

## **SYNTHESIS REPORT For Publication**

**CONTRACT N° :** BRRT – CT97 - 5018

**PROJECT N° :** BE – T2 - 0511

**TITLE :** **Rubber compounding for improvements in health, safety and the environment**

**PROJECT CO-ORDINATOR :** TARRC/MRPRA

**PARTNERS :** BTR-AVS, CSIC, CTTM, DSM ELASTOMERS, FLEXSYS, FORSHEDA, FREUDENBERG, HATCHAM, HUTCHINSON SSLI/LIG, METEOR, PIRELLI, RHODIA, SEMPERIT, SP, TARRC/MRPRA, TRELLEBORG, WOCO

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## **2. SUMMARY**

### **2.1 Keywords**

Rubber compounding, safe chemicals, nitrosamine-free compounds, polyaromatic hydrocarbons, factory environment, fumes, odour, food contact, potable water contact, waste reduction, recycling, rubber proteins, mould fouling.

### **2.2 Abstract**

The objective of this THEMATIC NETWORK was to share information on rubber compounding for health, safety and the environment, to broaden contacts within and outside the European rubber industry and to identify improvements to specifications and standards.

The technical objectives were to:

- identify and evaluate safe compounding chemical ingredients for existing rubber types;
- formulate nitrosamine-free rubber compounds;
- find low toxicity rubber process oils;
- reduce airborne pollution and odour in rubber manufacturing and products;
- identify rubber compounds compatible with food usage;
- identify rubber compounds resistant to biodeterioration and microbial growth in potable water;
- consider ways to reduce waste and improve disposal;
- be updated on proteins in rubber;
- disseminate results, particularly to SMEs;
- review knowledge of mould fouling.

Work performed has led to the production of 40 State-of-the-Art Reviews, 18 Technical Reports, and 54 Individual Partner reports. Notable achievements have been the setting-up of an information Website ([www.rubber-compounding.com](http://www.rubber-compounding.com)), an FP5 project launched (zinc oxide reduction), novel work on rubber odour (electronic nose, smell-free rubber), testing rubber compounds for potable water contact, solvent reduction updating, suggestions for aromatic oil substitution, documentation on the control of factory fumes, proteins in rubber updates, life cycle assessments and knowledge exchange and dissemination (2 open seminars).

In all these activities, there was continuous exploitation of the exchanged information. For example, new knowledge on smell-free rubber has led to a full scale factory process trial and the production of rubber articles noticeably less smelly. Successful networking continues to benefit a traditional and yet strategic industry.

The overall conclusion is that this Thematic Network to assist the European rubber industry has been very worthwhile. The result has been to establish a great measure of trust amongst Partners, which in turn has led to easy exchange of technical and general information. Proposals for new work were generated and solutions discussed. At the end of the official period of the Network there remains a desire to continue, and ways will be found to do this.

### 3. THE CONSORTIUM

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## **3.2 Consortium Descriptions**

### **3.2.1 Structure of the Consortium**

This consortium involved a partnership of 14 industrial companies and 4 research organizations. The industrial Partners represent material suppliers and users producing end products in different sectors such as automotive, chemical, construction, food and water, materials processing, medical and railways. Partners are active in the work of national rubber manufacturers associations and in product standardization at the national, international and European levels.

### **3.2.2 Profile of Each Participant**

Partner 1 (Coordinator) : TARRC (GB)

TARRC (formerly MRPRA) is a research organisation whose main function is to provide technical support to industrial users of rubber by carrying out R & D related to the manufacture of rubber products. It contributed its expert know-how on the science and technology of rubber compounding, chemical analysis expertise and on-going research on nitrosamines, compounding for pharmaceutical rubber products and potable water applications. It carried out state-of-the-art reviews and also contributed its know-how of research project management.

Partner 2 : CTTM (FR)

CTTM is a research institute carrying out R & D in the area of rubbers, with strengths in formulation and characterization of compounds, and microencapsulation of reaction products. It contributed studies on solvent elimination for the factory environment and waste reduction, the preparation of a state-of-the-art review and assisted in network coordination.

Partner 3 : BTR (GB)

BTR was a large industrial conglomerate manufacturing a wide range of rubber products and in this network was particularly represented by its antivibration systems group. It contributed research results on the handling of rubber chemicals, lower zinc-containing rubber compounds and reduction of nitrosamine levels. Towards the end of the project the antivibration systems group became a part of the Trelleborg group of companies.

