



Number of Automix Applications and Mixing Efficiency

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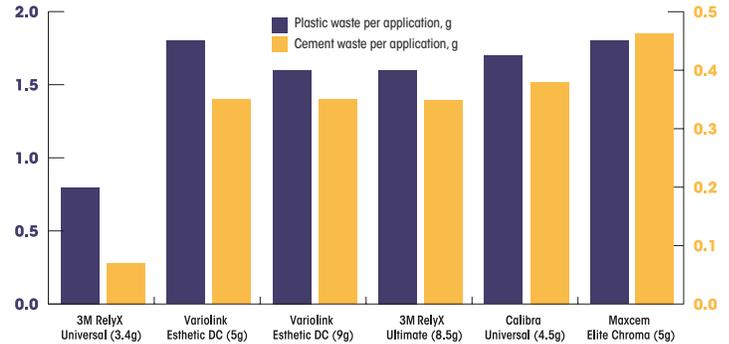
Introduction:

The purpose of this project was to measure the number of applications dispensed from an auto-mix syringe and compare the material waste of different cement systems. The number of applications from an auto-mix syringe can vary based on the clinical application and technique. While small veneers or short crowns can use as little as 60 µL of cement, the median clinical application size uses around 90 µL of cement. As a large portion of cement is wasted using an auto-mix tip, using a system with minimal waste can greatly increase the number of applications from each syringe.

Methods:

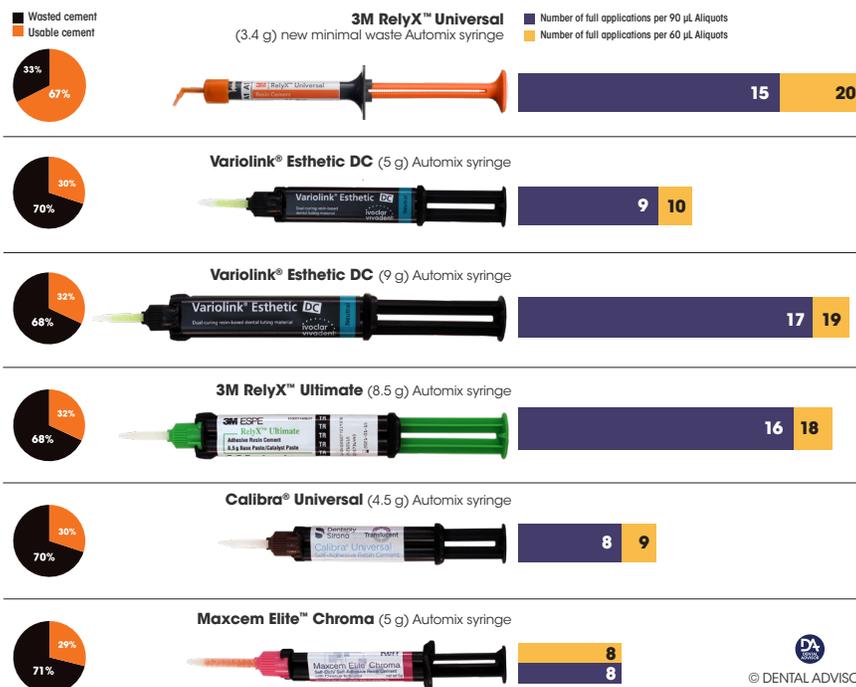
Cement portions from 5 syringes of each cement were extruded using the tips supplied by the manufacturer of each material onto a measuring paper placed on an accuSeries 224 scale (Fisher Scientific) accurate to 0.1 mg. The density of each material was measured using a density determination kit (Denver Instruments). A new tip was used for each portion extruded and the total number of applications counted per syringe. To determine waste from mixing, 10 mixing tips for each product were measured before and after use to give an average mass of material wasted inside the mixing tips. Syringes were weighed before and after use to find the amount of usable cement per syringe, the mass of the syringe packaging, and plastic caps. The total number of applications per syringe, cement waste per tip, plastic waste per application, and total measured packaged cement were used to determine how much usable cement was available, compared to the amount that was wasted by mixing.

Cement and plastic waste per 90 µL application



Total plastic and cement waste is divided by the number of applications to give a comparison of the waste generated by each application. **3M RelyX Universal** generates less than *half the plastic waste* per application as the other cement systems tested, and between **5.0-6.6X less cement waste** from mixing.

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Conclusion:

The new **3M** mixing tips were about five times more efficient in terms of cement waste than the **Mixpac** helical taper mixing tips included with four common cements and over six times more efficient than the longer helical mixing tip included with **Maxcem Elite Chroma**. The new **3M** syringe packaging had half as much plastic waste per application as other automix cement systems. Overall, the new **3M** system utilized around 67% of the packaged cement towards filling crowns, while the next closest system used less than 32%. The **3M RelyX™ Universal** system can give up to 15 full applications for an average use of 90µL, and up to 20 applications for cases requiring 60 µL aliquots.