Minutes of the Transport Stresses Working Group of the Committee for European Environmental Engineering Societies Held on 19th February 1998 at the Royal Military Academy, Brussels

Present at the Meeting of the Transportation Stresses Working Group (TSWG) were;

Dr P. Dehombreux	BSMEE
Mr. M. Dumelin	SSEE
Mr. M. Juntunen	SEEF
Mr E. Klaeui	SSEE
Mr. D. Richards	SEE (Chairman)
Mr T. Trost	SEES

Matters Arising

The meeting welcomed Mr Erich Klaeui from SSEE. Apologies were received from Mr. R. Finger, Mr K. Ahlin, Dr. U. Braunmiller, Mr T. Guise, Mr P. Najdenov, Mr E. Furrer, Dr K. Ziegahn and Mr J. Moriceau. However, several of these sent written contributions, for which the group was grateful.

A list of TSWG members, including corresponding members, was circulated. This list is attached to the minutes as Attachment No 1.

Thomas Trost had previously indicated to the chairman that the titles of CEN TC 261 sub committees and working groups, used in the minutes of the previous meeting, were still in error. Thomas supplied a table of these which is included as Attachment No 2.

Systematisation of Measurement Methodologies

Ulrich Braunmiller and Ed Furrer had sent in written statements in case Karl Ziegahn was unable to make the start of the meeting. These notes were as follows;

CEN TC 261 SC 1 WG4. (Generalities - Test Methods and Schedules) There was no meeting of this committee since the last meeting of the TSWG. The next meeting will be on 10th and 11th March 1998 at BSI in London. Ongoing actions are revision of existing drafts (ISO standards on packaging testing adopted as CEN standards with no or minor modifications, but there is a demand to modify them) rotational drop test and clamp truck test. The group also deals with a random vibration test. In parallel the ISO/TC122/SC3/WG7 working group “random vibrations” is active on that topic. Unfortunately no member of the TSWG is active on that ISO group.

CEN TC 320 (Transport Quality). Karl-Freidrich Ziegahn is not active in this group any more and so we have no report.

DIN 30787. This work continues. Ed Furrer reports that he is currently in the process of translating the latest drafts of DIN 30787 parts 2, 3 and 4 into English, which are going to be discussed at the DIN meeting in May of this year.

CEN TC104. Thomas Trost reported that Kjell Ahlin may not be able to continue reporting on this group.

SRETS. The mid term review was held in late 1997. The work under the various tasks is as follows;

> Task 1 Identification of Damage Inducing Mechanisms. The report is now complete and will be printed as an EU report, available at Packforsk and the EU.
>
> Task 2 Environmental Data. The measurements at PIRA/ J& B as well as Bosch are completed. A task report is in preparation, publication to be cleared.

Task 3 Methodological Strategies. The analysis is complete. A task report is in preparation, publication to be cleared.

Task 4 Testing Schedules Replicating the Damage Mechanisms of the Environment. Work is still in progress but nearing completion.

Task 5 Effects of Practical Testing Limitations. This currently running task is addressing practical problems associated with the implementation of derived test severities.

Task 6 Comparison of Test Schedules with Field Trials. Field trials with real products (water heaters and some Bosch products) has started.

Task 7 Practical Evaluation of the Test Schedules. This final task will start at end of this year.

Technical Papers. No technical papers were tabled or discussed.

Bibliography After a short discussion Thomas Trost agreed to continue co-ordinating this action. It was agreed that in the foreseeable future a date would need to be set for the next issue of the bibliography. A question of the best way to do this addressed but left unresolved.

> **Continuing Action**. A general action was placed to submit any new references to transportation stresses to Thomas Trost. **All Members**

Monograph on Round Robin Methodologies. The chairman apologised that this was not yet complete. More work was involved that had been originally envisaged. In addition permission would need to be sought from the IES to reproduce two of the papers. Work continues on this topic.

Round Robin Exercise

The round robin II exercise seemed to be progressing well. Several people had indicated they intended to contribute to the exercise but had not yet completed the work. As such a new date for completion was set and the chairman asked all the national societies to prompt the participating members to complete the work.

