REMA TIP TOP

//ONE BRAND //ONE SOURCE //ONE SYSTEM

Tyre Cologne 2018 – Global Retreading Conference– SOLVENT-FREE-REPAIRS

ENVIRONMENT-, HEALTH-, SAFETY-ASPECTS

There are various discussions and projects since years to reduce the volume of organic solvents in industrial applications. (VOC = Volatile Organic Carbons)

Some links may show you how intense this problem is discussed worldwide:

https://rd.springer.com/chapter/10.1007/978-94-007-1712-1_1 (a book)

http://www.microchemicals.com/technical_information/solvents.pdf here an important sequence out of the pamphlet:

Safety Properties: TWA, Explosive Range, Flash Point, and Ignition Temperature

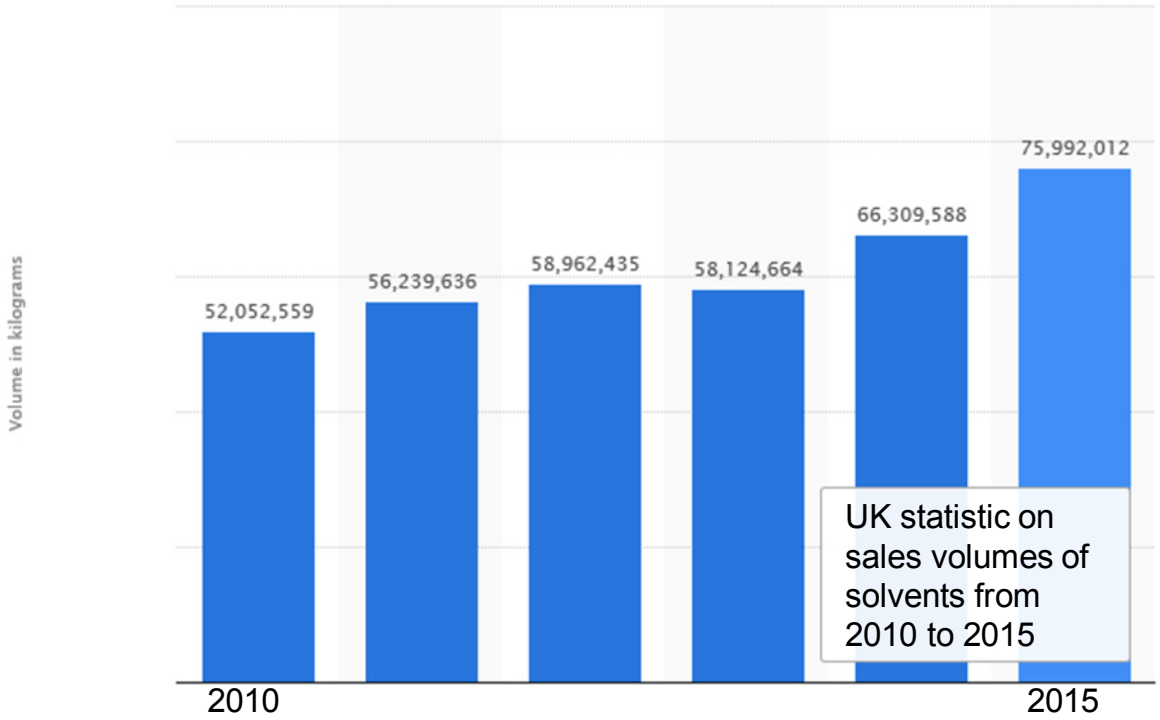
TWA (Time Weighted Average): This term is used in the specification of Occupational Exposure Limits (OELs) to define the average concentration of a chemical to which it is permissible to expose a worker over a period of time, typically 8 hours.

