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Comparative Evaluation of the Dimensional Accuracy of Multiple Implant Impressions Using 3 Different Impression Materials Analyzed Immediately, After 24 Hours & After 2 Pours – An In-Vitro Study

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Abstract

Objectives: The accuracy of the definitive cast to a large extent is dependent on the impression technique, impression material, splinting (if used), and cast material in order to achieve passively fitting implant – retained prosthesis. This in vitro study aimed to comparatively evaluate the dimensional accuracy of multiple implant impressions using 3 different impression materials assessed at various time intervals.

Materials and methods: 3 groups using Addition Silicone, Condensation Silicone and polyether impression materials were further divided into 2 subgroups each, as splinted open and non-splinted closed tray in each group. Thus, 90 impressions were made with the splinted open tray impression technique using perforated rigid custom made trays and dental floss and pattern resin as splinting materials, and 90 with non-splinted closed tray technique using perforated metal stock trays. Measurements of the inter-implant distances on the working casts in three dimensions were obtained by rapid photometer and the differences calculated in relation to the reference model.

Results: The dimensional accuracy of Addition Silicone elastomeric impression material was significantly better at immediate and after 24 hour pour followed by Polyether and least for Condensation Silicone($P<0.001$). On the other hand, after 2 pours the dimensional accuracy of Polyether was significantly better followed by Addition Silicone and least for Condensation Silicone. ($P<0.001$)

Conclusion: Addition Silicone was the better impression material followed by polyether for a situation of multiple implants. Polyether was stable and suitable for multiple pours. The open tray was better for a situation of multiple implants than closed tray impression technique.

Keywords: multiple implants, implant impression techniques, impression materials, Impression–coping splinting, impression accuracy, dental casts.

Clinical Significance: Although an in vitro study, the results are very promising in terms of achieving optimal fit of implant prosthesis. The impression techniques and materials used in the study provide a valuable contribution to the field of implant dentistry and may be applied clinically to obtain most favorable outcomes.

Introduction

There has been a tremendous increase in the number of implant – supported restorations worldwide. To have a successful long – term result with implant prostheses, a passive and precise fit of the implant superstructure to an implant abutment is recommended.

A dental impression is a negative imprint of an oral structure used to produce a positive replica of the structure for use as a permanent record or in the production of a dental restoration or prosthesis. [1] Achieving a passive fit between implant frameworks and underlying structures is critical for successful long-term osseointegration.[2] Since the accuracy of an impression affects the accuracy of the definitive cast, an accurate impression is essential to fabricate a prosthesis with good fit. An inaccurate impression may result in misfit of the prosthesis which in turn results in ill-fitting implant frameworks causing mechanical failures of the prostheses and implant systems such as loosening of the prosthetic and abutment screws or implant fracture and occlusal inaccuracy, or biologic complications of the surrounding tissue which may include adverse tissue reactions due to increased plaque accumulation, pain, tenderness, marginal bone loss, and loss of integration.[2,3]

Precise working casts are needed to fabricate passively fitting implant prostheses, regardless of the mode of fabrication. Accurate implant impressions play a significant role and serve as a starting point in the process of producing good working casts, along with other contributing factors, such as pouring material/technique and machining tolerance of the prosthodontic components. Factors such as impression techniques - open-tray / closed-tray, impression material, splinting, parallelism/ nonparallelism of implants, impression type – digital / conventional, depth of implant placement, connection level - implant level / abutment level, type of impression tray, and alveolar bone undercuts may possibly influence the accuracy of implant impressions. Inconsistent results have been reported in many studies investigating these factors.[4]

