

# Cutting VOC emissions

## Why the shop-floor offers new ways to drive LEAN



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**With chemicals and solvents being part of everyday life on the manufacturing shop-floor, VOC (Volatile Organic Compounds) emissions and the related safety hazards are increasingly top of mind.**

A typical facility will use up to 5 tons of solvent a year, exposing countless workers to dangerous toxic chemicals that can cause untold health problems. As an indication of the scale of the problem, about 32 million workers in the EU – almost a quarter of those employed – are exposed to cancer-causing agents<sup>1</sup>.

Unsurprisingly, worker safety has a direct impact on manufacturing productivity and profitability.

In this paper we'll look at the manufacturing landscape in relation to VOCs and environmental compliance and the challenges faced by those committed to cleaner, safer working environments.

**VOCs – health and safety, profitability and compliance: Are they always mutually exclusive?**

Dust, gaseous pollution and particulates are all waste products commonly found in manufacturing environments.

Dusts are generated during mechanical treatment of materials – for example, wood dust from sawing, metal dust from grinding – while emissions containing gaseous pollutants include ozone, oxides of nitrogen and carbon monoxide and can be caused by tasks such as welding.

However, VOC emissions can come from many sources, including solvent dispensing. All of these contribute to potential waste in:

1. Materials
2. Motion
3. Re-work
4. Transportation
5. Over-processing

Solvents used in general manufacturing include paint and lacquer thinners, mineral spirits, Turpentine and Skydrol\*, and Diestone DLS, as well as more potentially hazardous or noxious products such as MEK, IPA and Acetone.

By no means exhaustive, this gives an indication of the challenge that must be faced if real improvements are to be made to worker health and safety, productivity and cost savings.

Is there really only one way?

There is a popularly held belief that easily changing your chemical to a safer one is only rarely possible, therefore source control is generally the most effective solution.

Instead, we propose that VOC emissions can be reduced, safety enhanced, and the benefits of LEAN manufacturing achieved by better managing solvent usage.

While environmental compliance may seem to conflict with productivity, they actually go hand in hand. By minimising the emissions, it's possible to significantly reduce waste and lost productivity.

**Next: Prevention is always better than cure**

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# Section 2

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## **The long-term impact of VOCs: What are the challenges?**

There are many challenges posed by the presence of VOC emissions in the workplace.

### **Passing on the skills: the importance of training**

One of the key remaining differentiating factors for production activities in Europe is the high level of highly-qualified workforce.

While goods can be produced elsewhere much more cheaply and at times in great quantities, manufacturers still struggle to find the same quality standards and consistency in skills and training.

However, the European workforce is aging; when the current generation goes, a great deal of knowledge will go as well. This is a challenge for industry in general, but it applies specifically to instances of solvent use.

When solvent is involved, the first step is to know about the risks related to the products, and how best to use those products for a particular task. There can be no substitute for experience nor should the level of skill required be underestimated

### **Vulnerabilities of a new workforce**

Not least of these is growing number of young people entering working life with asthma, allergy or hypersensitivity problems.

Their health and safety is paramount to any employer, but a growing understanding of VOC emissions raises the concern that these new hires may not be adequately protected by existing preventive measures.

Reducing the overall consumption of solvents and making their dispensing more efficient can be a significant step forward in safeguarding the health of vulnerable young workers.

### **New environments**

Outsourcing of maintenance has caused its own problems. It can mean that staff are entering a new and unfamiliar environment every time they carry out a job – and exposed to new and unfamiliar hazards.

This is becoming increasingly important, as in-plant emissions cannot always be controlled sufficiently by engineering means alone.

Workers may have to wear respirators, and tests need to be carried out to confirm that the respirators used are the right ones for each task – not just the same ones used across all processes, to save costs.

### **Underpinning all of this is the need for training, to increase worker understanding and improve their skills and knowledge.**

Training is essential, to ensure that workers know to clean and change supplies as often as needed for each process. This is particularly pertinent in processes involving VOCs, as limiting emissions will help ensure the worker's continued health and safety. Appropriate donning of PPE like respirators and dispensing and disposal solutions for minimising VOC emissions should be included as part of this training. With the right help, support and guidance, there is much that an individual can do to protect their own wellbeing while boosting productivity and profitability.

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### **Impacts on the body**

Exposure to inhalants cause a number of effects, including chronic respiratory problems and fatigue. Other effects include weakness, loss of coordination, slow reflexes, poor judgment, blurred vision and ringing in the ears – all of which can have a detrimental effect on completing a task<sup>2</sup>.

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46% of industrial workers are exposed to at least 1 chemical in their daily work; 21.6% are exposed to at least three<sup>3</sup>

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19.4% of industrial workers are exposed to chemicals for 10+ hours a week<sup>4</sup>

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22% of workers report they are breathing in fumes and vapours for at least a quarter of their working time<sup>5</sup>

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Dangerous substances contribute significantly to the 350 million working days lost through occupational ill-health and to the suffering of over 7 million people who are victims of occupational illnesses<sup>6</sup>

# Section 3

## Understanding emissions zoning

Identifying hazardous area zones and equipment categories helps workers use the correct supplies and Personal Protective Equipment (PPE).

Hazardous places are classified in terms of zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere.

### Gases, vapours and mists:

#### Zone 0

A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.

#### Zone 1

A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.

#### Zone 2

A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Next: Facing up to the challenges

## Small actions. Big outcomes.

Getting internal support for compliance can be an uphill struggle, and even the best-intentioned can find the topic slipping to the bottom of their agenda.