> **Action**. A general action was placed to submit **Round Robin II contributions by the target date of 1st April 1998.** National societies to prompt their participating members to complete the work.. **All Members**

Erich Klaui made a presentation of his results of the Round Robin Exercise. This proved to be quite useful has it highlighted the areas the participants are going to find difficult. The following is a summary of Erich's presentation from which quantitative values have been deliberately removed.

In undertaking the Round Robin exercise Erich firstly addressed the time histories of the four data sets. This indicated that the data was stationary for the first three data discs and nonstationary on the fourth. As a result of this Erich found that the calculation of PSDs for discs 1 to 3 was relatively straight forward. Calculation of a PSD for the fourth ,non stationary, disc was more problematic and Erich the method he had used to quantify this data. For the identifying the shocks Erich used two methods viz;

i. Estimate a level and locate every occasion when the time history exceeds that value.

ii. Use a computed Amplitude Probability Distribution to identify the threshold value.

In order to qualify the shock environments Erich used time histories Time histories for the shocks on discs 1 and 2 and Shock Response Spectra (SRS) for the shocks on Discs 3 and 4. Erich went on to explain that that some modification of the latter two SRS test definitions was required to remove certain components arising from the random vibration. He went on to explain how he did this and the method he used to design a suitable test. Some general discussion ensued on this matter.

As a result of discussions on Erichs results, Thomas Trost asked for a brief description of the method used to create the Round Robin Exercise data. This is enclosed as Attachment No 3. The chairman also indicated that the Fortran computer program used for this (which is run under DOS) could be made available if required.

It was decided to include, in the next meeting of the TSWG, to discuss the results of the Round Robin Exercise.

Thematic Network.

Following the last meeting only two organisations had contacted the chairman expressing any interest in participating in the exercise. Moreover, the timescales for the bid were short (a full bid was required by 17th December 1997). As such the chairman had decided that support was insufficient to justify the effort involved.

Those members of the TSWG who are taking part in the SRETS work had received, a presentation at the mid term review, on the next framework. The broad remit of this new framework seemed to be closer to the work of CEEES than did the last framework. It was suggested that further information on the next framework was required.

Any Other Business

Markku Juntunen told the meeting that the work on "Design of Equipment for Mechanical Environments" (discussed at the last meeting) had recently received a continuation of funding.

Next Meeting

The date of the next meeting of the TSWG, in xxxx, is still to be xxx.

Attachments

1. Names and Addresses of TSWG Members
2. CEN TC261 Sub Committees and Working Groups
3. Description of approach used to create Round Robin Data

Distribution

Mr K. Ahlin
Mr M. Belotti
Dr. U. Braunmiller
Mr. M. Dumelin
Dr P. Dehombreux
Mr. R. Finger
Mr. E. Furrer
Mr T Geise
Mr. T. Hell
Mr K. Janousky
Mr H. Jansen
Mr. M. Juntunen
Mr C. Karsberg
Mr L. Kushel
Mr E. Klaeui
Mr. C. Lalanne
Mr J. Moriceau
Mr P. Najdenov
Mr. D. Richards
Mr G. Ruding
Mr J. Seller
Mr T. Schreiber
Mr H. Torstensson
Mr. T. Trost
Mr. B. Wouters
Dr. K. Ziegahn
plus CEEES Secretariate