Two impression techniques, direct and indirect, are currently used to transfer inter-implant dimensions so that the resultant definitive cast duplicates the clinical condition precisely. Researchers suggest that a direct, open tray or pick-up technique should be used with multiple angulated implants to decrease the distortion. The indirect, closed tray or transfer impression technique can be considered suitable for a parallel or divergent, 2-implant situation [5]. In the direct technique, the impression transfer copings are picked up with the impression when it is removed from the mouth. However, the necessity of unscrewing guide screws retaining the transfer copings before removing the impression can be a disadvantage in clinical practice. In the indirect technique, the impression transfer copings are retained on the implants upon removal of the impression. The procedure is simple, but accurately repositioning the copings into their respective imprints is crucial. Although the indirect impression technique is clinically preferred, the impression copings are frequently not replaced correctly into the impression.[6]

To ensure maximum accuracy, Brånemark emphasized the importance of splinting transfer copings together, intraorally, before registration of the impression. Many in vitro investigations have tried to assess if the accuracy of the direct technique could be improved by splinting the transfer copings.[7] Different materials have been tested to splint the copings, such as dual-cure acrylic resin, auto polymerizing acrylic resin, and prefabricated acrylic resin bars.[8] Acrylic resin and dental plaster have traditionally been used to splint impression copings, but the effects of these materials in maintaining the accurate inter-implant positions during direct impression transfers and fabrication of precise implant casts is not completely clear.

Various impression materials have been examined for use with conventional and implant-supported restorations. Polyether has been the recommended impression material in the past for implant fabrication because of its dimensional stability, rigidity, and tear resistance. Another material frequently used is addition silicone, which presents many of the desirable properties of polyether. The hydrophilic addition silicones have displayed improved wettability and dimensional stability equal to the characteristics of polyether.

The purpose of this in vitro study was to comparatively evaluate the dimensional accuracy of multiple implant impressions using 3 different impression materials - Addition Silicone, Condensation Silicone and Polyether, which were analyzed immediately and after 24 hours of making the impression and after 2 pours with type III dental stone.

Materials and methods

The research study was conducted in the Department of Maxillofacial Prosthodontics, in a Dental institute and Research Centre in Bangalore in collaboration with Indian Institute of Science, Bangalore.

Fabrication of reference models

For this study, two heat polymerized acrylic resin (® DPI Heat Cure) models of an edentulous maxillary arch were fabricated. An edentulous maxillary metal die was duplicated with putty impression (Addition Silicone - Photosil™). Molten wax was poured into the mould and wax patterns were fabricated. The wax patterns were flasked, dewaxed, packed and cured by conventional compression mould technique. The processed models were finished and polished after acrylisation. A #6 round bur was used to perforate the alveolar ridge of the maxillary edentulous acrylic resin (® DPI Heat Cure) models at selected implant emergence position. A 4mm tungsten carbide bur was used to further drill along the initial pilot hole prepared with the #6 round bur. Preparations were made 3mm deeper than the actual implant length that was 14mm. In each acrylic resin model 6 implants (3.75x11.5mm) were placed in the incisor, canine and first molar regions respectively. The implants were fixed by using self-cure acrylic resin (® DPI-RR Cold Cure). The 6 implants in the acrylic resin model were sequentially numbered 1 to 6 from left molar to right molar region. The distance between implant 1 to 2 (i.e. left molar region to left canine region) was 16mm, implant 2 to 3 (i.e. left canine region to left incisor region) was 14.5mm, implant 3 to 4 (i.e. left incisor region to right incisor region) was 10mm, implant 4 to 5 (i.e. right incisor region to right canine region) was 11.5mm and implant 5 to 6 (i.e. right canine region to right molar region) was 16mm respectively. The distance between each of the implants was measured using a Vernier caliper.

