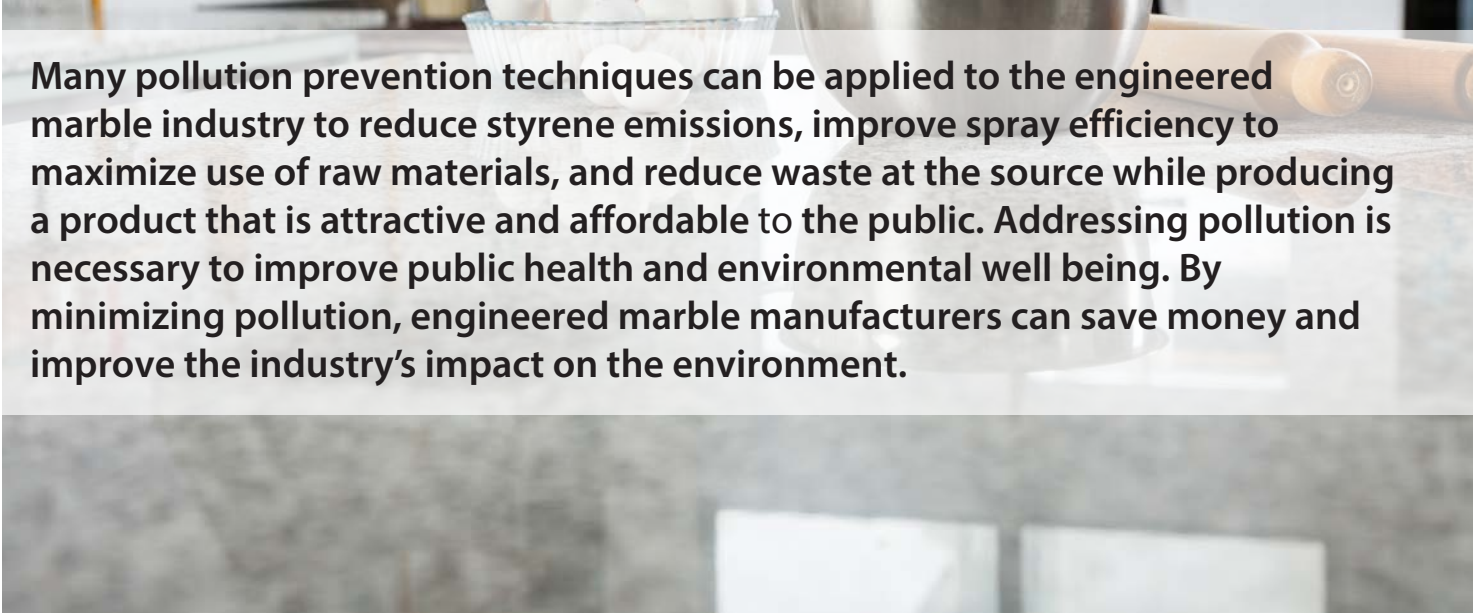


## Pollution Prevention (P2) for Engineered Marble Manufacturing



Many pollution prevention techniques can be applied to the engineered marble industry to reduce styrene emissions, improve spray efficiency to maximize use of raw materials, and reduce waste at the source while producing a product that is attractive and affordable to the public. Addressing pollution is necessary to improve public health and environmental well being. By minimizing pollution, engineered marble manufacturers can save money and improve the industry's impact on the environment.

### Reducing Air Emissions

Air emission can be reduced by practicing controlled spraying to increase material transfer efficiency and reduce styrene emissions by operating the spray gun at the lowest possible fluid tip pressure, using proper spray gun handling techniques and using close capture mold configurations to minimize overspray surface area.<sup>1</sup> Train employees on the proper use of spray guns to reduce overspray, raw material waste and emissions to the air.

