

**Pressure Effects on Porosity  
of  
Dental Composites During  
Curing.**

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- **Abstract**
- **Objective:** The objective of this study is to demonstrate the effect of pressure on porosity of dental composites during the curing process.
- **Method:** Pressure curing was accomplished utilizing BISCO's TESCERA™ light/heat/pressure curing device for indirect restorations. The composite (BISCO Pyramid™ Enamel Translucent) was mixed by hand for 15min to introduce porosity. Approximately 0.4g of composite was pressed by hand between two glass plates using a shade disk mold as spacer (i.d. 1.15mm, dia 25.0mm). The pressure of Nitrogen was varied while holding constant the length of time the specimen is held under Nitrogen pressure prior to the light cure/heat cycle (1min @ 20psi, 40psi, 60psi, & 80 psi). The cured composite disk was removed from the mold and examined under a light microscope for porosity and a photo was taken. A control sample was cured in a light box (Pro-Lite DLS, Pro-Den Systems, Inc., Portland, OR) at ambient pressure for 5 min.
- **Results:** The photographs of specimens cured under ambient pressure show many bubbles. Photographs of specimens cured at increasing pressure demonstrate that the quantity of bubbles decrease with pressure, gradually coalescing into large bubbles. Photographs of a specimen cured under 80psi pressure revealed no visible bubbles.
- **Conclusion:** It is possible to remove porosity in a high-viscosity composite by curing it under pressure.

## Introduction

Porosity in dental composites can affect the physical strength as well as the appearance of the finished restoration. Even if the composite is manufactured taking great care to minimize porosity, porosity is invariably introduced when the composite is dispensed and packed into a mold.

The purpose of this investigation is to examine the effect of pressure immediately prior to curing on porosity in a composite.

## Materials

Composite: BISCO PYRAMID Enamel Neutral

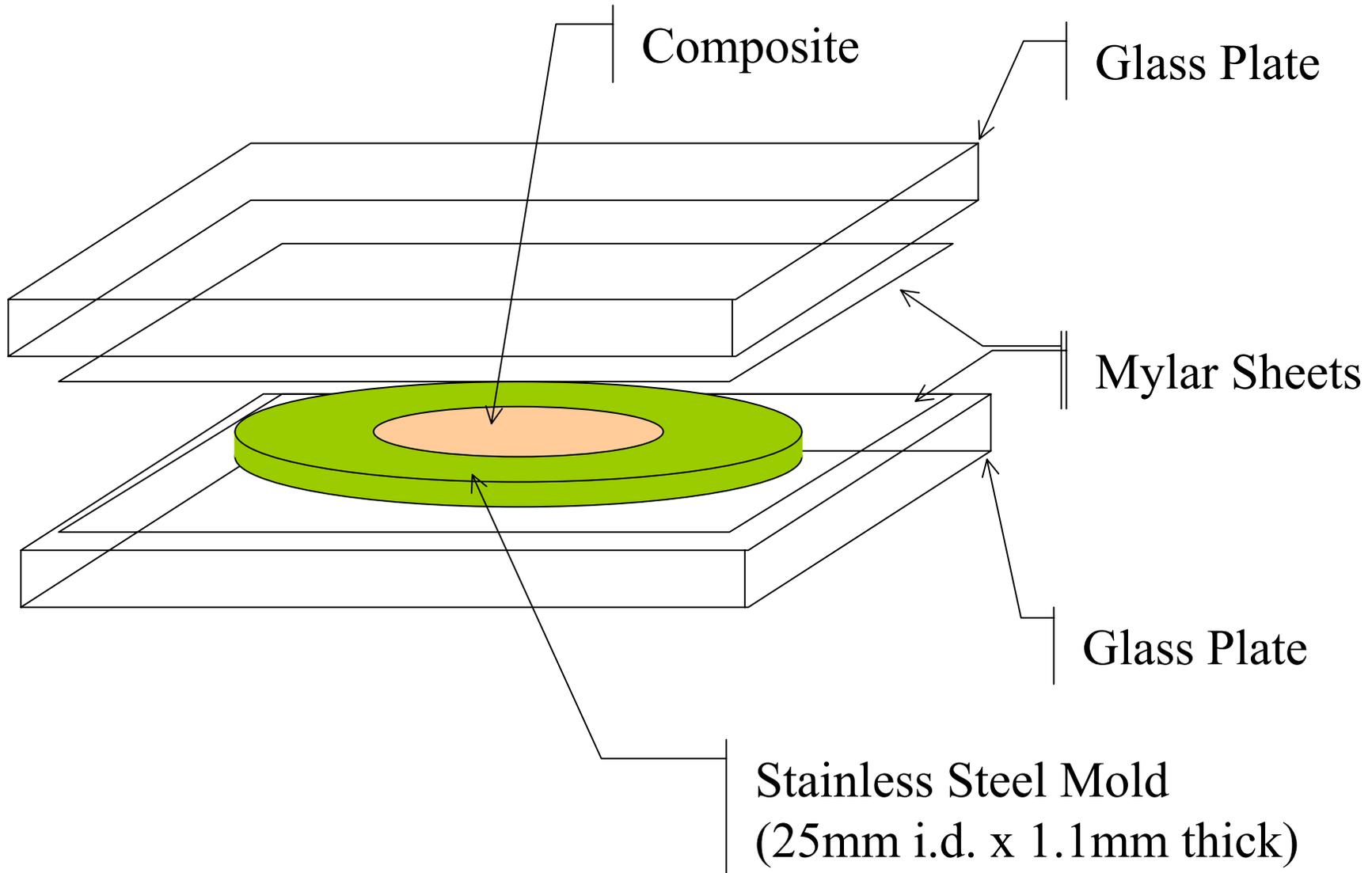
*Composite was kneaded by hand for approximately 15 min to introduce porosity.*