Fabrication of custom made trays

An elastomeric impression (Addition Silicone - Photosil™) of the reference acrylic model was made and poured with type III dental stone (Goldstone ®) to obtain diagnostic models on which all custom trays were fabricated. Two layers of modelling wax (Hindustan Dental products) were heated and adapted onto the casts and stops (2 posterior bilaterally) were made in order to ensure repeatable and accurate positioning of the custom made impression trays. Separating media (® DPI Heat Cure Cold Mould Seal) was applied on the stops. 90 identical custom made trays measuring 2mm in thickness were made with autopolymerising acrylic resin (® DPI-RR Cold Cure). The spacer wax was removed after the custom tray fabrication. The rigid custom trays were evaluated on the diagnostic model and any sharp edges or irregularities were smoothened with sandpaper. The trays were completely perforated to create a window throughout the implant region in order to provide access for pick-up copings with a tungsten carbide bur. The trays were perforated with a round bur to aid in mechanical retention of the impression material, and then left undisturbed for 24 hours prior to impression making to ensure dimensional stability.

90 such custom made trays were fabricated for this technique of which 30 each were used for Addition Silicone (Photosil™), Condensation Silicone (Zeta plus) and Polyether (3M ESPE Impregum™ Soft) impression materials respectively. Similarly, 90 Perforated metal stock trays (C.P Stainless steel - U.3) were used for all the 3 elastomeric impression materials using closed tray impression technique without splinting in which 30 each were used for Addition Silicone (Photosil™), Condensation Silicone (Zeta plus) and Polyether (3M ESPE Impregum™ Soft) impression materials respectively. Tray adhesive was applied thinly and evenly over the inner surface of each tray and extended approximately 3 mm onto the outer surface of the tray along periphery. The complete drying time after application of adhesive was at least 30-60 seconds (ideally 15 minutes) to obtain durable and stable adhesion between elastomeric impression material and the tray.

The Open tray impression technique

The impression copings were secured on the implants and hand tightened with the hex drive to the implants of the reference acrylic model. The transfer copings were tied up with four complete loops of dental floss (Colgate Total) and splinted with pattern resin (GC CORPORATION TOKYO, JAPAN) and allowed to set for 3 minutes.

30 impressions of each impression material as mentioned earlier were made for splinted open tray impression technique according to the manufacturer's instructions. The impression materials were loaded inside the custom made trays and part of the impression material was meticulously injected using a syringe around the impression copings to ensure complete coverage of the copings. The impression of the reference resin model was made until the tray was fully seated and maintained in position throughout the polymerization time and any excess material from the open tray windows was removed with a finger swipe to expose the guide pins. Impression materials were allowed to set according to the manufacturers recommended setting times to compensate for the delayed polymerization time at room temperature. After the impression material had set, the guide screws were removed so that the splinted transfer copings remained in the impression when the tray was removed from the reference acrylic model.

The Closed tray impression technique

30 impressions of each impression material were made according to the manufacturer's directions for non-splinted closed tray impression technique. The impression materials were loaded inside the perforated metal stock trays and part of the impression material was meticulously injected using a syringe around the impression copings to ensure complete coverage of the copings.

Closed tray impression copings remained on the reference model when the stock tray was removed after the impression material had polymerized. These impression copings were removed one at a time from the reference acrylic model and attached to the implant analog. The combined impression coping analog unit was inserted into the impression by firmly pushing it into place to full depth. The dimensional accuracy of the impression materials in both open and closed tray technique were analyzed immediately and after 24 hours of impression making after 2 pours with type 3 dental stone using rapid photometer.

Statistical Analysis

The study data were analyzed using Statistical Package for Social Sciences (SPSS) version 22.0 (IBM

Corp).Descriptive statistics including mean and standard deviation were carried out along with inferential statistics that included ANOVA and Bonferroni Post hoc analysis and student unpaired ‘t’ test to assess the dimensional accuracy of the different impression materials in the different technique**.** The level of significance **(P value)** was fixed at P < 0.05.

Results

Closed Tray Impression Technique (Table 1)

Immediate Pour

The mean dimensional accuracy of Addition Silicone 13.250 + 0.008, Polyether 13.329 + 0.008 and Condensation Silicone 13.850 + 0.008 which was statistically significant (P < 0.001). The multiple comparisons between the groups revealed that Addition Silicone had statistically significant (P < 0.001) better dimensional accuracy than Polyether and Condensation Silicone.

