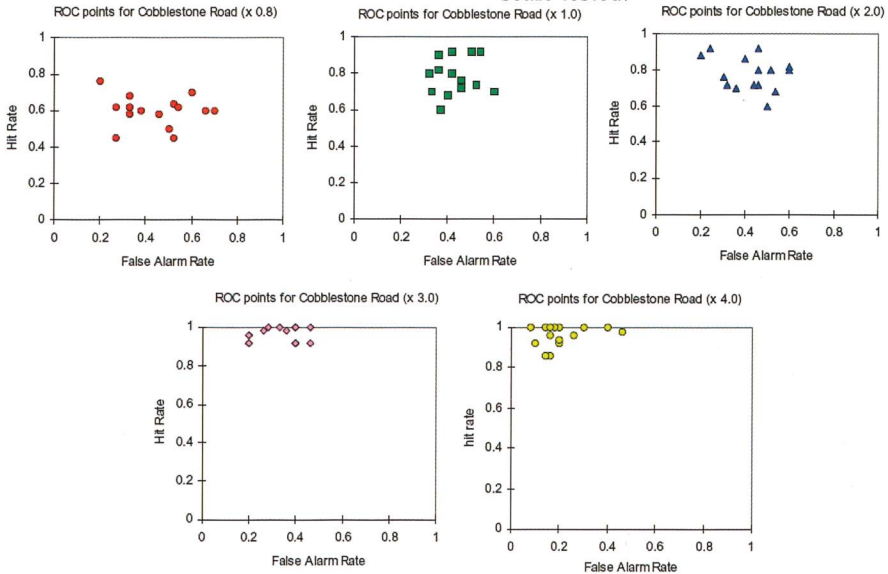


Figure 12. ROC points of cobblestone surface for the laboratory experiment to measure the effect of the transient events scaling.

5. DISCUSSION

Comparison of the current results to those previously obtained by Giacomini and Woo [9] suggests similarities. The curves of percent correct detection and those from the detectability index d' which are presented here, both those as a function of transient event frequency and those as a function of transient event scale, show similar qualitative behaviour to the curves defined in [9] as a function of overall signal scale. For example, the monotonic improvement in detection rate as a function of increasing compression ratio found for the cobblestone surface in this study mirrors the monotonic increase obtained in [9] as a function of overall signal scale, but with smaller changes in detection across the various test conditions.

The results of both the previous study [9] and the current study suggest that the manipulation of steering wheel vibrational feedback can improve driver detection of the road surface. In the current study, the rate of correct detection was improved by as much as 20 percentage points by the adoption of stimuli manipulation.

The results of both the previous study [9] and the current study also suggest, however, that a fixed increase in the frequency of transients

events, or a fixed increase in transient event scale, or a fixed change of overall signal scale, will not lead to improved road type detection in the case of all road surface types. Individual road surface types appear to require individual signal manipulation settings. The conclusion suggests that an important function of an automobile perception enhancement system would be that of pattern recognition. Automated real-time classification of stimuli type would permit a perception enhancement system controller to determine the needed optimal feedback gains.

6. ACKNOWLEDGMENTS

The authors thank the CONACyT for their economic support of the research and thank colleagues at MIRA for providing the steering and suspension data.



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Human Response to Vibration

Is whole body vibration an effective alternative to strength training?

Marco Cardinale^{1,2}

¹Olympic Medical Institute, Northwick Park Hospital, London (UK)

²School of Medical Sciences, University of Aberdeen, Scotland (UK)

Email Address; Marco.Cardinale@boa.org.uk

Whole body vibration (WBV) has been recently purposed as an exercise intervention due to its potential in increasing force-generating capacity in the lower limbs. The recent popularity of vibration exercise is due to the combined effects on the neuromuscular system and the neuroendocrine system so far observed. The preliminary results currently available in the literature seem to recommend vibration exercise as a therapeutic approach for sarcopenia and possibly osteoporosis. In particular, vibration has been reported to produce adaptive responses similar to the ones observed with resistance exercise.

Most of the studies so far conducted have focused on the acute and chronic effects of WBV on neuromuscular performance. In our studies, whole body vibration exercise has been shown to acutely enhance strength and power capabilities in well-trained individuals (Bosco et al., 1999; Bosco et al., 2000). Also WBV applied for a total of ten minutes (26 Hz, 4 mm) was shown to improve vertical jumping ability, increase testosterone and growth hormone levels and decrease cortisol levels in recreationally active individuals (Bosco et al., 2000). Not all studies have reported acute increases in neuromuscular performance. Torvinen et al. (2002a) for example have shown acute increases in knee extension maximal strength and vertical

jumping height following 4 minutes of WBV when relatively large amplitude was applied (4 mm) with a tilting plate as compared to no significant acute effects when a low amplitude was applied with a whole plate oscillation (2 mm, Torvinen et al., 2002b). Other studies have also reported contradictory results. Chronic studies seem to suggest that WBV can produce adaptive responses similar to the ones observed with conventional resistance exercise.

We have recently conducted a series of experiments to analyse the acute effects of WBV on hormonal responses in healthy individuals. Our results have shown no significant change in salivary testosterone and cortisol levels following ten sets of WBV vibration exercise at 30Hz as compared to a control condition with time-series measurements performed up to 24 h following the exercise intervention. We have also analysed serum IGF-1 and Testosterone responses to two different small vibration amplitudes (1.5 and 3 mm) and no significant effects of vibration were identified. These results are in perfect agreement with recent evidence in the literature (Di Loreto et al., 2004). Dynamometric and electromyographic analyses conducted in our lab also seem to suggest that the exercise intensity, when standing on WBV plates with relatively small

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amplitude vibration, it is modest and does not produce significant alterations in the hormonal profile and muscle activation patterns of healthy young individuals.

On the other hand, work recently completed analysing the effects of the same parameters on elderly individuals showed acute increases in serum IGF-1 and Testosterone levels which were sustained for up to 2 hours following a 5 min WBV intervention.

We have recently conducted studies employing Near Infrared Spectroscopy and Ultrasonography and we have identified different activation patterns of the muscles of the lower limbs while undergoing WBV exercise and acute alterations in muscle architecture following WBV exercise sessions. Finally, we have developed and patented (WO1004009173) a vibration exercise device based upon a biofeedback system that allows vibration exercise to be performed in static and dynamic modality and with different levels of muscle activation. Preliminary results seem encouraging and suggest that this methodology is much more effective than the one currently available.

Current evidence does not support the idea that WBV exercise could substitute conventional resistance exercise modalities for strength development in elite athletes. However, this technology represents a promising alternative in special populations and/or injured athletes due to its potential effects on the neuromuscular system and on bone tissue. In this light, we have also developed an animal model and have conducted a series of experiments aimed to understand the effects of WBV on motor learning, motor control and neurogenesis using NMRI mice. Our results have shown that WBV was able to improve sensory-motor activities in the trained mice and produced neurogenesis in the dentate gyrus similarly to other forms of exercise previously reported (i.e. Van Praag et al. 1999). These results support our idea that WBV can be an effective form of exercise for special populations. Elite

athletes are unlikely to benefit from current equipment designs; however more studies should be conducted superimposing vibration to high levels of muscle activation with the possibility of providing benefit also to fit individuals. It is certain that well-controlled, unbiased studies are needed in order to ascertain the most effective and safe modality for its use on humans.

Key words: Vibration Exercise, Neuromuscular Performance, Neuroendocrine performance

RESUME : Dr. Marco Cardinale is the research manager of the Olympic Medical Institute, the specialist national support centre for high performance athletes of the British Olympic Association. Dr. Cardinale is also an honorary lecturer at the University of Aberdeen, School of Medical Sciences. He has been involved in research activities on the use of vibration as an exercise intervention for ten years and has produced numerous scientific papers and 1 patent on vibration exercise devices. Dr. Cardinale is ad-hoc reviewer for many granting agencies and scientific journals and is a member of the life sciences advisory group on bed rest studies of the European Space Agency.



DOES WHOLE BODY VIBRATION INCREASE MUSCLE STRENGTH?