http://www.pfonline.com/articles/degreasing-solvents-old-and-new

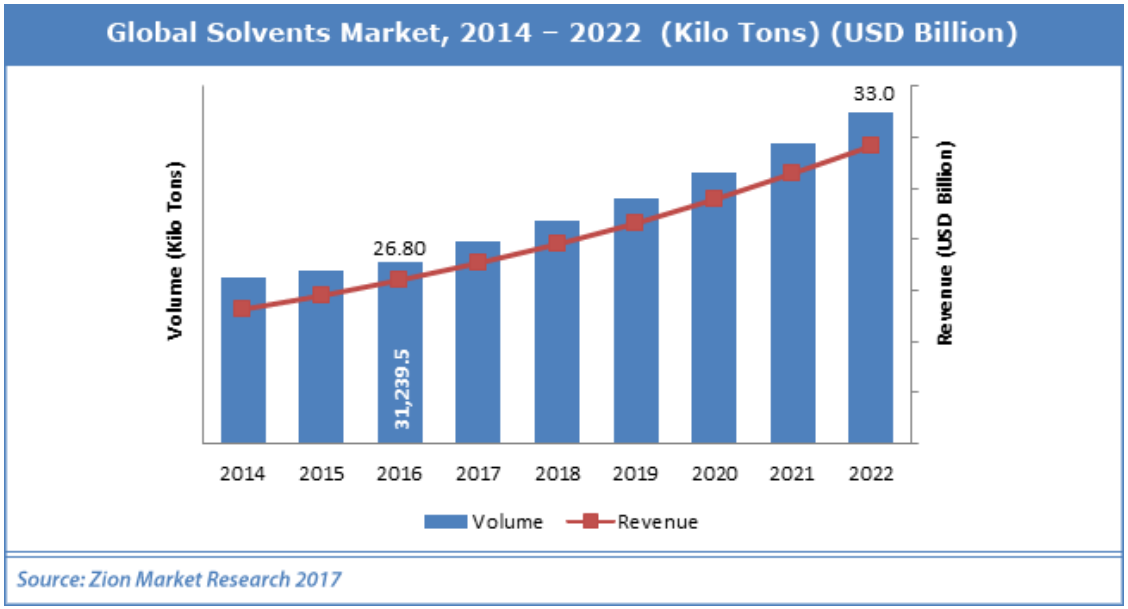
https://echa.europa.eu/regulations/reach

https://www.osha.gov/SLTC/solvents/standards.html

ACTUAL STATISTICS ON ORGANIC SOLVENTS (EXAMPLE UK)



EXPECTED GROWTH OF SOLVENT MARKET INCLUDING ALCOHOL



Alcohol emerged as dominating type segment of the global solvents market in 2016. It held more than 30.0% share of the total volume consumption in 2016 and it is expected to be the fastest growing type

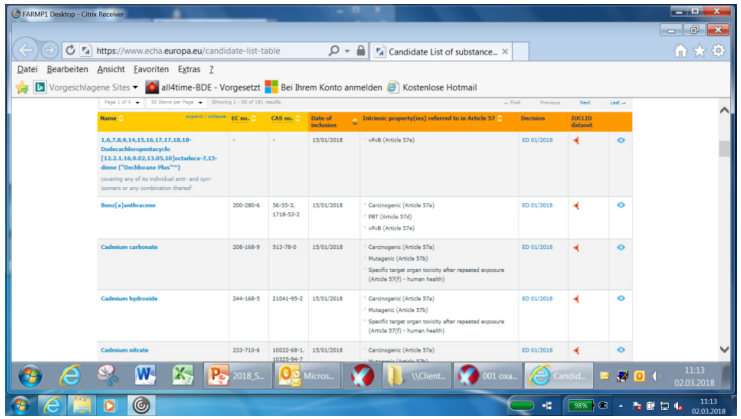
SVHC UNDER REACH REGULATION

TRI

Bisphenol A

ETU (Ethylthiourea) …etc.