Partner 4 : DSM (NL)

DSM is a large company that makes and supplies general and special-purpose synthetic rubbers and thermoplastic elastomers (TPEs). It contributed research results on nitrosamine-free products, identification of acceptable additives for food contact applications, rubber contact with potable water and associated test reproducibility.

Partner 5 : Hatcham (GB)

Hatcham belongs to the Watts group of companies and makes rubber compounds to customer specifications. It uses all types of rubbers, natural and synthetic. Hatcham contributed results on odour in factories and in final products.

Partner 6 : Flexsys (NL)

Flexsys manufactures and sells rubber chemicals, such as vulcanizing agents, accelerators, antidegradants, and white fillers. Flexsys contributed research results on safe rubber chemicals and on ways of eliminating nitrosamines.

Partner 7 : Semperit (AT)

Semperit Technical Products is part of Semperit AG (Holding) and manufactures hoses, gaskets, components for food and potable water contact and latex products. Semperit contributed knowledge, specialist expertise, test pieces to tasks on food and water contact, research results on mould fouling, information on proteins and assisted inter-laboratory tests and state-of-the-art reviews.

Partner 8 : Forsheda (SE)

Forsheda manufactures a wide range of rubber products to customer specifications such as automotive, building, marine, mechanical, seals and gaskets, using all types of rubbers. Forsheda contributed results on safe chemicals, alternative non-aromatic process oils, rubber contact with potable water and waste reduction.

Partner 9 : Freudenberg (DE)

Freudenberg manufactures automotive components, seals and gaskets, rubber sheeting, linings, vibration dampers and a range of custom products. Its technical services company participated in this network. Freudenberg contributed results on factory fumes and the service environment, including odours in finished products and research results on mould fouling.

Partner 10 : Hutchinson (FR)

The Hutchinson group have wide interests from rubber latex to automotive components. Their research center at Montargis participated in the network. Hutchinson contributed results on rubber products and acceptable additives for food contact.

Partner 11 : Meteor (DE)

Meteor Gummiwerke manufactures automotive parts, construction products, seals and gaskets, sheeting and sports equipment using all types of rubbers. Meteor contributed results on nitrosamine-free systems and factory environmental issues.

Partner 12 : Pirelli (IT)

Pirelli is a large industrial company that manufactures a wide range of rubber products such as cables, road tyres, belting, electrical products, footwear, mats, building and construction products. (60% cables, 40% tyres). Pirelli contributed results on the toxicity of aromatic process oils in rubber compounds, and on fumes and odours.

Partner 13 : CSIC (ES)

The Consejo Superior de Investigaciones Cientificas (CSIC) is a research organisation whose Instituto de Polimeros has expertise on compounding for nitrosamine-free rubber products and on studying fumes and odours in factories. CSIC contributed research on nitrosamine-free systems and the measurement of fumes and odour. It also acted as an important link with the local Spanish rubber industry, and helped in preparing state-of-the-art reports.

Partner 14 : SP (SE)

The Swedish National Testing and Research Institute (SP) is concerned with R & D, testing and EU harmonization. The Materials Technology department possesses expertise on the analysis of PAHs (poly-aromatic hydrocarbons) in rubber products. SP contributed measurements on PAHs within rubber compounds and made odour measurements using a state-of-the-art “electronic nose”.

Partner 15 : Trelleborg (SE)

Trelleborg is a large manufacturer of a wide range of rubber products such as special tyres, compression and extruded rubber parts, hose, vibration insulators, sheeting and mats, protective products and wear-protection coverings. Trelleborg contributed results on lower zinc levels in rubber compounds, evaluated alternative non-aromatic process oils, and assisted the preparation of a state-of-the-art review on mould fouling.

Partner 16 : WOCO (DE)

WOCO has manufacturing companies in France and Germany specializing in rubber-to-metal bonded components for the automotive industry and other sectors. WOCO contributed results on product odour, food and water contact products.

Partner 17 : SSLI (GB)

SSLI (formerly London International Group) is a manufacturer of latex dipped goods such as surgeon's gloves, condoms, household and industrial gloves, health and beauty aids. Its research centre in Cambridge participated and contributed results on zinc levels, peroxide vulcanization systems, proteins in rubber and general matters of food contact. It made inputs to state-of-the-art reviews.

Partner 18 : Rhodia (FR)

Rhodia (formerly Rhone-Poulenc) is a large manufacturer of a wide range of chemicals, and in this network the interest was in inorganic materials for the rubber industry. It contributed results on bonding, nitrosamines and silica dust measurement.