Maria Nordlund Ekblom

¹, Swedish school of Sport and Health Sciences (GIH), Stockholm

²Department of Neuroscience, Karolinska Institutet, Stockholm

Email Address: maria.nordlund@gih.se

INTRODUCTION

Whole body vibration (WBV) has recently been put forward as an effective and somewhat glamorous complement or even alternative to traditional resistance training. A review article from 2005 with a literature search that ended in 2003, presents several articles on acute effects of vibration training, but only two on sustained i.e. training effects of WBV (Lou *et al.*, 2005). Lou *et al.* (2005) conclude that the findings of these two articles were contradictory with one showing no difference between WBV and a control group and the other showing that the training effects were larger in the WBV group. Since the end of the search of Lou *et al.*, several studies have been published who investigate training effects of WBV on muscle strength. We therefore performed a systematic literature search to summarize these findings.

METHODS

MEDLINE (Pub Med) and SPORT DISCUS (Ebsco) were searched on the August 14, 2005 back to the earliest available time for the word vibration in combination with strength and training. Studies were only included if they investigated long-term effects of whole body vibration on strength and/ or jump performance and included a control group.

RESULTS AND DISCUSSION

Twelve articles fulfilled the inclusion criteria. Nine of the twelve studies showed a significant improvement in one or more parameters when comparing performance before with performance after WBV.

Since WBV always occurred during some type of exercise on the vibrating platform, improvements must be compared to those of a control group, before anything can be said about the effects of WBV, as such. All studies included a control group, but the activities of the control groups differed. Some articles included several different control groups and others just one. Only five of the twelve included articles used a control group that performed identical exercises to that of the WBV group. Out of these five, only one showed greater improvements in muscle strength after WBV, and the remaining four reported no difference between WBV and control groups. Eight articles compared a WBV group to that of a passive control group. Not surprisingly, the majority of these articles showed greater improvements in strength and/or jump performance in the WBV group. Two of these nine articles, however, showed no improvements in either the WBV group or the passive control group. A special case was a study performed by Delecluse *et al.* (2005) who added WBV to intense background training and saw no improvements

in either group. Four studies compared WBV to a control group performing exercises of alleged higher intensity than that of the WBV group. Out of these four articles one showed greater improvements in the WBV group and the other three showed no difference between the WBV group and the active control group. The differences in exercise intensity between the WBV group and the active control group were unclear. The training carried out on the vibrating platform included squatting on one leg. The load imposed during this exercises may be rather high for the untrained and elderly subjects and not too different from the load of the strength training exercises performed by the active control group. It can be concluded that the articles reviewed here do not support the idea that WBV should be used as a complement or substitute to resistance exercise for strength development. The theoretical rationale for training effects from WBV on muscle strength can be

questioned. It is often speculated that WBV increases muscle strength via inducing reflex mediated activation of the muscles, but WBV has never been shown to increase neural activation above that achieved during a maximal voluntary muscle action.

A full article on this systematic review will be published online in Med Sci Sports Exerc in October 2006.

RESUME : Dr. Maria Ekblom (publishes as Nordlund) is a lecturer and research assistant at the Swedish School of Sport and Health Sciences. In her doctoral theses she has investigated spinal mechanisms for reflex control in man. Her main research focus is neural activation during lengthening and shortening muscle actions, as well as during fatigue.



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ACOUSTIC EMISSION

Hej Alf

För din information så säljer jag piezoelektriska accelerometrar och tillbehör från Vibra-Metrics som ägs Physical Acoustics Corp i USA som tillhör vår företagsgrupp (Mistras Holding Group).

Det jag dock framförallt arbetar med är försäljning av tjänster och mätutrustning för **Akustisk Emission** (AE) som är högfrekventa transienta (dock inte alltid) elastiska vågor i material. AE brukar ibland lite slarvigt kallas för passivt ultraljud. Det är vibrationer som är så högfrekventa att de blir omöjliga att mäta med vanliga accelerometrar. Dessa högfrekventa "vibrationer" finns naturligtvis överallt i vår omgivning.

Kommersiellt nyttjas AE för materialprovning där den är mest använd, t ex för att lyssna till aktiv korrosion i cisternbottnar, etc. När det rostar kan man höra detta! Där är tekniken väl etablerad (det finns erfarenhet från mer än 10 000 cisterner) AE genereras även från roterande maskiner. Stora långsamtgående lager genererar AE och tekniken är mycket användbar för att hitta skador. Man kan detektera urladdningar i transformatorer, lyssna sig till kavitation (även biologisk kavitation från växter), man kan enkelt och snabbt hitta dolda läckage i t ex ventiler. Andra områden är sand detektering (olja-sand separering), loose part monitoring (allt från rörledningar till mickro chip), etc.

Om Akustisk Emission är en teknik som du tycket passar på ett SVIB seminarie så kan jag ge en presentation.

Hälsningar
Leif Norman

På senaste mötet i Maskinvibrationskommittén nämnde jag att jag fått ovanstående mail från Leif och då fick jag veta att det pågår flera standardiseringsarbeten på Acoustic Emission, AE, inom den internationella vibrationskommittén. Bland annat finns ett förslag till nytt arbete NW, (New Work Item) Condition monitoring and diagnostics of machines –Using airborne/sturture-borne urltasound –General Guidelines samt ISO DIS 22096 Acoustic emission. Röstningstiden för den svenska remissen SIS 4441 gick ut

den 28 augusti 2006. Förslaget godkändes.

Elisabet Blom, ÅF Konsult, yttrade på senaste mötet med Maskinvibrationskommittén att alla borde tänka på kostnaderna för inköp av standarder i samband med olika uppdrag och föreslog därför att man inte utan vidare skulle godkänna arbetet utan att tillfoga en uppmaning om att söka kombinera de två dokumenten.

Ylva Vidhög som också deltog i mötet påpekade att frekvensområdet för "acoustic emission" har sänkts så lågt att det numera innefattar området för air- och structureborne sound vilket används bland annat för "loose part monitoring" och "leak detection". Hon understödde önskemålet att kombinera metoderna i ett dokument i stället för att göra ett nytt.

Anders Nöreömark, ordföranden i den svenska kommittén, drog sig till minnes ett tillfälle när han abonnerade på standarder för maskinvibrationer och fick ett flertal metoder för mätning på gräsklippare och hushållsapparat. Han tyckte därför rent allmänt att det skulle vara av godo att hålla nere antalet standarder och floran av korsreferenser.

Vibrationskommitténs uppgift har reviderats

På annan plats i detta nr av SVIB Nytt finns det nya Scopet för ISO TC 108. Den största avvikelserna från tidigare är att man tagit med tillståndskontroll i titeln och på flera andra ställen och att man utlämnat metoder för provning samt maskiner för vibrations och stötprovning.

Den internationella kommittén håller möten dels i Prag 16 – 20 april dels i Berlin 23 – 27.

Alf Olsson

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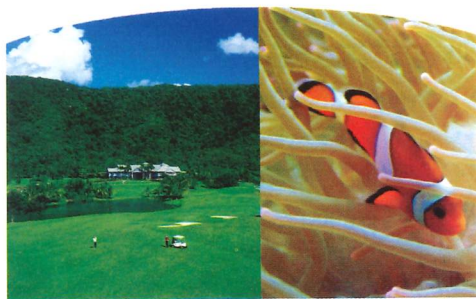


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In Cooperation with

The International Union of Theoretical and
Applied Mechanics (IUTAM)



Dear Colleague,

*Almost 600 abstracts have now been received for ICSV14. The abstract deadline date of 15 January 2007 has now passed. We have received a lot of requests to extend the abstract submission deadline because of the recent end of the year holiday period. We have decided to extend the abstract deadline to **15 February 2007**.*

Dear Industry Professional,

Two new working groups, **Liquid-borne Particle Counting** and **HALT and HASS**, will meet to discuss test methods and develop Recommended Practices during ESTECH 2007, the Institute of Environmental Sciences and Technology (IEST) annual technical meeting and exposition. The conference will take place April 29-May 2, 2007 at the Indian Lakes Resort in Bloomingdale (northwest suburban Chicago), Illinois.

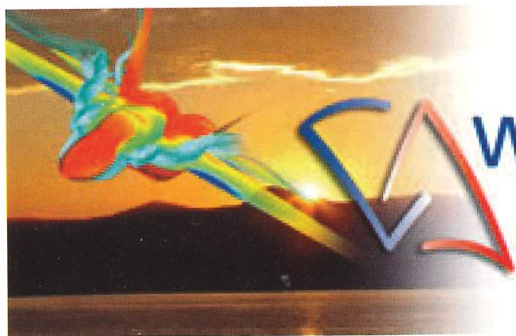
IEST offers Recommended Practices on a broad range of topics. A **Recommended Practice Update** session will highlight provisions of the most widely used documents published by the Design, Test, and Evaluation/Product Reliability Division. Members of existing IEST Working Groups and other interested persons are invited and encouraged to attend.