After 24 Hours

Similar results were observed after 24 hours where the Addition Silicone showed mean dimensional accuracy of 13.150 + 0.008, Polyether 13.329 + 0.008 and Condensation Silicone 13.560 + 0.008 which was statistically significant (P < 0.001). Multiple comparisons again revealed Addition Silicone to have statistically significant (P < 0.001) better dimensional accuracy than Polyether and Condensation Silicone.

After 2 Pours

After 2 pours Addition Silicone showed mean dimensional accuracy of 13.050 + 0.008, Polyether 13.038 + 0.008 and Condensation Silicone 13.270 + 0.008 which was statistically significant (P< 0.001). However Multiple comparisons revealed Polyether to have statistically significant (P<0.001) better dimensional accuracy followed by Addition Silicone and Condensation Silicone.

Open Tray Impression Technique (Table 2)

Immediate Pour

The mean dimensional accuracy of Addition Silicone 11.587 + 0.008, Polyether 11.594 + 0.005 and Condensation Silicone 12.012 + 0.007, was statistically significant (P < 0.001). The Multiple comparisons between the groups revealed that Addition Silicone had a statistically significant (P < 0.001) better dimensional stability than Polyether and Condensation Silicone.

After 24 Hours

Similar results were observed after 24 hours wherein Addition Silicone showed mean dimensional accuracy of 11.488 + 0.008, Polyether 11.594 + 0.005 and Condensation Silicone 11.722 + 0.007 which was statistically significant (P < 0.001). Multiple comparisons showed Addition Silicone had a statistically dimensional significant accuracy than Polyether and Condensation Silicone (P < 0.001).

After 2 Pours

After 2 pours Addition Silicone showed the mean dimensional accuracy of 11.177 + 0.008, Polyether 11.494 + 0.005 and Condensation Silicone 11.432 + 0.007 which was statistically significant (P < 0.001). However, multiple comparisons showed Polyether to have a significant better dimensional accuracy than Addition Silicone and Condensation Silicone (P < 0.001).

Comparison of open tray and closed tray impression technique with Addition Silicone impression material (Table 3)

Immediate Pour

Addition Silicone showed mean dimensional accuracy of 11.587 + 0.008 in the open tray impression technique as compared to 13.250 + 0.008 in the closed tray impression technique, with a mean difference of 1.6663 which was statistically significant (P < 0.001).

After 24 Hours

Addition Silicone showed the mean dimensional accuracy 11.488 + 0.008 in the open tray impression technique as compared to closed tray impression technique 13.150 + 0.008, with a mean difference of 1.6662 which was statistically significant (P < 0.001).

After 2 Pours

The test results revealed that the Addition Silicone showed the mean dimensional accuracy of 11.177 + 0.008 in the open tray impression technique as compared to 13.050 + 0.008 in the closed tray impression technique, with a mean difference of 1.873 which was statistically significant (P < 0.001).

Comparison of open tray and closed tray impression technique with Polyether impression material (Table-4)

Immediate Pour

Polyether showed the mean dimensional accuracy of 11.594 + 0.005 in the open tray impression technique as compared to13.329 + 0.008 in the closed tray impression technique, with a difference of 1.735 which was statistically significant (P < 0.001).

After 24 Hours

Polyether showed the mean dimensional accuracy of 11.594 + 0.005 in the open tray impression technique as compared to 13.329 + 0.008 in the closed tray impression technique, with a mean difference of 1.735 which was statistically significant (P < 0.001).

After 2 Pour

Polyether showed the mean dimensional accuracy of 11.494 + 0.005 in the open tray impression technique as compared to13.038 + 0.008 in the closed tray impression technique, with a mean difference of 1.544 which was statistically significant (P < 0.001).