# Network Tasks

## Health

### 2. NITROSAMINE FREE PRODUCTS

Evaluation, peroxide systems, testing  
Harmonisation

### 3. PAHs

Alternatives  
Measurements  
Harmonisation

### 5. FOOD CONTACT

Contaminants  
Additives Harmonisation

## Safety

### 1. SAFE RUBBER CHEMICALS

Handling, unwanted chemicals, low Zinc  
Pharmaceuticals  
EU standards

### 6. WATER CONTACT

Microbial growth  
Testing  
Harmonisation

## Environment

### 4. FACTORY AND SERVICE ENVIRONMENT

Fumes, odours, solvents  
EU Standards

### 7. WASTE REDUCTION AND DISPOSAL

### 11. MOULD FOULING

### 8. PROTEINS IN RUBBER

### 9. DISSEMINATION

## NEW STANDARDS

- Safer products
- Advances in compounding
- Safer working environment
- Increased consumer confidence

## **4. NETWORK ACHIEVEMENTS**

### **4.1 Objectives**

The underlying objective of this Thematic Network was to help the European rubber industry make improvements in rubber compounding in order to meet increasing requirements and expectations for health, product safety and the factory environment. A principal aim was to share information on the formulation of rubber among Network members engaged upon compounding research, experienced in rubber technology and manufacture, or having special knowledge of health and safety issues. Other key objectives were exchange of information on national requirements in the search for European standards and consensus, the identification of problems in need of further research and development, and, not least, improved understanding between the rubber industry and its customers. Safe working conditions and safe products were priorities.

Specific tasks for the Network, as illustrated in figure 1, were agreed at Step 1 for tasks 1-7; Task 8 was added during year 2, Task 9 during year 3 and Task 11 during year 4.

Networking benefits a traditional and yet strategic industry. The European rubber manufacturing industry faces increasing legislation, specifications and consumer demands controlling the use of compounding ingredients.

### **4.2 Strategic aspects**

Strategic aspects relate to developments in legislation, specifications and consumer demands. The rubber industry anticipates that quality assurance will soon be extended to include aspects of health and safety and, as is already becoming established, the management and auditing of the manufacturing environment, in accordance with such key standards as ISO 9001 and 14000, and the automotive industry's ISO/TS16949. Customers as diverse as the healthcare and motor industries are major markets for rubber products and many have sought assurances from their suppliers that products are free from toxic or prohibited materials and have been manufactured in a safe environment.

This Thematic Network has been concerned mainly with the exchange of information between Partners, many of whom are from the rubber manufacturing industry. They represent Suppliers (DSM, Flexsys, Rhodia), Manufacturers (BTR/Trelleborg, Hatcham, Semperit, Forsheda, Freudenberg, Hutchinson, Meteor, Pirelli, Woco, LIG) and Information/R&D providers (TARRC, CTTM, CSIC, SP). Interactions among the Partners have had positive impacts upon the industry, that annually turns over some 30 Beuro per annum in Europe.

Three of the Network Tasks (1,4 and 7) have outputs that impact upon the environment and working conditions. For example, the need to reduce the amount of zinc oxide in rubber compounds has been recognised because of the negative environmental impact of

zinc washed away into river water where it is detrimental to aquatic life. In response to the need, a new project on zinc oxide reduction was launched (February 2001) under FP5. Equally, effort has been devoted to passing on information on how to reduce the use of organic solvents in rubber factories, about safe handling of rubber chemicals and about alternatives to polyaromatic hydrocarbon oils. Effort has also been made to review factory practices on waste reduction, rubber scrap re-use, and mould fouling.

People object to 'chemical' smell in their cars, or associated with rubber articles they may handle. In response to this societal need, effort has been made through Task 4 to establish clearly what is known about the causes of product odour, whether it can be measured quantitatively and what remedies there might be.

Within the rubber industry there are many Small and Medium sized Enterprises. They have a need for knowledge, often quite basic, and in response to this the Network took steps to disseminate appropriate information to them. Reaching out to help SMEs is in itself not easy. Effort has been made (Task 9) to find out what sort of information SMEs have need of, and also how best they would like to receive the information. Personnel in SMEs have many demands upon their time. We conclude that the Internet may be a good way to convey information to them, and to this end our TN Website was modified so that SMEs may easily receive basic information.

### **4.3 Principal Network Tasks**

#### TASK NO.1 Safe Rubber Chemicals

- Safe handling of rubber chemicals in factories.
- Unwanted rubber chemicals (black and grey lists).
- Lower zinc levels in rubber compounds (zinc oxide reduction).
- European Standards.