One way to reduce styrene emissions is to consider Low Styrene Emission (LSE) Resins.<sup>2</sup> These resins are produced by adding vapor suppressant additives to the resin formulation. The additives form a film over the resin surface once the molding is left to stand. Another way to reduce styrene emissions is to reduce the styrene content through Low Styrene Content (LSC) Resins. Resin producers have achieved a consistent reduction in the styrene content of standard resins or gelcoats without compromising handling or performance. If the facility has the opportunity to perform research

and development, low styrene content (less than 15 wt% styrene) resins for use as liquid molding resins have been achieved using fatty acid chains as a base.<sup>3</sup>

### Reducing Mold Waste

Volatile organic compounds (VOCs) and particulate matter can be limited by using only as much material blend as necessary for the mold being cast. Limiting excess mixture will eliminate waste and save money by increasing efficiency. Reuse molds and maintain the quality and upkeep of commonly used molds to reduce waste. Excess VOCs can be limited by checking that the molds used are accurate in size and shape to meet order specifications; this will limit the amount of grinding necessary. Sourcing the material blend components from local producers will limit transportation costs and environmental impacts such as greenhouse gas emissions. Avoid overspray or the application of excess amounts of gel to the molds by t options for control of fugitive chemical raining employees on the proper amounts of gel spray needed for the mold. Contact the manufacturer of the gel coat

ventilation booth and oven to discuss emissions, specifically styrene, for the gel coat, oven, and marble casting operations.<sup>2</sup>

### Vibrating Tables

A preventive maintenance program for the vibrating tables should be instituted to ensure that the motors are continuing to perform at the highest efficiency possible. Once a vibrating table is no longer used, consider finding a recycler for the scrap metal.

### Catalytic Oxidation

Add-on-emission control devices can be implemented into an air flow management system in order to control styrene emissions in the engineered marble manufacturing process. The most common emission control devices are thermal and catalytic oxidation systems. Catalytic oxidizers have inherently lower fuel costs than thermal oxidizers (due to the lower combustion temperature in catalytic oxidizers).

Therefore, catalytic oxidizers require a smaller amount of heat recovery to achieve autothermal operation. Catalytic oxidation systems work by passing VOC-laden exhaust through special catalytic beds to facilitate the oxidation of styrene at lower temperatures. A well-operated and maintained catalytic oxidation unit can achieve destruction efficiencies of 98 percent.

Catalytic oxidizers have lower energy usage and resultant operating costs than thermal oxidizers (with equal levels of heat recovery). This operating cost advantage may be offset by the increased capital cost of catalytic oxidizers. The smaller size of catalytic oxidizers also typically results in lower installation costs than thermal oxidizers with an equivalent flow rate. The generation of nitrogen oxides is virtually eliminated with catalytic oxidizers (due to the low combustion temperatures). Testing of a regenerative catalytic oxidizer demonstrated nitrogen oxide production of less than 1 ppm.

## Sustainable Alternatives

Although cultured marble products are rather sustainable, there are alternative counter tops that are less impactful on the environment such as locally sourced sustainably harvested wood counter tops and Terrazzo recycled material counter tops.<sup>4</sup> Engineered Marble manufactures can transition to produce Terrazzo recycled material counter tops. This would expand their market while reducing the overall use of styrene. Working with Terrazzo recycled material will give the opportunity to create innovative ways of using the technology to later build bath tubs and showers in a more sustainable manner.



## References

- <sup>1</sup>[Composites Manufacturing Magazine. \*Controlled Spray and NARA.\*](#)
- <sup>2</sup>[Air & Waste Management Association. \*Evaluation of Pollution Prevention Options to Reduce Styrene Emissions from Fiber-Reinforced Plastic Open Molding Process.\*](#)
- <sup>3</sup>[La Scala, et al. \*Fatty Acid-based Monomers as Styrene Replacements for Liquid Molding Resins.\*](#)
- <sup>4</sup>[King County. \*Eco-cool Remodel Tool : Kitchen.\*](#)

*For translations or other communications aids, please email the Title VI Coordinator at [idb@azdeq.gov](mailto:idb@azdeq.gov).*

*Para traducciones u otras ayudas de comunicación, envíe un correo electrónico al Coordinador del Título VI al [idb@azdeq.gov](mailto:idb@azdeq.gov).*