Registration and the advance program can be found at www.iest.org/estech/estech.htm. Do not forget to sign up for the ESTECH 2007 Golf Outing to be held Sunday, April 29 at 1 p.m.

Sincerely,

Heather Dvorak

Heather Dvorak, Marketing Associate



World Congress

Vancouver, Canada

May 22nd - 25th

2007

Dear Colleague, **NAFEMS World Congress 2007 - Call for Papers** NAFEMS is an independent not-for-profit body with the sole aim of promoting the effective use of engineering simulation methods such as finite element analysis, multibody system dynamics and computational fluid dynamics. The NAFEMS World Congress will be **the** International Congress on Simulation Technology for the Engineering Analysis Community.

This conference will bring together world leading industrial practitioners, consultancies, academic researchers and software developers with a common interest in engineering analysis. Simulation is now established in many engineering companies as part of their product development process. Whilst the conference will cover many aspects of the use of simulation, a particular focus will be how the appropriate deployment of simulation can lead to a further competitive advantage through helping to stimulate innovation.

Held at the Westin Bayshore Hotel, Vancouver, Canada, on May 22nd-25th 2007, the NAFEMS World Congress 2007 is easily accessible from across the globe. **Call for Papers** We are inviting papers from all areas of engineering simulation, including the areas listed below. If you are interested in submitting an abstract for consideration, please register your interest at www.nafems.org/congress and we will get back to you with further information. **Deadline for Abstract Submission – 18th September 2006** **Themes**

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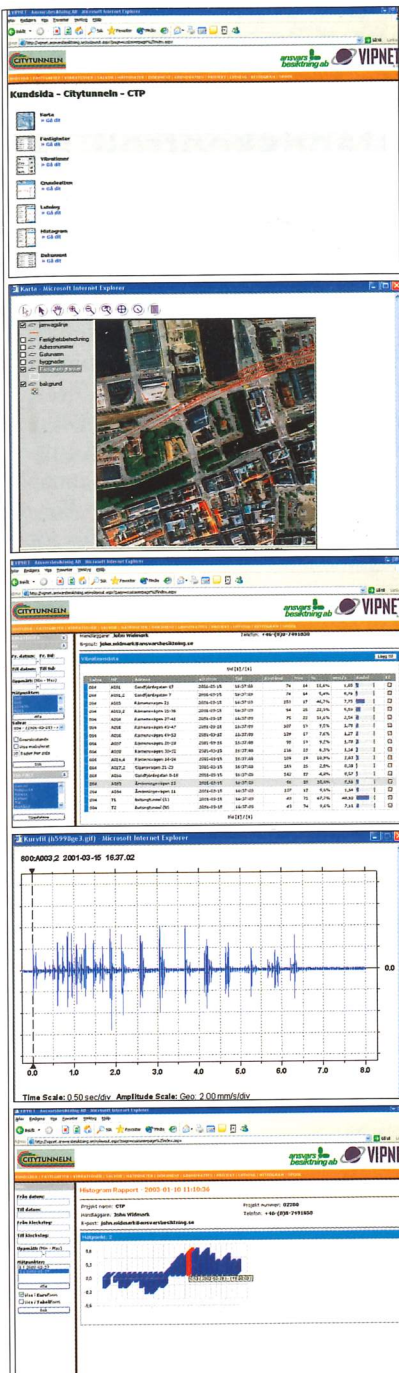
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The Wiley Preview som dimper ner i SVIBs brevlåda 4 ggr per år innehåller allt färre böcker under rubriken Engineering. I septembernumret förekom dock följande lärobok i ny utgåva vilken kanske möter upp till ett nyligen framfört önskemål om fler "tutorial sessions" i SVIB.

Engineering: Mechanics-Dynamics, 6th Edition

J. L. Meriam, University of California, Santa Barbara, USA and
L. Glenn Kraige, Virginia Polytechnic Institute and State University, USA.

Over the past 50 years Meriam & Kraige's Engineering Mechanics – Dynamics has established a highly respected tradition of excellence – a tradition that emphasises accuracy, rigor, clarity, and applications. Now in a Sixth Edition, this classic text builds on these strengths adding a comprehensive course management system, Wiley Plus, to the text, including and e-text, homework management, animations of concepts and additional teaching and learning resources.

READERSHIP: Courses in Engineering Mechanics Dynamics. 736 pp £ 79,50 Sept. 2006.

SEK har tagit fram en Handbok 440: Utgåva 1 - Tillståndskontroll av kaplanturiner.

Handboken innehåller råd och vägledningar som syftar till att på ett enhetligt och systematiskt sätt utföra tillståndskontroller på Kaplanlöphjul i såväl vertikal som horisontell uppställning. I handboken ges anvisningar för hur olika kontroller kan genomföras, både under drift och då turbinen är avställd. Handboken är i första hand avsedd för driftpersonal, leverantörer, konsulter och annan personal som genomför tillståndskontroller i vattenkraftverk men kan även användas för utbildningsändamål.

Ljud nämns oftare än vibrationer

Svaga kavitationsljud kan till exempel förstärkas genom att placera exempelvis en skruvmejsel mellan örat och löphjuls-kammarens vägg. Förutom att registrera kavitationsljud genom direkta hörselintryck har metoder baserade på elektronisk utrustning med sensorer för multidimensionell diagnostik provats utan att nå någon kommersiell framgång.

Löphjulsspalt med värdet noll kan detekteras genom att notera ljud- eller vibrationer i området kring löphjuls-kammaren.

COMADEM 2007

Dear Colleague,

On behalf of the Organizing Committee, I am pleased to invite you to attend the 20th International Congress and Exhibition on Condition Monitoring and Diagnostic Engineering Management (COMADEM), to be held in Faro (Algarve), Portugal, from 13-15 June 2007.

I strongly encourage you to submit papers to the COMADEM 2007 congress. **The deadline for abstracts submission is January 8 2007.** Further details about COMADEM 2007 can be found at <http://www.co.it.pt/comadem2007>

I would appreciate it you could also send this information to your colleagues that might be interested in this event.

Please accept my apologies if you receive this

information more than once, which might be due to the fact that several different databases were used.

Thank you for your interest and I hope to see you in Faro (Algarve), Portugal, in June 2007!

Best regards

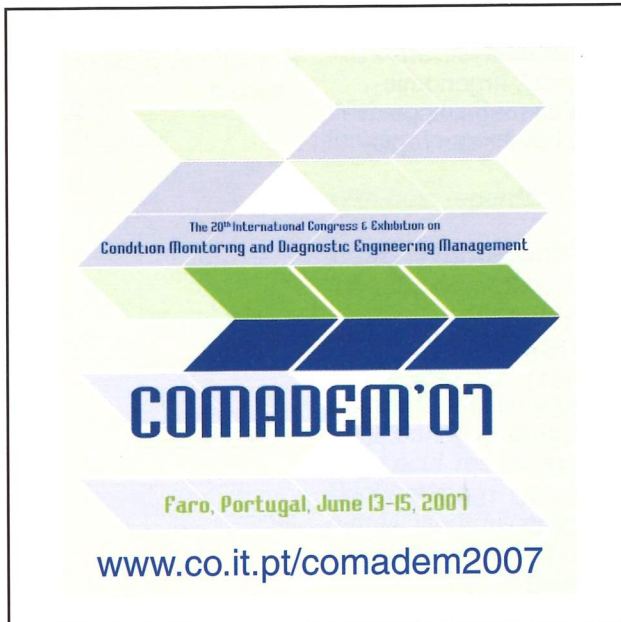
A. J. Marques Cardoso
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Invitation to participate

The 11th International Hand-Arm Vibration Conference, organised by the Acoustical Society of Italy (AIA) and the National Institute of Occupational Safety and Prevention (ISPESL) will be held in Bologna (Italy) from 3rd to 7th June 2007.

The upcoming Conference will take place two years after the implementation of the European Directive 2002/44/EC into the national legislation of Member States. The Conference will be an important opportunity for evaluating preventive strategies to reduce worker exposures to hand-arm transmitted vibration and to decrease the occurrence of Hand-Arm Vibration Syndrome (HAVS) in workers.

This multi-disciplinary Conference will provide a unique opportunity to exchange information between researchers around the world. Special emphasis will be given to preventive measures and to the transfer of knowledge from the researchers to tool manufacturers, and occupational health physicians in fields related to medical, ergonomic, testing, engineering and legal aspects of HAVS. 86 papers have been registered.