#### TASK NO.2 Nitrosamines

- Alternative ingredients evaluation.
- Peroxide vulcanisation systems.
- Reproducibility of testing/sampling.
- European technical harmonisation.

#### TASK NO.3 Polyaromatic Hydrocarbons (PAH)

- Alternative process oils.
- PAHs in rubber compounds.
- PAHs in factory atmospheres.
- European harmonisation.

#### TASK NO.4 Factory and Service Environment

- Airborne nitrosamines - existing regulations and information exchange.
- Vulcanization fumes in factories.
- Solvent reduction in factories (various processes).
- Odour in factories and in final products.
- Silica dusts.
- European Standards.

#### TASK NO.5 Food Contact:

- Food contamination by additives.
- Identification of acceptable additives.
- Harmonisation of European Standards.

#### TASK NO.6 Contact with Potable Water:

- Compounding rubber to reduce microbial growth.
- Data exchange on test reproducibility.
- Harmonisation of European Standards.

#### TASK NO.7 Waste Reduction and Disposal

- Collection of information from industrial Partners on reduction and recycling of scrap.
- End-of-life scenarios.
- Waste tyres and recycling.
- Factory waste other than just rubber (eg packaging).
- Bibliography updating.
- Evaluation of grinding technologies.

#### TASK NO.8 Proteins in rubber

- 'Reliable' websites on allergies.
- Identify laboratories in the EU for reliable protein analysis.
- Options for protein removal or avoidance.
- Devices on the market expected to contain natural rubber.
- Analysis of Accelerator residues.
- Current protein limits worldwide.

#### TASK NO.9 Dissemination to SMEs

- Translate technical summaries into French, German, Italian and Spanish.
- Put technical summaries into TN website library.
- Make summary reports on new topics as they arise.
- Gather information on how best to reach out to SMEs to help them.

#### TASK NO.10 PROJECT MANAGEMENT

- Do all that is needed to motivate the Network.

#### TASK NO.11 Mould fouling

- Literature search.
- Report on current knowledge.

### **4.4 Training and Technology Transfer**

All activities of this Network have been devoted to the needs of the European rubber industry. Ideas, knowledge, results, technical and technological details have been transferred from the research organizations to the industry and between industrial Partners. Research Partners have been made aware of practical short and long term problems faced by the rubber manufacturing industry. The meetings of Partners have been a major forum for this transfer. There were 2 or 3 invited lectures per meeting, and there have been 2 open seminars for the industry.

#### 4.5 State-of-the-Art Reports

Network activities have led to the preparation of the following reports:

<b>Task</b>	<b>Title</b>
1.1	Silica dusts
1.1	Safe handling of rubber chemicals
1.2	Rubber chemicals on black and grey lists
1.3	Reduction of zinc levels in rubber compounds
1.3	Reaction mechanisms of zinc oxide in rubber compounds
2.1	Compounding sulphur vulcanised rubber for nitrosamine compliance
2.2	Peroxide vulcanization for freedom from nitrosamines
2.3	Nitrosamine analysis in rubber
3.0	PAHs and alternatives
4.2	Odour in rubber products
4.2	Information sources on fumes and odours
4.2	Low odour rubber
4.2	'Electronic nose' to sense rubber odour
4.2	Rubber flooring odour
4.2	Hydrocarbons emission testing
4.3	Solvent reduction
4.3	Silane coupling agents
4.4	Filter systems for rubber production
4.5	Legislation and regulations on fumes in the work place
4.5	VOC Guidelines

5.1	Food contamination by additives
5.2	Food contact: accelerator systems
5.3	Food contact: standards harmonization
6.0	Potable water applications
6.1	Compounding to reduce microbial growth
6.2	Test reproducibility
6.3	Materials in contact with water – European regulations
7.1	Waste reduction and disposal including tyres
7.3	The scrap tyre issue in EU
7.3	Recycling of used tyres in Spain
7.5	Rubber recycling in Germany
7.5	Recycling options for the rubber industry
7.6	Evaluation of grinding technology and application
8.0	Proteins in rubber: current position
8.1	Latex – Health and Safety
8.3	Proteins in rubber
8.5	Accelerators in NR gloves
11.0	Mould fouling

## 5. EXPLOITATION AND DISSEMINATION

The nature of this Network is such that there was continuous exploitation of exchanged information. The following examples are given to illustrate the many different ways in which this Network has been doing this.