https://www.echa.europa.eu/candidate-list-table



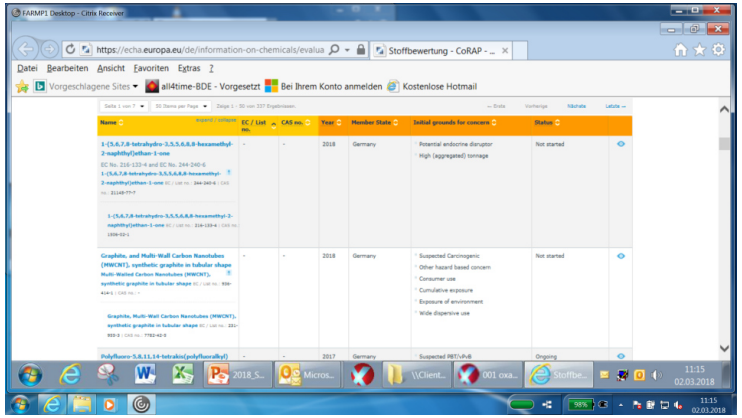
POTENTIAL NEXT SUBSTANCES

PER (Perchlorethylene)

CMR (Titan Dioxyd)

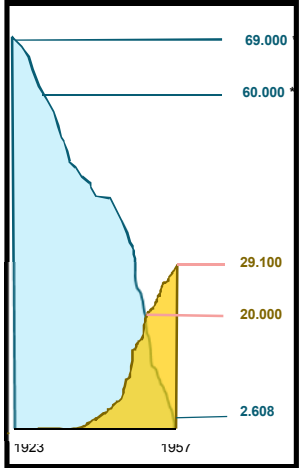
Methylenchlorid; ZEPC; ZDEC; ZDBC; etc.

https://echa.europa.eu/de/information-on-chemicals/evaluation/community-rolling-action-plan/corap-table



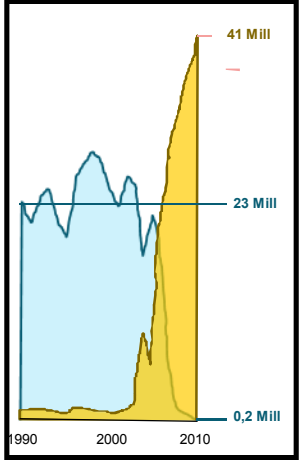
The Power of Disruptive Technologies

Steam Train



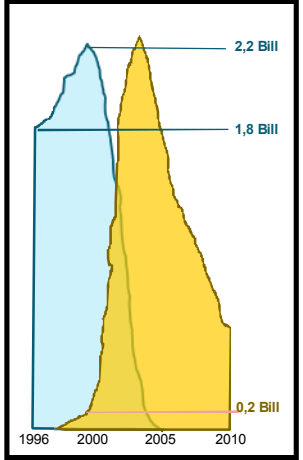
Diesel Locomotive

Cathod Ray Tube TV



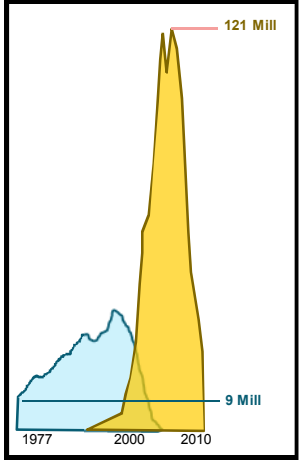
Flatscreen TV

VHS-Tapes



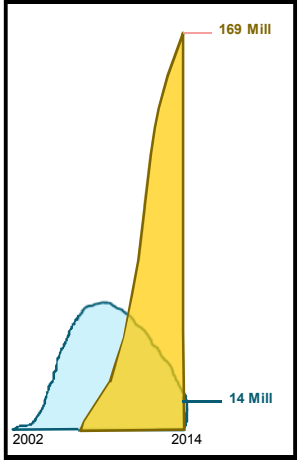
DVD

Analog Camera



Digital Camera

I Pod



I Phone

IDEAS TO ESCAPE FROM ORGANIC SOLVENTS

1) Replacement by less-critical solvents (e.g. water, alcohol…)
2) Change of process to avoid the need of solvents
3) Reduce productivity or eliminate critical product line to reduce use of solvents

1) = more or less influences on performance of products possible
2) = new way of thinking needed, or new kind of development
3) = critical for the business of the company, or opens the door for competition from outside production which does not yet care about critical solvents in production