The past Conferences have been held in:

Dundee (Scotland, 1972)
Cincinnati (USA, 1975)
Ottawa (Canada, 1981)
Helsinki (Finland, 1985)
Kanazawa (Japan, 1989)
Bonn (Germany, 1992)
Prague (Czech Republic, 1995)
Umeå (Sweden, 1998)
Nancy (France, 2001)
Las Vegas (USA, 2004)

Conference Venue

The conference will take place at the Bologna Research Area of the National Research Council of Italy (CNR). The city of Bologna preserves the traces of past civilisations and the character of medieval splendour. Avidly visited by the Romantic writers and celebrated for the arts and culinary excellence, Bologna is animated by a cosmopolitan culture that is enriched by the presence of the University. Founded in 1088, the University is recognised as the oldest one in the western world and offers a multi-campus structure which is divided into 23 faculties, 68 departments and 5 campus branches.

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The registration fee is:

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649 € if paid after 16 May 2007

At a preferential rate for our use, bedrooms have been reserved at the conference hotel Residence Starnberger See and additionally at the Hotel Kaiserin Elisabeth. These are reserved only until 10 July 2007, after which they will not be held. To book your room, please contact the hotel of your choice directly, quoting IWRN 9.

**The Deutsche Bahn AG (DB Systemtechnik,
Department of Acoustics and Vibrations)
is organising the 9th Workshop.**

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- IWRN 9 -

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**"Thirty Years from the
Romania Earthquake of
March 4, 1977"**

**Bucharest, Romania
1-3 March 2007**

The 30th anniversary of the 1977 Vrancea earthquake offers the opportunity to organize a symposium devoted primarily to the summarizing of professional experience, of evolution of engineering practice and of scientific research in the field of earthquake engineering. This would make it possible to enhance cooperation at an international and national level.

Dear Colleagues,

Attached is an invitation to an international symposium (EAEE) that I am organizing next year in March in Bucharest. Please ignore the date for the abstract submission, and let me know if you are interested. The only fixed date is January 15, 2007. No fees are required.

Wishing you Season's Greetings, we look forward to meet you in Bucharest.

With best regards,

Prof. Ion VLAD

Ion Vlad [vlad@dial.kappa.ro]

*Technical University of Civil Engineering
Bucharest*

*Romanian National Center for Earthquake
Engineering and Vibrations
124 Lacul Tei, sector 2, 020396 -
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e-mail: vladi@itcnet.ro and

vlad@dial.kappa.ro

Tel/Fax: 0040 21 242 58 03

Is whole body vibration an effective alternative to strength training?

Marco Cardinale^{1,2}

¹Olympic Medical Institute, Northwick Park Hospital, London (UK)

²School of Medical Sciences, University of Aberdeen, Scotland (UK)

Email Address: Marco.Cardinale@boa.org.uk

Whole body vibration (WBV) has been recently purposed as an exercise intervention due to its potential in increasing force-generating capacity in the lower limbs. The recent popularity of vibration exercise is due to the combined effects on the neuromuscular system and the neuroendocrine system so far observed. The preliminary results currently available in the literature seem to recommend vibration exercise as a therapeutic approach for sarcopenia and possibly osteoporosis. In particular, vibration has been reported to produce adaptive responses similar to the ones observed with resistance exercise.

Most of the studies so far conducted have focused on the acute and chronic effects of WBV on neuromuscular performance. In our studies, whole body vibration exercise has been shown to acutely enhance strength and power capabilities in well-trained individuals (Bosco et al., 1999; Bosco et al., 2000). Also WBV applied for a total of ten minutes (26 Hz, 4 mm) was shown to improve vertical jumping ability, increase testosterone and growth hormone levels and decrease cortisol levels in recreationally active individuals (Bosco et al., 2000). Not all studies have reported acute increases in neuromuscular performance. Torvinen et al. (2002a) for example have shown acute increases in knee extension maximal strength and vertical jumping height following 4 minutes of WBV

when relatively large amplitude was applied (4 mm) with a tilting plate as compared to no significant acute effects when a low amplitude was applied with a whole plate oscillation (2 mm, Torvinen et al., 2002b). Other studies have also reported contradictory results. Chronic studies seem to suggest that WBV can produce adaptive responses similar to the ones observed with conventional resistance exercise.

We have recently conducted a series of experiments to analyse the acute effects of WBV on hormonal responses in healthy individuals. Our results have shown no significant change in salivary testosterone and cortisol levels following ten sets of WBV vibration exercise at 30Hz as compared to a control condition with time-series measurements performed up to 24 h following the exercise intervention. We have also analysed serum IGF-1 and Testosterone responses to two different small vibration amplitudes (1.5 and 3 mm) and no significant effects of vibration were identified. These results are in perfect agreement with recent evidence in the literature (Di Loreto et al., 2004). Dynamometric and electromyographic analyses conducted in our lab also seem to suggest that the exercise intensity, when standing on WBV plates with relatively small

amplitude vibration, it is modest and does not produce significant alterations in the hormonal profile and muscle activation patterns of healthy young individuals.

On the other hand, work recently completed analysing the effects of the same parameters on elderly individuals showed acute increases in serum IGF-1 and Testosterone levels which were sustained for up to 2 hours following a 5 min WBV intervention.

We have recently conducted studies employing Near Infrared Spectroscopy and Ultrasonography and we have identified different activation patterns of the muscles of the lower limbs while undergoing WBV exercise and acute alterations in muscle architecture following WBV exercise sessions. Finally, we have developed and patented (WO1004009173) a vibration exercise device based upon a biofeedback system that allows vibration exercise to be performed in static and dynamic modality and with different levels of muscle activation. Preliminary results seem encouraging and suggest that this methodology is much more effective than the one currently available.

Current evidence does not support the idea that WBV exercise could substitute conventional resistance exercise modalities for strength development in elite athletes. However, this technology represents a promising alternative in special populations and/or injured athletes due to its potential effects on the neuromuscular system and on bone tissue. In this light, we have also developed an animal model and have conducted a series of experiments aimed to understand the effects of WBV on motor learning, motor control and neurogenesis using NMRI mice. Our results have shown that WBV was able to improve sensory-motor activities in the trained mice and produced neurogenesis in the dentate gyrus similarly to other forms of exercise previously reported (i.e. Van Praag et al. 1999). These results support our idea that WBV can be an effective form of exercise for special populations. Elite

athletes are unlikely to benefit from current equipment designs; however more studies should be conducted superimposing vibration to high levels of muscle activation with the possibility of providing benefit also to fit individuals. It is certain that well-controlled, unbiased studies are needed in order to ascertain the most effective and safe modality for its use on humans.

Key words: Vibration Exercise, Neuromuscular Performance, Neuroendocrine performance

RESUME : Dr. Marco Cardinale is the research manager of the Olympic Medical Institute, the specialist national support centre for high performance athletes of the British Olympic Association. Dr. Cardinale is also an honorary lecturer at the University of Aberdeen, School of Medical Sciences. He has been involved in research activities on the use of vibration as an exercise intervention for ten years and has produced numerous scientific papers and 1 patent on vibration exercise devices. Dr. Cardinale is ad-hoc reviewer for many granting agencies and scientific journals and is a member of the life sciences advisory group on bed rest studies of the European Space Agency.



Hoppolek för barn med grava funktionshinder

Benskörhet och deformation av skelettet är ofta förekommande hos barn med grav cerebral pares eftersom de inte själva kan belasta sitt skelett genom lek och rörelse som andra barn.

Hoppolek är en medicinteknisk konstruktion som syftar till att ge barn med grava funktionshinder möjlighet att belasta skelettet. Där kan barn i ståskal (formgjutna plastskal som möjliggör upprättstående) ställas på en plattform som barnen själva, genom knapptryckning på en flexibel manöverpanel, kan få att rotera, vibrera och hoppa. Barnen kan också trycka på/av musik.

Ylva Dalén, leg. sjukgymnast MSc, har arbetat med barn med funktionshinder inom habilitering i tio år och är uppfinnare av Hoppolek som belönades med Stockholms stads uppfinnarstipendium 2001. Två prototyper och en demoprodukt är sedan dess framtagna. En prototyp står på Tekniska museet i Stockholm på en utställning om kvinnors uppfinningar och den första prototypen används i ett forskningsprojekt inom ramen för vidare forskarutbildning sedan tre år. Ylva är registrerad doktorand vid Karolinska Institutet och kommer att presentera preliminära resultat av sin studie som beräknas vara avslutad i juni 2007. Demoprodukten visades vid BNAM 2006, tillsammans med en preliminär utvärdering av hur en liten grupp barn påverkats av Hoppolek.