### (i) The Website

The Network's Website has been up and running since 1998. At the request of Partners various modifications were made. It appears to be at its most beneficial as a drip-feed of technical information and upcoming events, and particularly so for SMEs. The Website address is [www.rubber-compounding.com](http://www.rubber-compounding.com). Emphasis is on the needs of an external audience.

### (ii) FP5 proposal

Through the Network considerable desire was generated among Partners to try to reduce zinc in rubber compound formulation. Some of the Partners came together with the intention to formulate a proposal for FP5 that would address the problem and look for practical solutions. The completed proposal was sent to the EC in March, 2000. It was positively evaluated and work began on 'ECOZINC' in February 2001.

### (iii) Rubber odour

This is turning out to be a wider issue than first thought. Not only has a new smell-free grade of rubber (SUMAR) been evaluated, but also a number of reports were prepared. Topics include odour from flooring, odour from tyres, odour from rubber products in general – and how to measure odour using an electronic 'nose'.

### (iv) Potable water contact

A supplier Partner is endeavouring to develop improved grades of EPDM rubber for use in contact with potable water and has supplied four manufacturing Partners with formulations and ingredients for factory trials. There was ongoing evaluation of prepared test pieces for taste and microbial growth. Attention focussed upon the so-called KIWA test and the acceptability of the results produced by this test, compared with established MDOD and W270 tests.

### (v) Waste reduction and disposal

Industrial Partners supplied information on how they deal with scrap in their factories. A Partner's use of rubber crumb and devulc reclaim has been summarised. Another summary has been prepared of Partner data concerning factory waste other than rubber: for example, packaging.

(vi) Dissemination to SMEs

Efforts have been made to find out how best Small and Medium-sized Enterprises might benefit from the non-confidential results generated by this Network. A number of SMEs across Europe were formally consulted. Based on questionnaire responses it became clear that they could benefit from some of the basic HSE information being brought together by the Network. Overall, the view was reached that use of the Internet might be the best way to supply the information. Accordingly, our TN Website was adapted to provide this.

(vii) Open Seminars

Two one-day seminars were held (26 Sep 2001 and 20 Nov 2001) on the improvements the European rubber industry has been making in rubber compounding in order to meet ever-demanding requirements for health, product safety and the environment. Many of the results obtained by the Network were disseminated.

(viii) Publications

- P.M. Lewis, HSE a challenge for the rubber industry, Seminar on HSE in the Rubber Industry, Le Mans (FR) 28 Jan 1998.
- G. Boccaccio, Applications biomédicales des élastomères, Seminar on HSE in the Rubber Industry, Le Mans (FR) 29 Jan 1998.
- J. Loadman, Latex protein allergy, a rational perspective, Seminar on HSE in the Rubber Industry, Le Mans (FR) 29 Jan 1998.
- C. Cardinet, Caoutchoucs en contact avec des denrées alimentaires, Seminar on HSE in the Rubber Industry, Le Mans (FR) 29 Jan 1998.
- M. Koch, Potable water applications, compounding and legislation, Seminar on HSE in the Rubber Industry, Le Mans (FR) 29 Jan 1998.
- Y. Bomal, Poussières de silice, Seminar on HSE in the Rubber Industry, Le Mans (FR), 29 Jan 1998.
- Y. Bomal et alia, Silica dusts, Conf. Proc. Hazards in the European Rubber Industry, Manchester (UK), 28/29 Sept 1999, paper 4.
- Y. Bomal et alia, La problemática del polvo de silice, Caucho, Nov/Dec 1999, p.19.
- A. Marcos Fernandez, Red temática, Caucho, Mar/Apr 2000, p.405.
- A. Marcos Fernandez, Adhesion con silanos, Caucho, Mar/Apr 2000, p.19.
- G. Boccaccio, Les déchets de caoutchouc, FLASH Info Pays de Loire, Sept 2000, p.34.
- The European Rubber Journal has published a feature article about the TN (ERJ Nov 2001, pp 23-25). ERJ also published an article entitled “Where is zinc going”, based on presentation by A.V. Chapman to the Institute of Materials, London (Dec. 2000).
- A.V. Chapman and A.D. Roberts, European Thematic Network on Rubber Compounding: Safe chemicals, Nitrosamines and Emissions, DKG Fachtagung 2002, Fulda (DE) 19/20 June.