Intentionally Blank

Attachment 1
Names and Addresses of TSWG Members

Attachment 2
CEN TC261 Sub Committees and Working Groups

CEN TC261 Sub Committees and Working Groups

CEN TC261 Sub Committee Structure		
Subcommittee	Working Groups	
SC 1 Generalities	WG 1	Terminology
	WG 2	Marking
	WG 3	Dimensional Coordination
	WG 4	Test Methods and Test Schedules
	WG 5	Range of Capacities
SC 2	WG 1	Glass Packaging
	WG 2	Metal Packaging
	WG 3	Paper and Paper Board Packaging
	WG 4	Drums
	WG 5	Ridgid Plastic Packaging
	WG 6	Packaging Made From Flexible Material
	WG 7	Child Resistant Packaging
	TC194/WG5	Migration Test Methods
SC 3	WG 1	Small Load Carrier Systems
	WG 2	Wooden Oackaging
	WG 3	Tension Strapping and Accessories
	WG 4	Pallets, Box Pallets and Accessories
	WG 5	Strech and Shrink Film
	WG 6	Ridgid Plastic Packaging
	WG 7	Intermediate Bulk Carriers
SC 4 Packaging and Environment	WG 1	Terminology, Symbols and Criteria
	WG 2	Degradability
	WG 3	Material Recovery Methodologies
	WG 4	Energy Recovery
	WG 5	Other Recovery Processes
	WG 6	Prevention by Source Reduction

Attachment 3
Description of approach used to create Round Robin Data

DESCRIPTION OF APPROACH USED TO CREATE ROUND ROBIN DATA

The process used to create the round robin data was based upon an existing computer program developed at Hunting Engineering to create random vibrations. The program was originally developed to create random "noise" as part of a exercise to evaluate a missile control system. The need was to create random data with a specific spectral profile and an unlimited distribution. The amplitude of the vibrations needed to be varied with the altitude and airspeed of the aircraft carrying the missile.

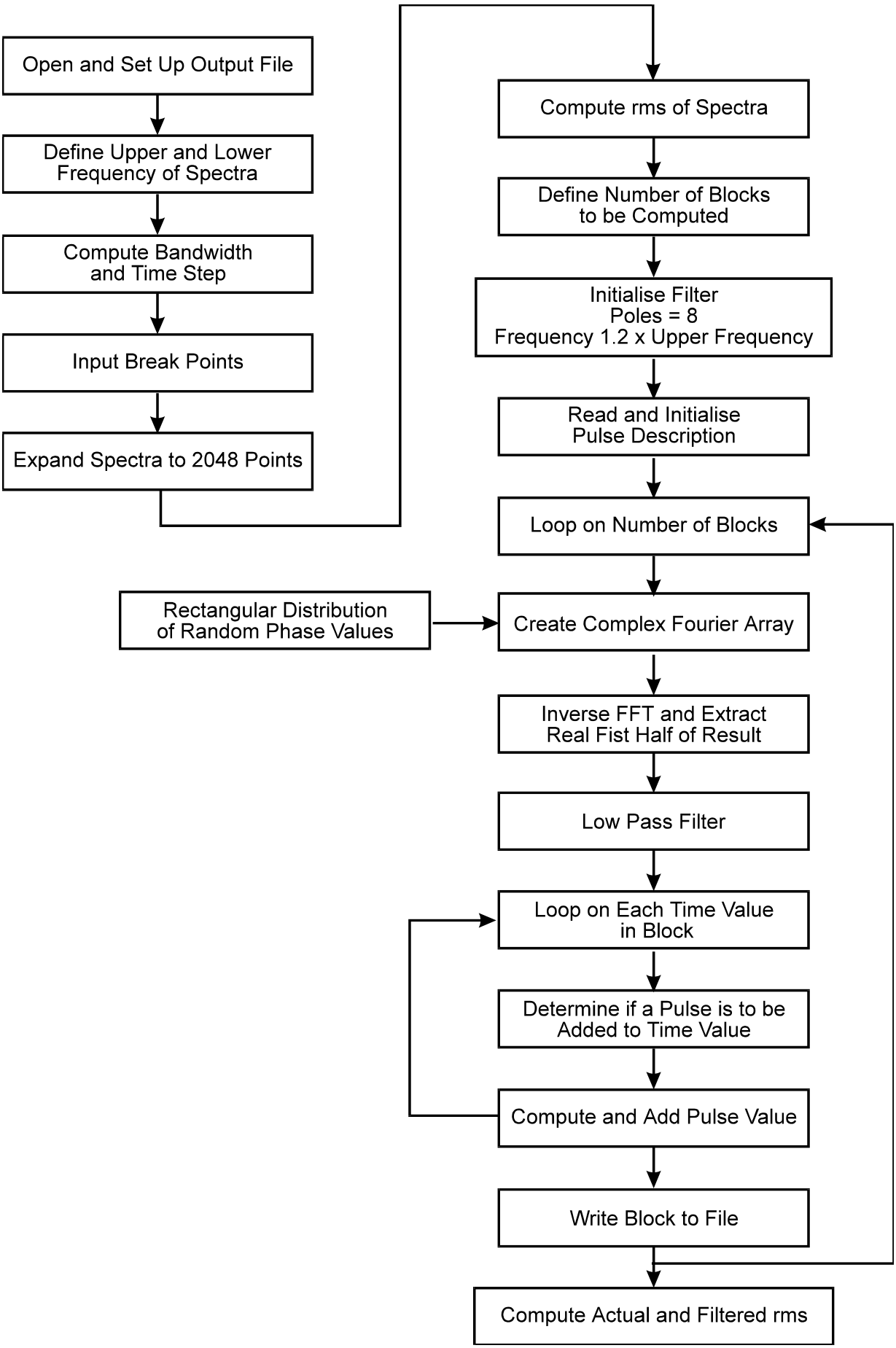
The flow diagram for the Round Robin II data creation program is shown in the attached figure. The "core" of the program is a routine to create blocks of random vibration using an Inverse FFT. The spectra of the random vibration is predefined by a series of "breakpoints" very much like a random vibration controller. The computed random vibration is then low pass filtered with an 8 pole digital filter. A number of predefined decaying sinusoidal pulses are then superimposed on the random vibration.