Foto: Johan Granlund

Transient vibrations from impact wrenches: Vibrations negative effect on blood cells and standards for measurement

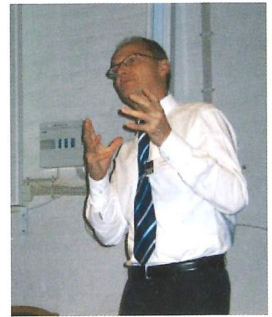
Lindell H¹, Lönnroth I², Ottertun H¹

¹ Hans Lindell, IVF, Swedish Institute of Production Engineering Research

Argongatan 30, 431 53 Mölndal, Sweden, hans.lindell@ivf.se

¹ Swedish Institute of Production Engineering Research, Göteborg, Sweden

² Sahlgren University Hospital, Göteborg, Sweden



Hans Lindell in action

Introduction

This paper shows how the cell membrane of red blood cells is destroyed by transient vibrations from impact wrenches. It also describes how ISO 5349 (1) filters away these transients without taking their negative effect into account. It is also shown that these transients can be dampened substantially. Moreover, because blood cells are destroyed, it is likely that transient vibrations will have a harmful effect on other biological tissues of the hand including nerve cells. The reason for using blood cells as an indicator of biological damage from transient vibrations is that the impact is easy to detect and measure.

Vibrations from hand held tools that produce transient vibrations, such as impact wrenches in car repair shops, are a common cause of vibration-related injuries (2). Such injuries occur even though these tools have a typical vibration level of about 3 m/s^2 (as measured in accordance with ISO 5349) and are used only 10 minutes per day. This may be compared with a grinder whose vibration level is often 6 m/s^2 and is typically used several hours per day. The transmitted vibration dose is several times higher from the grinder in comparison to the wrench. Thus, one would suspect that vibration-related injuries would be greater among people working with grinders than it

would among people working with impact wrenches; however, evidence suggests this is not the case. The vibration dose is calculated by multiplying exposure time with acceleration squared.

It is our belief that the transient vibration peaks from the impact wrenches cause these injuries in the human hand. This effect, however, is not covered by ISO 5349.

Methods

To investigate whether transient vibrations have an impact on biological tissue, an experimental procedure was designed that allowed cow blood to be filled into soft polyurethane rubber containers mounted on the following parts of an impact wrench and a grinding machine.

1. The handle of a one-half inch pneumatic impact wrench with aluminium housing;
2. the handle of a one-half inch pneumatic impact wrench with aluminium housing and an internal vibration dampening mechanism;
3. the socket of the impact wrench;
4. the handle of an 180 mm pneumatic vertical grinding machine with a standardised unbalanced wheel; and
5. the handle of an 180 mm pneumatic vertical grinding machine with grinding wheel.

The test time was 15 minutes for all measu-

rements. The impact wrenches were run on a fixed nut (case 1, 2 and 3), the grinders were run unloaded in the air (case 4) and during grinding under normal working conditions (case 5).

The vibrations were measured close to the container to allow comparisons with these measurements and the results from the blood tests. Both the hand-arm-weighted acceleration according to ISO 5349 and the unfiltered acceleration were measured.

The hand-arm-weighted acceleration was measured with a mechanical filter and a B&K 4384 accelerometer using a B&K 2635 charge amplifier. The signal was analysed in a Norsonic 830.

The unfiltered acceleration was measured with a B&K 4374 accelerometer with a weight of 0.7 gram and mounted to the surface with X-60, a stiff gap-filling glue often used in strain gage measurements. The mounted resonance frequency was calculated to be well above the measuring range. To restrict analysis to accelerations that are within the specifications of the accelerometer, we used a B&K 2635 charge amplifier and the signal low pass filtered at 30 kHz.

The peak acceleration amplitude is largely dependent on how high up in frequency the acceleration is measured. To compare measurements care must be taken that they are carried out in the same way with the same frequency limit. The vibrations from an impact wrench probably have a frequency content well above 30 kHz.

DC shift is often a problem when measuring transient vibrations using piezoelectric accelerometers without a mechanical filter for hand-arm-weighted measurements. The DC shift mainly generates a low frequency noise that will seriously disturb the hand-arm-weighted measurements measuring up to only 1250 Hz. In addition, there is the effect of the integration of the signal, which will further suppress the high frequency content. However, when the peak amplitude is of interest

and measurements are taken up to 30 kHz, the amplitude of the DC shift is negligible compared with the measured signal. Because of this, there are no problems using piezoelectric accelerometers without a mechanical filter for peak amplitude measurements of high frequencies.

Spectrographic method for the determination of lysis of red blood cells

If the membrane of a red blood cell is disrupted, the red-coloured substance (haemoglobin) is released to the blood plasma. In biological terms, the process is called lysis. The extent of lysis of a blood sample can be quantified spectrographically through the measurement of light absorbance of the released haemoglobin.

Special care should be taken not to contaminate the blood sample with any water of ordinary quality. This may disrupt the blood cells through osmotic effects, causing erroneous analytical results. The blood sample ought to be fresh and the analysis carried out promptly after experiments to avoid natural degrading effects.

The blood samples (5 to 10 ml) to be analysed are first treated to separate the blood plasma from the blood cells. This is accomplished by centrifugation at 2800 rpm for 5 minutes at a radius of 10 cm. These conditions will provide a clear plasma fluid without jeopardising the analyses through damage of the blood cells. The plasma samples may have to be diluted so as not to obtain excessive readings of absorbance with loss of accuracy. Dilution is performed with a physiological sodium chloride solution of 0.9% concentration. For reference purposes, nonexposed blood is treated likewise to provide a sample for use as a "blank" in the spectrographic analyses. Diluted samples are measured against references diluted identically with the given salt solution. By preference a double beam spectrometer is used. Before taking sample graphs, the cuvettes are filled with identical reference solutions to set the absorbance

reading at a zero level.

A diagram covering the visible wavelength region of interest is shown in Figure 1. Absorbance peak values at 540 nm have been used for the calculations. To obtain an instrument reading corresponding to 100% lysis of blood cells, a blood sample was first frozen to -70°C , thawed, and then treated with ultrasound. This procedure is known to completely destroy the blood cells. The corresponding absorbance value represents 100% lysis; other sample readings can then be related to that absorbance value.

Figure 1 illustrates a spectrogram of lysed red blood cells. The two curves were obtained for a non-loaded and a loaded operation of a grinding machine during a 15-minute interval. Apparently, the load does not influence the degree of hazardous effect.

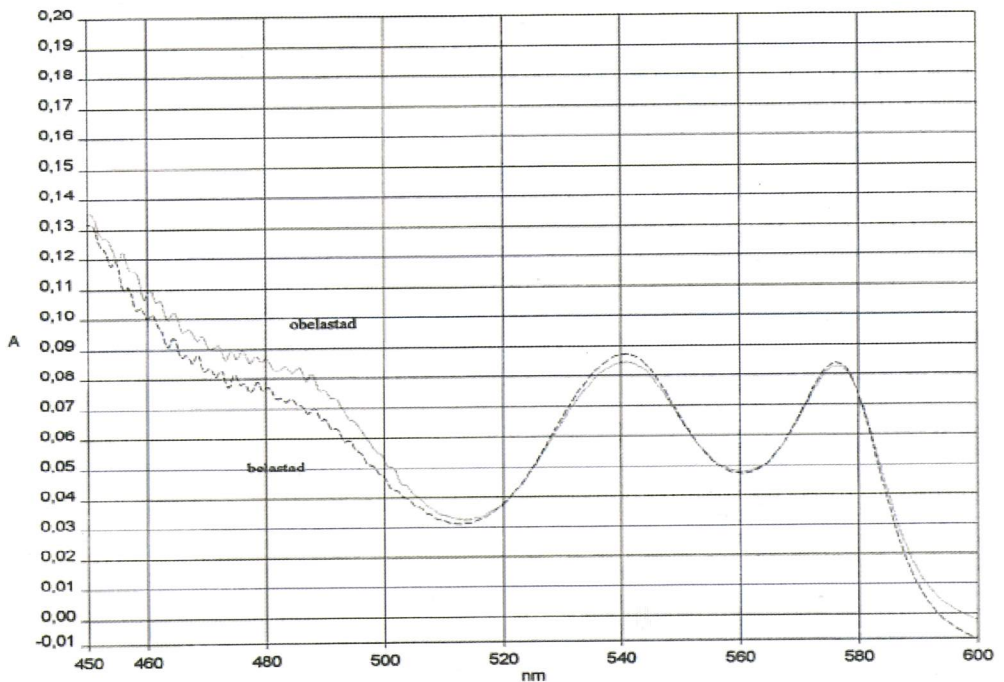


Fig1 Spectrogram

Results

The results from the blood cell experiment show that the rate of destruction is closely

correlated to the peak vibration amplitude and that there is no correlation to the ISO 5349 vibrations.