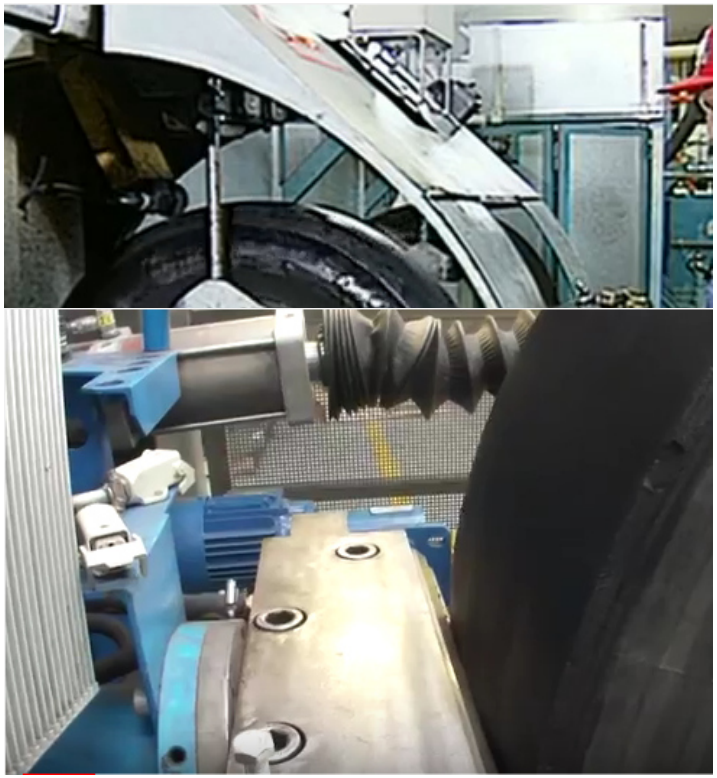
OTHER PROFESSIONAL ALTERNATIVES REPLACING SOLVENTS

1) Acrylic Paints
2) Water based paint for cars
3) Acrylic sealing material
4) Perchlorethylene for non-flammable applications in underground mines

TYRE REPAIR AND RETREADING ACTIVITIES IN THE PAST YEARS

Retreading companies introduced following steps to reduce solvents in process:

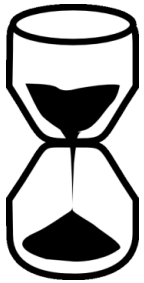
- Water based spray solutions for casing, tread and tyre-paint
- Direct extrusion of bonding rubber to the casing (e.g. AZ-extruder)
- Changing type of repair cement to cfc- and aromatic-free versions (since 1996)



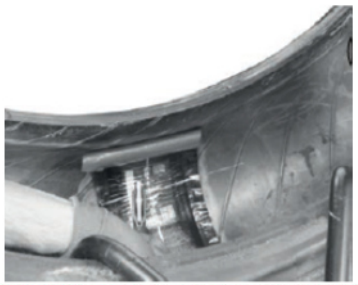
IDEAS TO ESCAPE FROM ORGANIC SOLVENTS IN TYRE-REPAIR

Change of process to avoid the need of solvents









M-RCF400 TYRE REPAIR PATCHES

- The only solvent-free repair system for tyres in global market (patented), introduced in 2010
- Durable repairs to radial car and truck tyres in hot-cure systems from 98°C onwards
- Due to stricter regulations on environment and health and safety in industrial processes, retreaders are preparing for cement-free production process in several countries (e.g. direct application of bonding rubber by AZ-extruder, pre-coated tread rubber…)

INVESTMENT IN A NEW SAVE SYSTEM

- 1 Million kms of drum testing
- Preparation of many test-tyres different brands and sizes
- Experiments with all typical types of vulcanization system in retreading
- Thousands of working hours in laboratory analysis
- 2 years of field testing with professional retreaders

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SOLVENT-FREE REPAIR APPLICATION

What is needed for solvent-free repair:

- **RCF DRY BUFFER for Cleaning of Inner-Liner (water + soap based)**
- **M-RCF Patches and RCF-rope rubber for solvent-free application**
- **M-RCF system-box for pre-heating of M-RCF patches**
- **RCF SEALER-PLUS for protection of over-buffed areas around the patch**

This is the first complete system in the market for one-step repairs (patented)

(Curing from 98°C onwards) without cement or solution

REPAIR-SYSTEM WHICH GIVES ADVANTAGES

- **Advantage of RCF-System:**
- **No solvent or cement** neccessary for application of patches (non-hazardous)
- The most **environmental-friendly** repair system on the market
- Significantly faster application of patches; **saves up to 40 % working time** in the repair process
- **No risk** of over-drying of the cement, or humidity underneath the patch
- **Faster work-flow** due to reduced number of steps (eliminates cementing + drying)
- **Savings** at work-shop constructions and equipment for exhausting the vapor
- **Lower classification** regarding safety at work and environmental stocking requirements
- **Very high „green tack“** of the pre-heated RCF-Patches on fresh buffed surfaces
- **Optimal bonding** after the vulcanizing process (>98°C, 1-step) in all typical curing processes

THE NEW PROCESS:

- Special bonding rubber
- Softening compound at temperatures around 70°C
- Pre-warming box for equal temperature all over the bonding rubber with fixed temperature
- Smooth buffing texture (RMA 2) for optimal adhesion of patch
- Curing temperature >98°C to prevent rubber from early curing
- Intensive stitching to avoid trapped air underneath the patch

APPLICATION PROCESS STEP-BY-STEP

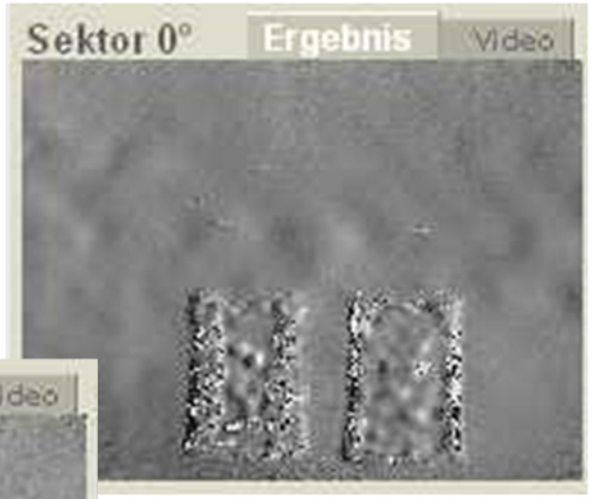
1. Clean inner liner with solvent free buffer
2. Prepare damage
3. Select M-RCF patch dimension according to application chart
4. Detach and re-apply protective red foil from backside of patch
5. Put patch in RCF-system box and pre-warm it for 7 minutes
6. Buff the inner liner (Silver Class tool with soft grit K36)
7. Clean buffed surface with brass bristled brush
8. Remove dust with vacuum cleaner
9. Install the patch to the damage and remove protective foil to stitch it well
10. Apply RCF SEALER-PLUS all around the patch (if no inner envelope used)
11. Cure tire
12. Inspect result of repair (Apply RCF SEALER-PLUS if inner envelope used)

APPLICATION PROCESS STEP-BY-STEP (VIDEO)

CUSTOMER EXPERIENCE

SHEAROGRAPHY
APPEARANCE

1) Uncured patches M-RCF
(micro-air bubbles)



2) After curing process
(Invisible Patch)

FUTURE DEVELOPMENT OF SOLVENT-FREE SYSTEMS

1. Spread RCF-system out to larger patch dimensions

2. Develop a chemical cold cure system without solvents

3. Preventive sealing of all kind of tyres without increasing the weight (by tyre manufacturers)

4. Develop air-free tyre systems / wheel-systems

Many thanks for your interest and your attention!

Our slogan:

TRUST, COMMITMENT, FUTURE

// ONE BRAND // ONE SOURCE // ONE SYSTEM

// SERVICE
// MATERIAL PROCESSING
// SURFACE PROTECTION
// AUTOMOTIVE

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