However, actions speak louder than words. Simple procedures that can be adopted quickly soon become routine and can be documented to help new workers or those unfamiliar with a particular location or process.

An easy way to get started is to identify which solvents are in common usage in your environment. The following are found consistently in the automotive, aerospace and metal sectors:

- MEK
- MPK
- MIBK
- Hexane
- Trichloroethylene
- Acetone
- Isopropyl Alcohol
- Toluene

If you use any of the above, what can you do to minimise consumption and exposure to their emissions?

One way to highlight a potential reduction in emissions is to focus on how the solvents are dispensed. Plunger-type dispensers are a cause of solvent evaporation, but overloaded rags left to drip solvent are a great deal more harmful. Addressing this can easily result in a significant reduction of VOC.

Improving the way wipers are dispensed not only lessens the impact on people and the environment, but also helps reduce waste – which feeds directly into Lean and continuous improvement initiatives.

## Of course, there's a stick as well as a carrot

Failure to deal with the issue can lead to large fines, increased insurance premiums and, potentially, plant closures.

That's why compliance can never be seen in isolation, but always as part of the whole process of materials, motion, re-work, waiting, transportation and over-processing wastes related to filling bottles and loading rags.

Next: Talk the talk, walk the walk

# Section 4

**Ideas in action:** Carry out a risk assessment of each system and process in a particular working and storage environment to see what hazardous products are being used. Have issues such as flammability or static been figured into the supplies used to complete a task?  
**Next:** Getting more out of KIMBERLY-CLARK PROFESSIONAL\* and LEAN

## Talk the talk, walk the walk

LEAN Manufacturing is the most powerful system ever invented for improving productivity, efficiency, quality and profitability.

However, there are two critical areas often overlooked when LEAN initiatives are propounded – industrial supplies and PPE.

By taking the principles of LEAN and applying them here, you can rapidly make headway in your drive for continuous improvement.

At the same time, you'll be reducing VOC emissions, improving health and safety and driving up productivity. This is how:

LEAN identifies eight wastes that compromise efficiency and inhibit quality in the workplace. Industrial supplies and PPE play a role in at least five of them;

### The Eight Wastes

1. Conveyance/Transportation: too much movement of material or product
2. Inventory: Tying up capital without producing income
3. Motion: Non-value added movement, like people stopping a task and walking to get supplies
4. Waiting: Waiting for product supplies, information or someone else to complete the task
5. Over-processing: Doing more work on a piece than is required by the customer
6. Over-production: Producing more product or information than the customer wants and before the customer wants it
7. Correction/Defects: Extra costs from re-work, rescheduling and so on

...And, critically, knowledge or latent skill. Your people are the best source of insight into their use of supplies and PPE – use that knowledge.

The most practical way to do this is to 'walk the walk'.

After all, you can't discover waste from behind a desk. A core principle of LEAN is 'Go see' – getting out on to the factory floor and experiencing how your people do their jobs every day. But you've probably walked your factory a thousand times – how will you spot the opportunities presented by LEAN Supplies?

**Look at things such as:**

### How people clean up after themselves

- Do they do it at all?
- Do they tidy as they work or at the end of a process or shift?
- What supplies do they use and how do they use them?

### How people use their PPE

- Do they take off gloves or glasses for certain tasks?
- Do they always use the right PPE for the job?
- Do they cut corners?

### How they apply solvents and lubricants

- Are they re-using rags?
- Are they walking to supply stores and back?
- Are they leaving solvent containers open?

Wiping, cleaning, lubricating, tidying, protecting – there are hundreds of processes and tasks that can be improved by walking the factory floor and engaging with workers.

Paying attention to these seemingly small details – and putting them in a LEAN context – can deliver significant returns.

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# Section 5

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## Getting more out of KIMBERLY-CLARK PROFESSIONAL\* and LEAN

### About KIMBERLY-CLARK PROFESSIONAL\*

Designed to support your continuous improvement processes through:

Site assessments focusing where people meet process, using LEAN principles Tailored solutions, designed for aerospace, automotive and metal manufacturing Integration of solutions in a LEAN manner, based on your unique processes this approach can identify wastes and hazards and provide counter measures to reduce or eliminate them.

**We are a credible second pair of eyes, helping you to:**

- Save time (from trial and error)
- Be more efficient
- Reduce overall costs

Find out more at [www.kcprofessional.co.uk/solutions/the-efficient-workplace](http://www.kcprofessional.co.uk/solutions/the-efficient-workplace) or

Request a Waste & Hazard Walk to review all of the processes that involve VOC emissions and determine where incremental improvements can be made.

[1. osha.europa.eu/en/publications/magazine/6](http://osha.europa.eu/en/publications/magazine/6)

[2. albertahealthservices.ca/2596.asp](http://albertahealthservices.ca/2596.asp)

[3. travail-emploi.gouv.fr/IMG/pdf/2012-023.pdf](http://travail-emploi.gouv.fr/IMG/pdf/2012-023.pdf)

[4. travail-emploi.gouv.fr/IMG/pdf/2012-023.pdf](http://travail-emploi.gouv.fr/IMG/pdf/2012-023.pdf)

[5. osha.europa.eu/en/publications/magazine/7](http://osha.europa.eu/en/publications/magazine/7)

[6. osha.europa.eu/en/publications/magazine/8](http://osha.europa.eu/en/publications/magazine/8)