Test case	Percentage of destroyed blood cells	Peak vibration amplitude, m/s^2	Measured ISO5349 vibration, (m/s^2)
1 Handle of impact wrench	0.4 %	15 000	2.2
2 Handle of impact wrench with a dampening mechanism	0.07 %	2 000	2.4
3 Impact wrench socket	100 %	> 30 000	10
4 Vertical grinder with unbalanced wheel	0.1 %	500	6.5
5 Vertical grinder with grinding wheel and grinding	0.1 %	1 000	7.1

Table

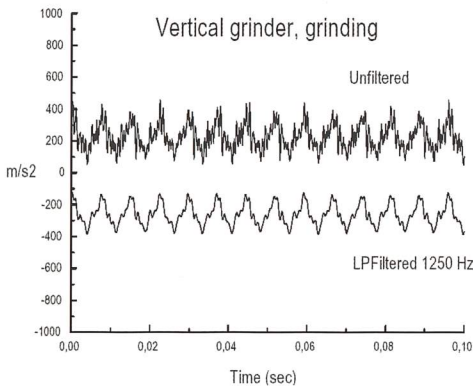


Figure 2 Grinder

Figures 2 and 3 display the influence of filtering the acceleration at 1250 Hz from a grinder and from an impact wrench, respectively, as prescribed in ISO 5349. As can be seen, the very high transients from the impact wrench are almost totally eliminated by the filter, whereas the acceleration from the grinder is much less affected. The vibrations in Figures 2 and 3 were measured up to 10 kHz, which accounts for why the amplitudes do not correspond to those given in Table 1.

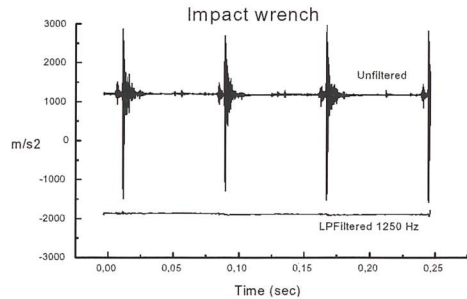


Figure 3 Impact wrench

Discussion

The results clearly demonstrate a relation between damages to the cell membranes of blood cells and the exposed transient vibration. The results further show that the values, according to ISO 5349, do not reflect this relationship since the high transient peaks are almost completely eliminated by the filter. Even further suppression of the transient signal is accomplished in ISO 5349 when the acceleration signal is integrated to velocity and the rms value is calculated over several seconds during the measurement interval.

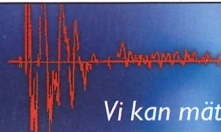
ISO 5349 specifies how much vibration energy is transmitted to the hand. The question is whether this is a relevant approach for transient vibrations. It may be more relevant to consider which forces the hand is subjected to. The peak acceleration informs us of how big the forces are, as described by the equation $F=ma$. As a comparison, one may consider the adage that driving on a bumpy, gravelled road for one minute is as harmful as driving on a highway for one minute and then hitting a brick wall. In other words, the amount of transmitted vibration energy is the same but the forces are certainly not.

The issue then is to develop a measurement standard that better reflects the problems with transient vibrations? What must be done is to evolve a method that takes into account both the peak amplitude and the frequency of occurrence. Concerning the measurement of peak amplitude, a method such as that used for the measurement of impulsive noise

could be useful. In such a case a filter with a well-defined rise time measures the peak amplitude. Nevertheless, the problem with taking into account the effect of how often the peaks occur remains unsolved.

Conclusion

- Impact wrenches generate very high transient acceleration peaks, causing high stresses in the tissue when transferred to the hand.
- The transients cause destruction of the cell membrane of blood cells subjected to these peaks, and it is likely that other biological tissues in the hand are affected as well.
- The filtering in ISO 5349 functions to almost completely eliminate these peaks and thus fails to take into account the associated risks.
- Transient peaks can be significantly reduced to a low cost by redesigning the tool.

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VIBRISK

Sahlgrenska Akademien vid Göteborgs Universitetssjukhus och EU-projektet VIBRISKS arrangerade en kurs "Surveillance and diagnosis of hand arm vibration syndrom according to the EU directive" den 5 september med efterföljande 2nd International workshop "Diagnosis of injuries caused by hand-transmitted vibration" den 6 – 7 september 2006.

Kursen samlade över 40 deltagande från Arbets- och miljömedicinska kliniker, Företagshälsovården och åtskilliga företag. Programmet bestod av föreläsningar som omfattade både teoretiska och praktiska aspekter av "hand-arm vibration syndrom" (HAVS). Världens ledande experter inom vibrationsområdet föreläste om vaskulära, neurologiska och muskuloskeletala effekter av handöverförda vibrationer. Ronnie Lundström, Umeå Universitetet föreläste om klassifikation av HAVS. Mats Hagberg, Arbets- och Miljömedicin i Göteborg höll ett uppskattat föredrag om klinisk diagnostisering av HAVS enligt EU direktivet.

Michael Griffin, ISVR sammanfattade det aktuella läget i föredraget "Hand-arm vibration syndrom and the EU directive and vibration standards". Han presenterade "EU Guides to Good Practice - Implement Directive 2002/44/EC on the minimum health and safety requirement regarding the exposure of workers to the risks arising from the physical agents (vibrations)".

De två nytgivna icke-bindande vägledningar för tillämpning av det EU Direktivet 2002/44/EC gäller hand-armvibrationer samt helkroppsvibrationer och finns tillgängliga för nerladdning från:
www.humanvibration.com/EU/IBGUIDE.htm under rubrikerna:

"Whole-body vibration guide" och

"Hand-arm vibration guide".

Innehållet förefaller i mycket överensstämma med den nyligen utgiven bok Vibrationer

– hur du minskar risken för skador, Arbetsmiljöverket, 2005 som i stora delar återgivits i tidigare nummer av SVIB Nytt.

En teknisk utställning med representanter från Bruel & Kjaer, ISVR, Instrumentpoolen AMM, Scantec Miljöinstrument AB, SOME-DIC Sales AB, VibroSense Dynamics AB ägde rum i pauser.

I workshopen de följande två dagarna deltog ca 25 personer från Sverige, Storbritannien, Italien, Danmark, Japan och Amerika, varav de flesta som föredragshållare.

Programmet var uppdelat på fyra sektioner neurologiska-, muskuloskeletala- och vaskulära besvär av handöverförda vibrationer samt "case management and treatment" som följdes av livliga pandediskussioner.

Föreläsningarna höll en mycket hög vetenskaplig nivå och låg ofta i gränssnittet mellan medicin, fysiologi och vibrationsteknik. Svårigheterna med att komma till rätta med vad som egentligen händer i nerver, blodkärl och muskler när kroppen utsätts för vibrationer leder till intensiv forskning och utveckling av metoder för att upptäcka tidiga reaktioner. Nya rön i patofysiologi av "hand-arm vibration syndrom" samt utvecklade metoder för diagnostisering och prevention av vibrations-skador presenterades i några föredrag.

Workshopen öppnades med sektionen för neurologiska besvär. Göran Lundborg, Malmö Universitetssjukhus, höll ett föredrag om etiologi, patofysiologi och diagnostisering av neurologiska besvär som uppstår till följd av hand-armvibrationer. Vidare presenterades studier om normala tröskelvärden för köld- och värmekänslighet samt för vibra-

tionskänslighet hos män och kvinnor i olika åldersgrupper. Thor Nilsson, Umeå Universitet, hade studerat tröskelvärden för köld- och värmekänsligheten i förhållande till kön och exponeringens varaktighet samt eventuella sjukdomar (t ex diabetes).