(ix) Presentations

- Thematic Network on Rubber Compounding, presentations by several partners, Seminar on HSE in the Rubber Industry, Le Mans (FR), 28/29 Jan 1998.
- TRA Polymer Materials Kick-Off Meeting, Brussels 23 Apr 1998, brief presentation of TN on Rubber Compounding by A.D. Roberts.
- TRA Polymer Materials Cluster 4 meeting at RAPRA (UK), 7/8 Oct 1998, presentation of TN on Rubber Compounding by P.M. Lewis and A.D. Roberts.
- TRAPM Round Table Meeting, Amsterdam, 9 Dec 1998, presentations on waste tyre disposal by A.D. Roberts.
- TRAPM Annual Meeting, Melton Mowbray (UK), 16/17 Sept 1999, LCA on comparison among tyre disposal scenarios, talk given by C. Regazzoni.
- TRAPM Annual Meeting, Melton Mowbray (UK), 16/17 Sept 1999, Zinc oxide reduction in rubber compounds, talk given by A.D. Roberts
- TRAPM/TRAWMAR joint meeting, Brussels (BE), 27/29 Feb 2000, Tyre retreading, talk given by A.D. Roberts.
- TRAPM Annual Meeting, Clermont-Ferrand (FR) 11/12 May 2000, Uses for recycled rubber, talk given by A.D. Roberts.
- Institute of Materials Seminar, London (UK) 4 Dec 2000, Reduction in zinc in rubber compounding, talk by A.V. Chapman.
- TRAPM Cluster 4 Meeting, Stockholm (SE) 20/21 Feb 2001, Recycling of tyres, talk given by A.D. Roberts.
- TRAPM Round Table Meeting, Brussels (BE) 15 Mar 2001, Presentations of TN Rubber Compounding and the impact of TRAPM, talk by A.D. Roberts.
- TRAPM Annual Workshop, Paris (FR) 13 Sept 2001, Tyre casing retreadability, talk given by A.D. Roberts.
- TRAPM Cluster 4 Meeting, Padova (IT) 14 Feb 2002, Waste tyre update, talk by A.D. Roberts.
- Belgian PRI Conference “Health, Safety and the Environment”, II, Brussels, 30 Jan. 2002, “Zinc in rubber compounds and the Environment”, talk given by A.V. Chapman.
- Thematic Network seminar at TARRC (Sept. 2001).
- Swedish presentation of the TN by A. Gustavsson (Nov. 2001).

## 6. REFERENCES

### 6.1 TN Open Seminars

#### **Rubber Compounding for Improvements in Health, Safety and the Environment**

##### **PROGRAMME**

**Wednesday, 26 September 2001**

10.00	Registration and Coffee	
10.30	Welcome and presentation of the TN Project	(AD Roberts, TARRC)
10.45	Banned chemicals: threat or opportunity for the rubber industry	(AJ de Hoog, Flexsys)
11.05	Formulating to minimise nitrosamines: is it still a problem?	(C. Thomas, Meteor)
11.25	Replacing polyaromatic hydrocarbon oils: why and how	(A Gustavsson, Forsheda)
11.45	Pause	
11.55	Factory and service environment: dusts and fumes	(W. Wenneis, Freudenberg)
12.15	How to reduce solvents for rubber-to-metal bonding	(G Boccaccio, CTTM)
12.35	Food contact: the legislative maze	(C Cardinet, Hutchinson)
13.00	LUNCH	
14.00	Visit to TARRC laboratories	
14.30	Waste management through its life cycle	(G-P Giuliani, Pirelli )
14.50	Potable water contact: compounding to meet current regulations	(M Koch, DSM)
15.10	Latex allergy: routes to minimize exposure	(R Arnold, SSLI)
15.30	Pause	
16.00	Mould fouling	(L Waengberg, Trelleborg)
16.20	Mould release in rubber processing	(DE Packham, Univ Bath)
16.40	Why and how to reduce zinc oxide	(AV Chapman, TARRC)
17.00	CLOSE	