Definition of Spectra. The program allows the user to define the upper and lower frequency range of the spectra to be defined. From the upper frequency the bandwidth of the spectra and the time step of the random vibrations are computed. The user is then invited to define a number of breakpoints to define the required spectra on a log log base. The spectra is then expanded into a full 2048 value definition. The programme imposes a "steep" roll on/off at frequencies above and below the range of the specified spectra. The rms of the expanded spectra is computed.

Random Vibration Using Inverse FFT. The method used for this phase is well document and is that used by most random vibration controllers. The expanded requirement spectra is treated as the "magnitude" part of complex array. The "phase" part is created by repeated independent calls to a rectangular random number generator with a span of zero to 2 Pi. The magnitude and phase are converted to Real and Imaginary components and the 2048 values are "reflected" into the upper half of a 4096 complex array. This array is passed into an Inverse FFT. The first 2048 points are used as the time response. The rms of this time history is computed and compared with that from the required spectra. For stationary data both the real and imaginary components are factored by unity. For non stationary data the factor is varied according to a predefined description. Extracting phase values from a rectangular distribution is permitted because the number of separate values (2048) and the central limit theorem ensures a gaussian distribution of the resultant time history. The distribution is unlimited excepting by the central limit theorem. Unlike many random vibration controllers the program fully recomputes random vibrations (i.e. a new IFFT) at every block and the requirement spectra remains unchanged.

Digital Filter. The digital filter is only included to remove the time history discontinuities between each block of 2048 values. The digital filter is based upon a series of routines which have been used at Huntings for over 20 years. Although the filter has both high and low pass capabilities only low pass is used for this application. The rms of the filtered time history is computed and compared with the unfiltered value.

Shock Superposition. The program allows decaying sinusoidal shocks to be superimposed on the random time history. Each shock (up to 50 can be added) is defined in terms of Start time, Number of half cycles of shock, Amplitude (in terms of the peak amplitude of the first half cycle) Frequency and damping. For simple half sines the number of cycles is set to one and damping zero.


Open and Set Up Output File
Define Upper and Lower Frequency of Spectra
Compute Bandwidth and Time Step
Input Break Points
Expand Spectra to 2048 Points
Compute rms of Spectra
Define Number of Blocks to be Computed
Initialise Filter Poles = 8 Frequency 1.2 x Upper Frequency
Read and Initialise Pulse Description
Loop on Number of Blocks
Rectangular Distribution of Random Phase Values
Create Complex Fourier Array
Inverse FFT and Extract Real Fist Half of Result
Low Pass Filter
Loop on Each Time Value in Block
Determine if a Pulse is to be Added to Time Value
Compute and Add Pulse Value
Write Block to File
Compute Actual and Filtered rms