På sektionen för muskuloskeletala besvär presenterade bl a Jens Wahlström, Universitetssjukhuset i Umeå, sin studie om muskuloskeletala symtom i relation till exponering för hand-armvibrationer och ergonomiska faktorer.

På sektionen för vaskulära besvär återkom en annan av doktoranderna på ISVR med en studie om normala värden för fingerblodtryck hos män och kvinnor i olika åldersgrupper. En

svensk studie om systoliskt fingerblodtryck i relation till kön, exponering och individuella faktorer redovisades av Mats Hagberg.

Work-shopen avslutades av Michael Griffins föredrag "Negligent exposure to hand-transmitted vibration" som handlade om samhällets och arbetsgivarens ansvar för arbetarens hälsa. Han framhöll att gällande föreskrifter och standarder inte är tillräckligt noggranna för att bedöma individuell känslighet för vibrationer och att det därför inte finns någon "safe exposure".

Nina Gritsko

Specialist i yrkes- och miljömedicin, Uni-



Nina Gritsko, glad för sitt diplom

Martin Almgren avtackades i sam- band med BNAM

SVIB



Martin Almgren, fd ordförande i SVIB

Ole Dössing, Rovsing Dynamics A/S är SVIBs nye ordförande. Ole har varit SVIBs vice ordförande i många år och blir nu den förste med att uppfylla innebörden av föreningens namnbytet från Svenska till Skandinaviska Vibrationsföreningen.

Förbered er således på att framgent läsa ledare författade på danska. I det här numret har Martin hörsammat mitt önskemål om att avrunda sina 5 år i Vibrationsintressets tjänst.

Markku Juntunen VTT Finland, blir ny styrelseledamot. Markku varit medlem i många år och deltagit på flera Vibrations-dagar och specialseminarier. På VTT leder han ett Internationellt uppmärksammat forskarteam som mäter och provar utrustning som utsätts för ansenliga stötar och explosioner.

Urban Emborg A2 Acoustics, är inte helt ny som styrelseledamot. Urban är den förste som fick SVIBs Guldaccelerometer 1988. Han fick den tillsammans med William Halvorsen för det sätt dom löste uppgiften att dämpa vibrationerna och därmed bullret i och från flygplanskroppen på SAABs första och enda stora passagerarflygplan med hjälp av avstämda dämpare.

Ylva Vidhög, Vattenfall, blir ny vice ordförande efter Ole. Ylva är inte heller ny i styrelsen men inte desto mindre dess första kvinnliga vice ordförande. Att hon kan sin vibrationslära och behärskar sina maskiner på Forsmarksverket är det nog många i SVIB som redan känner till.

Ny ordförande

Johan Jonsson, WSP, har utsetts till ny AU 3 ordförande efter Tomas Odebrant. AU 3 gjorde sitt val av ordförande under senaste AU 3 mötet på WSP i Göteborg i september på vilket Johan höll ett föredrag om sin avhandling på Chalmers "Tåg och strukturdynamik". Styrelsen noterade vid senaste mötet i Helsingborg den 23 januari dels valet av ordförande dels att arbetsutskottet hade valt in 5 nya medlemmar.

Anledningen till att styrelsen träffades på DUNKERS Kulturhus i Helsingborg var att avgöra om detta var ett lämpligt ställe att arrangera nästa AU 1 Symposium.

Tidpunkten för Symposiet bestämdes till 8, 9 och 10 maj. Första dagen skulle upptas av Tutorial Sessions och på kvällen skulle den första middagen för arrangeras mellan kl 19 till 21 på färjan mellan Helsingborg och Helsingör så att de som tänker vara med på torsdagen och fredagens specialsymposium om specifika mät- och analysproblem i samband med vibrationer kan ansluta till dom som redan tillägnat sig grundkunskapen i vibrationslära. Kjell Ahlin gör sin sista insats för SVIB innan han går i pension säger han. Fan tro't.

Vibrationsdagen 2007 kommer att arrangeras

torsdagen den 22 november i Köpenhamn. Ole har lovat hitta ett bra ställe att vara på. Styrelsen ber att få återkomma med besked om vem som blir föreningen nye skattmästare och vem som efterträder Thomas Abrahamsson som ordförande i AU 5.

Ole Døssing gick leende genom BNAM och mot det nya uppdraget i SVIB



Ole Døssing, ny ordförande i SVIB

BNAM papers

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och sedan password: **BNAM**

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SKANDINAVISKA VIBRATIONSFÖRENINGEN, SVIB

PROTOKOLL FRÅN ÅRSMÖTE 2006-11-09

Närvarande:

Martin Almgren, ÅF Ingemansson AB,
Alf Olsson, SVIB Normtjänst AB,
Tomas Odebrant, ÅF Ingemansson AB
Ylva Vidhög, Forsmarks Kraftgrupp,
Brith Fransson, SVIB Normtjänst AB
Ole Døssing, Rovsing Dynamics,
Eric Gott,
Lars Skogsberg, Atlas Copco AB
Torbjörn Kloow, Acoutronic AB
Leif Åkerlöf, ÅF Ingemansson AB
Johan Granlund, Vägverket Konsult

1

Fastställande av dagordning

Den stadgeenliga dagordning som sänts ut tillsammans med kallelsen och övriga årsmöteshandlingar godkändes.

2

Val av mötesordförande och mötessekreterare

Till mötesordförande valdes Martin Almgren och till mötessekreterare Alf Olsson.

3

Val av justeringsmän för dagens protokoll

Lars Skogsberg och Eric Gott utsågs att justera protokollet från årsmötet.

4

Fråga om stämman blivit behörigen kallad

SVIBs verksamhetsberättelse, balans- och resultaträkningar samt budget hade sänts ut per e-post tillsammans med kallelse och dagordning lite drygt 2 veckor före årsmötet den 9 november. Därtill hade information om att SVIBs årsmöte skulle hållas i samband med

BNAM annonserats i de senare utgåvorna av inbjudan med program som cirkulerats till SVIBs medlemmar med flera. Stadgarnas krav var uppfyllda varför stämman beslöts vara behörig.

5

Avgående styrelsens redogörelse för verksamheten under det föregående verksamhetsåret

Ordföranden föredrog styrelsens berättelse för verksamheten för tiden 1 september 2005 - 31 augusti 2006 och fäste därvid deltagarnas uppmärksamhet på det betydande stöd SVIB fått från de nordiska medlemmarna vilka aktivt medverkat till att de Vibrationsdagar som arrangerats under Martin Almgrens ordförandeskap i tur och ordning kunnat förläggas till huvudstäderna Köpenhamn, Oslo, Stockholm och Helsingfors.

6

Revisionsberättelse

Torbjörn Kloow läste upp revisorernas berättelse om föreningens räkenskaper och styrelsens förvaltning. Årsmötet godkände efter en längre diskussion om bakgrund och orsak till att det förekommit fel i årsredovisningen. Revisorernas rekommendationer med anledning av den utförda granskningen godkändes och överlämnades för vidare åtgärder till den nytillträdande styrelsen. Årsmötet godkände sekreterarens kommentar i anledning av revisorernas anmärkning mot föreningen och SVIB Normtjänst ABs ekonomiska mellanhavanden som reglerats i enlighet med den uppgörelse om 3 års amorteringstid som godkänts av föregående årsmöte. I övrigt hänvisas till revisionsberättelsen.

7

Fastställande av resultat- och balansräkningar

Årsmötet godkände de resultat- och balansräkningarna som förelåg efter rättelse. En ny resultaträkning skulle bifogas protokollet. Förlusten var enligt revisions-rapporten 3 670,37. I resultat-räkningen hade uppgivits att underskottet var 3 632,57. Skillnaden 37,80 kronor är hänförlig till utfallet av taxeringen för 2006 och skulle korrigeras därefter.

8

Beslut rörande ansvarsfrihet för den avgående styrelsen

Årsmötet beviljade också styrelsen och dess ledamöter ansvarsfrihet för det avslutade verksamhetsåret.

9

Fastställande av budget för kommande verksamhetsår

På intäktssidan hade medlemsavgifter, 550 å 50 kronor upptagits till totalt 27 500 kronor och behållningen från BNAM uppskattades till 12 500 kronor. Kostnader för samma period uppgick till 21 000 kronor och bestod av föreningens bokföring, årsmöteshandlingar och korrespondens 10000:-, serviceavgifter för pensionärer och hedersledamöter 11 000:- samt 5 000 kronor för styrelsen och arbetsutskotten. Därmed skulle verksamheten resultera i ett överskott på 14 000 kronor. Årsmötet diskuterade föreningens kostnader för subventionering av pensionärernas serviceavgifter och noterade att denna post minskade föreningens intäkter högst väsentligt.