**EU BRITE-EURAM THEMATIC NETWORK ON RUBBER  
COMPOUNDING FOR IMPROVEMENTS IN HEALTH, SAFETY AND THE  
ENVIRONMENT**

**Proposal n° BET2-0511 - Contract BRRT-CT97-5018**

**JOURNEE TECHNOLOGIQUE**

**« Santé, Sécurité et Environnement dans l'industrie du caoutchouc »**

**CTTM Le Mans**

**Mardi 20 novembre 2001**

**PROGRAMME**

9.30	Accueil et café	
10.00	Présentation générale du Réseau Thématique Européen.	(A.D. Roberts, TARRC)
10.15	Ingrédients interdits : menace ou opportunité pour l'industrie du caoutchouc	( A.J. de Hoog , Flexsys)
10.35	Formulations pour réduire les nitrosamines : est-ce encore un problème ?	(C. Bassi, Quarrechim)
10.55	Remplacement des huiles polyaromatiques: pourquoi et comment ?	(N. Barral, Nynas)
11.15	Pause	
11.30	Poussières et fumées dans les ateliers ; silices inoffensives.	(Y. Bomal, Rhodia)
11.50	Comment réduire les solvants pour le collage caoutchouc-métal	(C. Larivière, Henkel)
12.10	Réduction des déchets caoutchouc : le recyclage est prometteur.	(G. Boccaccio, CTTM)
12.30	Déjeuner	
14.00	Visite du CTTM	
15.00	Contact alimentaire : le dédale législatif.	(C. Cardinet, Hutchinson)
15.20	Potable water contact : compounding to meet	
15.21	current regulations.	(M. Koch, DSM)
15.40	Protéines allergènes du latex	(Pr. F. Leynadier, Hôpital Tenon)
16.00	Discussion générale	(animation :H. Pichon, CTTM)
16.30	Fin du séminaire	

**Program för höst- & årsmöte 2001**

Plats: *Hotell Scandic Swania, Trollhättan*

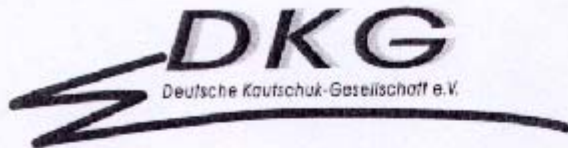
Datum: *29 - 30 november 2001*

Torsdagen den 29 november

- |               |  |
|---------------|--|
| 12.00 - 13.00 | Lunch  |
| 12.30         | Sekretariatet öppnar   |
| 13.00 - 13.30 | <b>Mötet öppnas av SGFs ordförande, information/framtida möten?</b><br>Per K Hermansen   |
| 13.30 - 14.15 | <b>Framtiden för leverantörer till bilindustrin</b><br>Lars Holmqvist, Konstruktionsbakelit, Styrelseordförande i fordonskomponentgruppen    |
| 14.15 - 14.45 | <b>Användning av databaserade konstruktionsanvisningar vid val av material</b><br>Thomas Andersson, Volvo                                    |
| 14.45 - 15.15 | <b>IMDS - International Material Data System</b><br>Anna-Karin Flood, James Lundström, Volvo   |
| 15.15 - 15.45 | Kaffepaus  |
| 15.45 - 16.15 | <b>Konstruktionsberäkningar för gummikomponenter</b><br>Per-Erik Austrell, LTH   |
| 16.15 - 16.45 | <b>Redovisning av EU-projekt: "Rubber Compounding for improvements in health, safety and the environment"</b><br>Alf Gustavsson, Forsheda AB |
| 16.45 - 17.15 | <b>Presentation av SAAB, Trollhättan</b>   |
| <b>17.15</b>  | <b>SGF.s årsmöte</b>   |
| 19.00         | Drink  |
| 19.30         | Middag   |

Fredagen den 30 november

**Studiebesök:** SAAB, Trollhättan klockan 12.30 (max 48 stycken, övriga museet)



## FACHTAGUNG 2002

DIE KAUTSCHUKINDUSTRIE:  
NEUE ROHSTOFFE UND  
VERARBEITUNGSTECHNOLOGIEN.  
ANFORDERUNGEN UND ANTWORTEN

VORTRAGS- UND DISKUSSIONSTAGUNG  
19. UND 20. JUNI 2002, FULDA

## PROGRAMM

- 14.00 Uhr **High-Tech Elastomerprodukte durch Plasmatechnik**  
J. Brand, Fraunhofer-Institut für Schicht- und Oberflächentechnik, Braunschweig (D)
- 14.30 Uhr **Neue kontaktverfärbungsfreie aminische Alterungsschutzmittel mit hoher Extraktionsbeständigkeit und verbesserter Langzeitwirkung**  
G. Knobloch, Ciba Speciality Chemicals Inc., Basel (CH)
- 15.00 Uhr **European Thematic Network on Rubber Compounding: Safe Chemicals, Nitrosamines and Emissions**  
A. D. Roberts (V) A. V. Chapman, TARRC / MRPRA, Hertford (UK)
- 15.30 Uhr SCHLUSSWORT

## **6.5 Sources of Information**

*ECN Environmental Review*, Reed Business Publishing, Sutton, UK.