Pressure Curing Device: BISCO TESCERA™ NTL™

## Methods

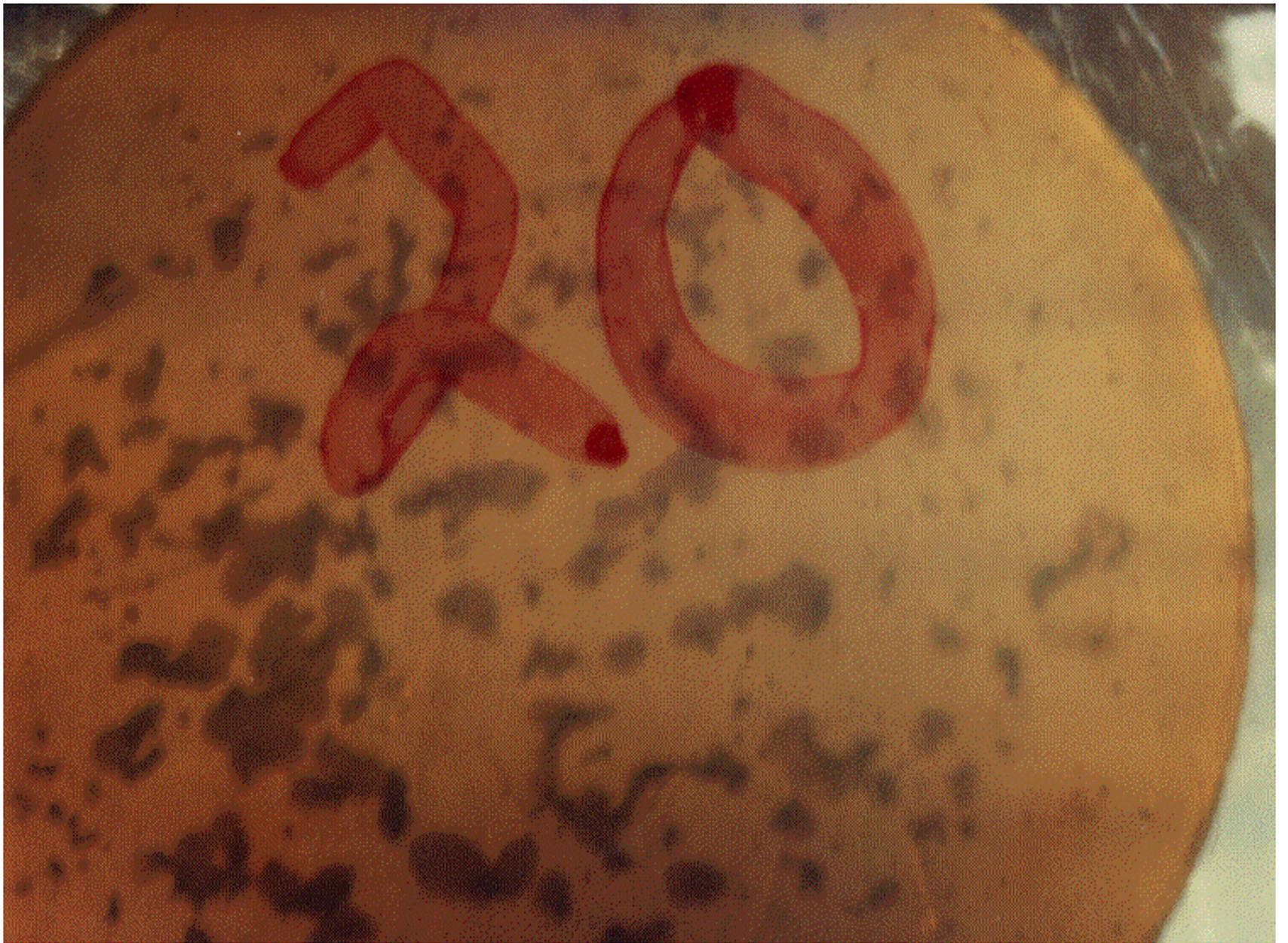
The NTL provides simultaneous heat and light curing under a pressurized N<sub>2</sub> atmosphere. Prior to curing, the uncured composite is first cycled through six N<sub>2</sub> purges to remove O<sub>2</sub>. Following the last purge, the chamber is pressurized to a given pressure. The composite is kept at that pressure for 1 min **BEFORE** the cure cycle. Pressure is maintained for the 1st min of the light/heat cure cycle.

# Specimen Preparation



- For this experiment, the NTL was operated with N<sub>2</sub> set at different pressures (20psi, 40psi, 60psi, & 80psi). The composite disk was packed into a stainless steel mold, pressed between Mylar sheets and glass plates. This entirety was placed in the NTL and processed at one of the pressures. The cured composite was then removed from the mold and examined under a light microscope for porosity. A Polaroid photo was taken.
- A control sample was cured in a light box (Pro-Lite DLS, Pro-Den Systems, Inc., Portland, OR) at ambient pressure for 5 min.











- **Observations**

- Photographs of specimens cured under ambient pressure show many small bubbles.
- At lower pressures, specimens appear to contain many small bubbles.
- At higher pressures, specimens appear to contain fewer large bubbles.
- At 80psi, bubbles were not visible through light microscope.

- **Conclusion**

- It is possible to remove porosity in a high-viscosity composite by curing it under pressure.