10

Fastställande av föreningens årsavgift

Årsmötet beslöt bibehålla årsavgiften 500 kronor inklusive serviceavgift och moms för denna och avgiften för pensionärer 150 kronor. Medlemsavgiften är 50 kronor.

11

Val av ordförande och styrelse för tiden t o m nästkommande årsmöte

Valberedningen var inte representerad vid årsmötet. Sekreteraren hade under eftermiddagen haft ett sista telefonsamtal med Nils Åke Nilsson och därvid noterat valberedningens förslag till ny ordförande och övriga medlemmar.

Till ordförande för SVIB valdes:

Ole Døssing.

Till vice ordförande valdes:

Ylva Vidhög.

Till sekreterare valdes:

Alf Olsson.

Till övriga ledamöter valdes:

Håkon Heyerdahl, NGI Norge och Markku Juntunen VTT Finland.

Stämman uppdrog åt styrelsen att inom sig själv utse en skattmästare.

12

Val av två revisorer och revisorssuppleant

Valberedningen föreslog omval av Torbjörn Kloow och Ralf Corin som revisorer för nästkommande verksamhetsår. Knut Bertelsen kvarstår som revisorssuppleant. Valberedningens förslag godkändes.

13

Tillsättande av en valberedning

Nils-Åke Nilsson kände efter alla år som sammanställande i valberedningen att det var dags att avsäga sig detta uppdrag. Sekreteraren föreslog att årsmötets tack till Nils Åke skulle skrivas in i protokollet och härmed noteras att beslutet var enhälligt. Därefter valdes en ny valberedning bestående av Martin Almgren som sammanställande och Elisabeth Blom, Leif Nielsen, DK samt Mats Backholm, FI som ledamöter.

Övriga ärenden

Några övriga ärenden förekom inte men – under middagen samma kväll kom Martin Almgren och Ylva Vidhög på att sekreteraren hade försummat att anmäla nyval av Urban Emborg som ledamot i Styrelsen. Med ursäkter och förklaringar uppsökte han sedermera var och en av deltagarna på ordinarie årsmötet för att utverka ett efterhandsgodkännande av ett tillägg till protokollet om inval av Urban Emborg.

Samtliga deltagare godkände att detta. Ett separat beslut har således tillfogats detta protokoll.

Vid protokollet

Alf Olsson

Ordförande:

Martin Almgren

Justeras:

Lars Skogsberg

Eric Gott

Tillägg till

PROTOKOLL FRÅN ÅRSMÖTE

Närvarande vars medgivande i efterhand inhämtats:

Martin Almgren, ÅF Ingemansson AB,
Alf Olsson, SVIB Normtjänst AB,
Tomas Odebrant, ÅF Ingemansson AB
Ylva Vidhög, Forsmarks Kraftgrupp,
Brith Fransson, SVIB Normtjänst AB
Ole Døssing, Rovsing Dynamics,
Eric Gott,
Lars Skogsberg, Atlas Copco AB
Torbjörn Kloow, Acoutronic AB
Leif Åkerlöf, ÅF Ingemansson AB
Johan Granlund, Vägverket Konsult

Val av ordförande och styrelse för tiden t o m nästkommande årsmöte

Valberedningen var inte representerad vid årsmötet. Sekreteraren hade under eftermiddagen haft ett sista telefonsamtal med Nils Åke Nilsson och därvid noterat valberedningens förslag till ny ordförande och övriga styrelsemedlemmar. Härvid försummade han att rapportera att valberedningen också föreslagit inval av Urban Emborg som styrelseledamot.

Valet godkändes således i efterhand, samma dag eller dagen därpå, av samtliga som närvarade vid det ordinarie årsmötet.

Ärendet skulle redovisas som ett separat tillägg till protokollet.

Vid protokollet

Alf Olsson

Ordförande:

Martin Almgren,

Justeras:

Lars Skogsberg

Eric Gott

SKANDINAVISKA VIBRATIONSFÖRENINGEN

ORG. NR 802010-8786

Balansräkning per 2006-08-31

Tillgångar:

Postgiro	78434,57kr
Bank	100,00 kr
Fordr.å SVIB Normtjänst	40000,00 kr

Avr.Skatter och avgifter	193,00 kr
Kundfordringar	24060,00 kr
Fordran moms	1807,00 kr
Summa:	144594,57 kr

Skulder och eget kapital

Eget kapital	107641,12 kr
Balanseradvinst/förlust	13398,52 kr
Leverantörsskuld	27187,50 kr
ÅretsResultat	3632,57 kr
Summa:	144594,57 kr

Resultaträkning
2005-09-01 till 2006-08-31

Kostnader

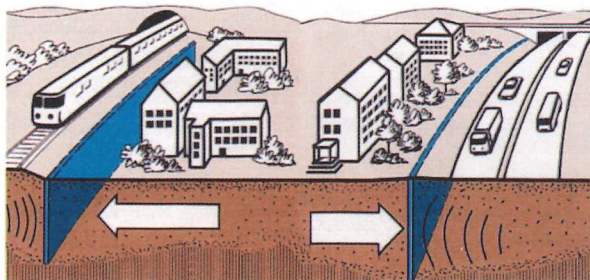
Serveceavgift hedersmedlemmar,	
pensionärer	10440,00 kr
Redovisningsarvode	5000,00 kr
AU3 studieresa	8 691,91 kr
Porto	6310,00 kr
Medlemsavgift SIS	4500,00 kr
Finansiella kostnader	408,50 kr
Summa:	35 350,41kr

Intäkter

Redovisning medlemsavg.	24060,00 kr
Provisioner SVIB Normtj.	7466,50 kr
Finansiella intäkter	193,00 kr
Öresutjämning	-1,66 kr
Årets resultat	3632,57 kr
Summa:	35 350,41 kr

Stockholm den 24 oktober 2006
Martin Almgren Ordf. och Skattmästare Ylva
Vidhög, Thomas Abrahamsson
Ole Døssing, Håkon Heyerdahl, Alf Olsson

AVSKÄRMNING AV MARKVIBRATIONER MEDELS GASFYLDA KUDDAR



Ferievägen 25 – 168 41 BROMMA

Tel. +46 (0)8 87 1990

Rådgivning vid:

- utredning av vibrationsfrågor
- dimensionering av isoleringsåtgärder
- projektering

www.vibisol.com

Ingemansson Automotive



Ingemansson Automotive provides specialized NVH (noise-vibration-harshness) engineering services to vehicle manufacturers and suppliers throughout the product development process, from the concept design to final hardware testing and refinement.

We cover all NVH areas such as:

- Full NVH attribute responsibility for vehicles, systems or components
- Advanced NVH simulation and testing
- NVH troubleshooting and problem solving
- NVH education and technology transfer projects
- Qualified NVH engineers on site

Ingemansson NVH specialists have helped a large number of leading manufacturers of vehicles, including cars, trucks, buses, trains, aircraft, ships and more.

With more than 40 years of accumulated experience, we excel in a track record of providing customized and cost-effective engineering solutions to any NVH issues.

Automotive NVH engineering is a highly complex discipline. Our large, well-trained specialist staff is therefore our most valuable asset. By using our advanced, state-of-the art simulation and multichannel testing resources, they always strive to deliver specialist services with the highest quality and productivity.

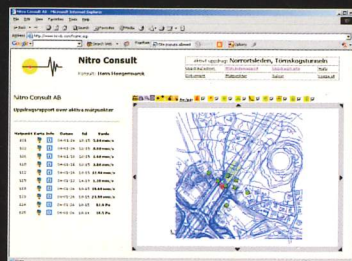
Being part of Ingemansson Technology AB also means that we can use the know-how of any of its nearly 100 noise and vibration experts and the network of qualified sub-consultants to deliver the best possible service value to our customers.



Konsten att lyckas med sprängning



Mätvärden direkt



www.ncvib.com

Företagsinformation

Nitro Consult AB
Måndag 30. Januari 2004

Välkommen!
Nitro Consult är ett konsultföretag inom bygg och anläggning. Vi erbjuder dig en omfattande service inom bygg och anläggning. Vi har erfarenhet och kompetens inom bygg och anläggning. Vi har erfarenhet och kompetens inom bygg och anläggning. Vi har erfarenhet och kompetens inom bygg och anläggning.

Vår verksamhet
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