Comparison of open tray and closed tray impression technique with Condensation Silicone impression material (Table 5)

Immediate Pour

Condensation Silicone showed the mean dimensional accuracy of 12.012 + 0.007 in the open tray impression technique as compared to closed tray impression technique 13.850 + 0.008, with a mean difference of 1.837 which was statistically significant (P < 0.001).

After 24 Hours

Condensation Silicone showed the mean dimensional accuracy of 11.722 + 0.007 in the open tray impression technique as compared to closed tray impression technique 13.560 + 0.008, with a mean difference of 1.837 which was statistically significant (P < 0.001).

After 2 Pours

Condensation Silicone showed the mean dimensional accuracy of 11.432 + 0.007 in the open tray impression technique as compared to closed tray impression technique 13.270 + 0.008, with a difference of 1.837 which was statistically Significant (P<0.001).

Discussion

The objective of making an impression in implant dentistry is to accurately relate an analogue of the implant or implant abutment to the other structures in the dental arch. [9] PVS and PE continue to be the impression materials of choice, although PE has been the preferred material with many authors, especially when assessing multi-unit implant impression accuracy in edentulous arches.[10]

The aim of this in vitro study was to comparatively evaluate the dimensional accuracy of multiple implant impressions using 3 different impression materials - Addition Silicone, Condensation Silicone and Polyether which were analyzed immediately, after 24 hours and after 2 pours with type III dental stone by rapid photometer to compare and assess the best impression material and better impression technique suited for multiple implants.

According to Luebke et al [11], Polyether displayed remarkable stability throughout all tests and this stability of polyether may be partially attributed to the fact that no by-products are lost during polymerization. Johnson et al [12] suggested that Addition Silicone (AS) and Polyether (PE) were the least affected with delays of 1, 4, and 24 hours in pouring the impression. According to Wee[13], the use of either polyether or addition silicone is recommended for direct implant impressions. This is in accordance with the results of our study where, dimensional accuracy of Additional silicone was better followed by Polyether and least for condensation silicone. After 2 pours the dimensional accuracy of Polyether was significantly better followed by Addition silicone and least for Condensation silicone by closed tray method.

It has been shown that a different thickness of elastomeric impression material in an impression tray can reduce impression accuracy.[14] Selection of a tray is a critical factor for the accuracy of an impression. Impression trays can be either custom made or stock trays. Generally a custom made tray is preferred since it permits a uniform thickness of impression material. It has been determined that using special hard trays is better than polycarbonate trays because rigid stainless steel trays limit the distortion of the impression. Masri et al concluded that plastic stock trays can increase the possibility of deformation due to lack of rigidity.[15] Carotte et al[16] found that metal and rigid plastic trays gave greater accuracy than flexible trays. Though the study was directed to conventional fixed partial dentures, the principle of implant dentistry remains the same. Jason et al[17] concluded that rigid custom trays produced significantly more accurate impressions than the polycarbonate stock trays. Marotti et al[18] concluded that self-perforating tray (Miratray Implant) may facilitate the dental implant impression technique but may provide less accuracy as it is not individualized and not as rigid as the conventional custom acrylic resin open tray. The results of this study revealed greater accuracy was obtained with rigid and perforated custom made trays than with the impressions made with perforated metal stock trays and Addition silicone was clearly superior to polyether. Thongthammachat et al[19]suggested that the materials used to splint impression copings are auto polymerizing acrylic resin, dual cure acrylic resin, orthodontic wire, prefabricated acrylic resin bars, light-curing composite resin, carbon steel pins and impression plaster. Autopolymerising acrylic resin yielded better results, probably because of increased stiffness and greater stability. This advantage makes adaptation of this technique for clinical use more practical. Autopolymerising acrylic resin is easier to use than composite resin as it does not require a dry environment or a specific light-curing device. It also has an economical advantage over light-curing composite resin. An ideal impression technique should provide excellent results while being easy to use, inexpensive and comfortable for the patient. D Öngül et al [8] concluded that for situations where impressions of multiple implants are to be made, splinting impression copings with acrylic resin demonstrate superior results than the non-splinted technique and splinting with light-curing composite. This is in accordance with the results of our study where, the open tray impression technique involving splinting with dental floss and pattern resin was better impression technique for a situation of multiple implants than closed tray impression technique. However, in contrast, Won-Gun Chang et al [20] concluded that both closed-tray impression (CTI) and open-tray impression (OTI) techniques are recommended for the fabrication of implant prostheses. Balouch F et al [21] concluded that closed impression technique had less dimensional changes in comparison with open tray method, thereby suggesting that closed tray impression technique is more accurate.