*Elastomerics*, Communications Channel, Atlanta, Ga, USA.

*European Adhesives and Sealants*, FMJ International Publications, Redhill, UK.

*European Rubber Journal*, Crain Communications, London, UK.

*J. Testing and Evaluation*, American Soc. Testing and Materials, USA.

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*Materials World*, Institute of Materials, London, UK.

*Metals and Materials*, Institute of Metals, London, UK.

*Modern Tire Dealer*, Bill Publications, Akron, Oh., USA.

*Plastics and Rubber International*, Plastics and Rubber Institute, London, UK.

*Rubber & Plastics News*, Crain Communications Inc., Akron, Oh., USA.

*Rubber Chemistry and Technology*, Rubber Division, American Chemical Society, USA.

*Rubber World*, Lippincott and Peto, Akron, Oh., USA.

*Caoutchouc et Plastiques*, Paris, FR.

*Recyclers World*, Internet.

## 6.6 General References

1. Physics and Chemistry of Rubber-like Substances, edited by L. Bateman, Maclaren, London 1963.
2. Natural Rubber Science and Technology, edited by A.D. Roberts, Oxford University Press, Oxford 1988.
3. Propriétés de vulcanisats: vers une optimization; E. Roualt and G. Boccaccio, Caoutchoucs et Plastiques, No. 724, 75 (1993).
4. Crosslink reaction mechanisms of diene rubbers with dicumyl peroxide; L. Gonzalez, A. Rodriguez, A. Marcos and C. Chamorro, Rubber Chemistry and Technology, 69, 203 (1996).
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6. The RAPRA Vulcanization Fume Project – Ingredient Emission Relationships through Computerized Analysis; B.G. Willoughby, International Rubber Conf. June 1991, Essen, Germany.
7. CORDIS database RTD-projects ‘Investigation into the exposure to hazardous substances in workplaces occurring during hot and cold vulcanization of conveyor belts’; RCN 29799.
8. CORDIS database RTD-projects ‘Water-borne adhesives as alternatives to solvent-based adhesives’; RCN 22993.
9. CORDIS database RTD-projects ‘Reduced zinc in rubber products for an enhanced environment’; RCN 54893.
10. CORDIS database RTD-projects ‘Use of fine-grain recycled rubber in recyclable thermoplastic rubber for moulding and extrusion’; RCN 22964.
11. CORDIS database RTD-projects ‘Tribo-electric cable plastics recycling’; RCN 44818.
12. CORDIS database RTD-projects ‘Environmentally acceptable bonding methods for rubber-based engineering components’; RCN 46930.
13. CORDIS database RTD-projects ‘Tyre pyrolysis process for cement manufacturing and tyre-to-energy plants’; RCN 61327.

14. CORDIS database RTD-projects 'Cost efficient recycling of elastomeric materials with noise and vibration damping applications'; RCN 34531.
15. CORDIS database RTD-projects 'Recycling of crumb rubber and polyolefin waste by producing thermoplastic elastomers'; RCN 57343.
16. CORDIS database RTD-projects 'Scrap tyre rubber to combat traffic vibrations'; RCN 57270.
17. CORDIS database RTD-projects 'High shear mixing to recycle vulcanized rubber by devulcanisation'; RCN 53127.
18. CORDIS database RTD-projects 'Pyrolysis of tyres for the productions of fuel oil'; RCN 15503.
19. CORDIS database RTD-projects 'Devulcanisation of scrap tyres by way of micro-organisms'; RCN 45693.
20. CORDIS database RTD-projects 'Thermal treatment of scrap tyres to produce re-usable carbon'; RCN 58674.
21. CORDIS database RTD-projects 'Waste stream recycling in rubber manufacturing'; RCN 43161.
22. CORDIS database RTD-projects 'Production of activated carbon from scrap tyres'; RCN 43039.
23. CORDIS database RTD-projects 'Measurement of N-nitroso compounds in ambient air of workplaces'; RCN 29596.
24. CORDIS database RTD-projects 'Hi-tech plant for production of recycled rubber goods'; RCN 24757.
25. RAPRA Revue Report 119 (ISSN: 0889-3144), 'Rubbers in contact with food', J.A. Sidewell and M.J. Forest, vol. 10, number 11, 2000.
26. Swedish Environmental Protection Agency (1995) Report 4437, Rubber chemicals.