Limitations of the study

One of the limitations of this study was that the implant impression accuracy was measured on experimental stone casts, in terms of relative or absolute distortion of the positions of the implant or other related components, and compared to the control or master casts. The accuracy was not evaluated directly on the impression. The evaluation of accuracy of implant casts was done using a reference model with ideally parallel implants. The results might have been different if the implants had been ideally angulated, as shown by earlier studies investigating the effect of implant angulation on impression accuracy.

Tray removal was not similar to the mouth and was perpendicular to the occlusal plane. However, in this study, as the impression trays were removed perpendicular to the implant plane, the implant position was not a critical variable as it is in the mouth. The results of this present study were limited to a number of six implants and may not be relevant for impressions made in the presence of higher or lower numbers of implants. The scanning operation and post processing of the scan slightly alter the surface of the cast. So the physical cast and the scan cast may not be the exact replica of each other resulting in uncertain measurements.

Conclusion

Within the limitations of this study, it could be concluded that the dimensional accuracy of Addition Silicone elastomeric impression material for a situation of multiple implants, was significantly better followed by Polyether and least for Condensation Silicone. Polyether was stable and more suitable for multiple pours. The open tray impression technique involving splinting with dental floss and pattern resin was a better impression technique for a situation of multiple implants than closed tray impression technique.

Scope of improvement

It must be remembered that the impressions used in this study were made in the laboratory and not in the mouth. The conditions of the oral cavity such as saliva, temperature, moisture, and undercuts, may affect one material more than another. Further clinical investigations will be necessary to confirm the results of the present in vitro study and further studies are required to evaluate different impression materials and implant impression techniques related to different clinical situations.

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List of Table

Table 1:

Comparison of mean dimensional accuracy between different elastomeric impression materials at different time intervals by Close Tray method using ANOVA followed by Bonferroni Post hoc Analysis

Time Period	Impression Materials	N	Mean	SD	Std. Error	95% CI for Mean		Min	Max	P-Value	Sig. Diff	P-Value
						Lower	Upper					
Immediately Poured	AS	30	13.250	0.008	0.002	13.247	13.253	13.240	13.260	<0.001*	1 Vs 2	<0.001*
	CS	30	13.850	0.008	0.001	13.847	13.853	13.840	13.860		1 Vs 3	<0.001*
	PE	30	13.329	0.008	0.001	13.326	13.332	13.320	13.340		2 Vs 3	<0.001*
After 24 Hours	AS	30	13.150	0.008	0.002	13.147	13.153	13.140	13.160	<0.001*	1 Vs 2	<0.001*
	CS	30	13.560	0.008	0.001	13.557	13.563	13.550	13.570		1 Vs 3	<0.001*
	PE	30	13.329	0.008	0.001	13.326	13.332	13.320	13.340		2 Vs 3	<0.001*
After 2 Pours	AS	30	13.050	0.008	0.002	13.047	13.053	13.040	13.060	<0.001*	1 Vs 2	<0.001*
	CS	30	13.270	0.008	0.001	13.267	13.273	13.260	13.280		1 Vs 3	<0.001*
	PE	30	13.038	0.008	0.002	13.035	13.041	13.030	13.050		2 Vs 3	<0.001*

Table 2:

Comparison of mean dimensional accuracy between different elastomeric impression materials at different time intervals by Open Tray method using ANOVA followed by Bonferroni Post hoc Analysis

Time Period	Impression Materials	N	Mean	SD	Std. Error	95% CI for Mean		Min	Max	P-Value	Sig. Diff	P-Value
						Lower	Upper					
Immediately Poured	AS	30	11.587	0.008	0.001	11.584	11.590	11.580	11.600	<0.001*	1 Vs 2	<0.001*
	CS	30	12.012	0.007	0.001	12.010	12.015	12.000	12.020		1 Vs 3	<0.001*
	PE	30	11.594	0.005	0.001	11.593	11.596	11.590	11.600		2 Vs 3	<0.001*
After 24 Hours	AS	30	11.488	0.008	0.001	11.485	11.491	11.480	11.500	<0.001*	1 Vs 2	<0.001*
	CS	30	11.722	0.007	0.001	11.720	11.725	11.710	11.730		1 Vs 3	<0.001*
	PE	30	11.594	0.005	0.001	11.593	11.596	11.590	11.600		2 Vs 3	<0.001*
After 2 Pours	AS	30	11.177	0.008	0.002	11.174	11.180	11.170	11.190	<0.001*	1 Vs 2	<0.001*
	CS	30	11.432	0.007	0.001	11.430	11.435	11.420	11.440		1 Vs 3	<0.001*
	PE	30	11.494	0.005	0.001	11.493	11.496	11.490	11.500		2 Vs 3	<0.001*

Table 3:

Comparison of mean dimension accuracy between close and open tray method in Addition Silicone using student unpaired t test

Time Period	Method	N	Mean	SD	S.E.M	Mean Diff	95% CI for the Diff		t	df	P-Value
							Lower	Upper			
Immediately Poured	Close Tray	30	13.250	0.008	0.002	1.663	1.659	1.667	792.59	58	<0.001*
	Open Tray	30	11.587	0.008	0.001						
After 24 Hours	Close Tray	30	13.150	0.008	0.002	1.662	1.658	1.667	781.47	58	<0.001*
	Open Tray	30	11.488	0.008	0.001						
After 2 Pours	Close Tray	30	13.050	0.008	0.002	1.873	1.868	1.877	874.81	58	<0.001*
	Open Tray	30	11.177	0.008	0.002						

Table 4:

Comparison of mean dimension accuracy between close and open tray method in Polyether using student unpaired t test

Time Period	Method	N	Mean	SD	S.E.M	Mean Diff	95% CI for the Diff		t	df	P-Value
							Lower	Upper			
Immediately Poured	Close Tray	30	13.329	0.008	0.001	1.735	1.732	1.738	1018.76	58	<0.001*
	Open Tray	30	11.594	0.005	0.001						
After 24 Hours	Close Tray	30	13.329	0.008	0.001	1.735	1.732	1.738	1018.76	58	<0.001*
	Open Tray	30	11.594	0.005	0.001						
After 2 Pours	Close Tray	30	13.038	0.008	0.002	1.544	1.540	1.548	867.916	58	<0.001*
	Open Tray	30	11.494	0.005	0.001						

Table 5:

Comparison of mean dimension accuracy between close and open tray method in Condensation Silicone using student unpaired t test

Time Period	Method	N	Mean	SD	S.E.M	Mean Diff	95% CI for the Diff		t	df	P-Value
							Lower	Upper			
Immediately Poured	Close Tray	30	13.850	0.008	0.001	1.837	1.833	1.841	924.89	58	<0.001*
	Open Tray	30	12.012	0.007	0.001						
After 24 Hours	Close Tray	30	13.560	0.008	0.001	1.837	1.833	1.841	924.89	58	<0.001*
	Open Tray	30	11.722	0.007	0.001						
After 2 Pours	Close Tray	30	13.270	0.008	0.001	1.837	1.833	1.841	924.89	58	<0.001*
	Open Tray	30	11.432	0.007	0.001						