

Investment

Investment has played a key role in the fabrication of dental restorations for many years. In fact, despite the development of alternative production processes, **almost all restorations produced today can trace part of their production back to investment and the lost wax technique.**

In the modern dental laboratory, few materials have a more integral role. Additionally, mounting competitive pressures are increasing the importance of investment, given that it plays a big part in determining quality and productivity in the lab. Fewer remakes, greater consistency and better fit are essential, and choosing the right investment, backed by strong technical support, is a vital first step.

The most important attributes to consider when selecting an investment are:

- > Consistency and accuracy of expansion
- > Working and set time
- > Technique flexibility
- > Fluidity and surface texture
- > Packaging variance
- > Technical support
- > Track record on the market

A proven investment that excels in these areas can decrease your labor costs per unit, while enhancing the consistency and fit of your restorations.



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Investment in the laboratory

How many times have you traced a problem in the lab back to investment? It may have been the way it was used, or it may have been the investment itself. In either case, problems with quality and productivity frequently stem from investment's role in the production process.

Although inconsistent or defective product can be the cause of a problem in the lab, minor variations in technique are frequently the culprit. For example, even slightly inaccurate measuring of expansion liquid will alter setting expansion. Insufficient mixing will reduce the quality of the surface finish. And slightly incorrect placement of wax patterns can lead to a split ring during pressing.

External factors, including temperature, humidity and altitude, can also be uncontrolled variables. For instance, a high ambient temperature may decrease working time, while high humidity may affect setting expansion. Improper exposure of expansion liquid to cold temperatures may result in unpredictable expansion and a rough surface texture.

Finally, a problem in the laboratory clearly can arise from the quality of the investment itself. A low-quality investment will jeopardize quality and productivity, while also increasing expenditures on secondary materials such as grinding burs. Inconsistent expansion will lead to poor fit and expensive remakes. Rough surface textures will require excessive finishing and provide less control over the quality of the fit. Imprecise packaging will impact powder-to-liquid ratios and expansion. Insufficient working time will make it more difficult to properly pour the ring without bubbles or voids.

How to choose the right investment

The investments used in dentistry generally fall into two categories: phosphate-bound investments and gypsum-bound investments. Phosphate-bound investments are more commonly used due to their greater strength, which makes them suitable for a wide variety of applications, including ceramic pressing. All universal and pressing investments are phosphate-bound.

Perhaps the most important attribute of any investment is the consistency of expansion. Every investment has two types of expansion, setting expansion and thermal expansion, and both need to be very consistent from batch to batch. Strict quality testing protocols, such as those used by Jensen for Microstar® HS™ Investment, will assure that your investment performs accurately every time.

In addition, the setting expansion of an investment needs to be controllable since different applications require different expansions. A high noble inlay, for example, will need less expansion than a non-precious PFM bridge framework. Phosphate-bound investments accomplish this by varying the concentration of the expansion liquid.

Other valuable technical attributes of phosphate-bound investments include:

- **Extended working time** enables the technician to thoroughly fill the ring with investment, without bubbles or voids, before the material begins setting. An investment without extended working time may set too quickly.
- **Universal compatibility** allows a single investment to be used for a broad range of applications. Microstar® HS™ Investment is a universal phosphate-bound investment suitable for both ceramic pressing and alloy casting. It is compatible with the traditional technique and the rush technique, and gives the laboratory the option of using a ring. By utilizing one investment for multiple applications, a laboratory can simplify its stocking requirements, increase inventory turn and, most importantly, become more familiar and efficient with the material through more frequent use.

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- A **fine grain structure** and **smooth surface texture** create smooth castings and pressings that require minimal finishing. By decreasing finishing time, labor costs per unit are decreased and productivity is increased.
- **Packaging accuracy** is extremely important. Pre-weighed investment envelopes must be accurate to maintain the integrity of your powder-to-liquid ratio. HS™ Investment packets have a low standard deviation of just 2g.
- **Pure expansion liquid** contributes to the quality of expansion and surface texture of the investment. Even the best investment material is dependent on high-quality expansion liquid.

Note: Most expansion liquids are NOT freeze stable. Some manufacturers add anti-freeze agents to lower the freezing temperature slightly, at the expense of the consistency and surface texture. Jensen encourages clients to handle temperature challenges by ordering in advance, which maintains the performance of your product. HS™ Expansion Liquid, specially formulated for HS™ Investment, contains no anti-freeze agents or other additives.

Beyond the basics

Choosing the right investment for your laboratory goes beyond technical attributes. As a natural and technique-sensitive material, investment is subject to many external variables beyond the quality of the product. For this reason, it is important to choose an investment supported by a technical team that is both knowledgeable and accessible. Microstar® HS™ Investment is backed by Jensen's renowned technical support.

Jensen takes pride in cultivating deep knowledge of its products among its sales and technical support staff, and having live staff members answer the telephone when you call for help or advice. Some dealers sell dozens of different investment products, and it's unlikely that their technical support staff is well versed in the characteristics of each separate material. Jensen distributes only one line, Microstar® HS™ Investment, and Jensen's technical advisors know their product extremely well.

Jensen's commitment to your success begins well before you place an order. They subject every batch of investment to rigorous in-house quality testing, before shipping to any customers. Investment may be a naturally variable material, but with Jensen's thorough series of quality control procedures, reliability and consistency are standard in every packet of HS™ Investment. Additionally, Jensen's Sales and Order Fulfillment departments take special measures to ensure that HS™ Expansion Liquid arrives to customers safely, without freeze-related damage.

An investment's track record is also important, as this is the best indicator of how an investment will perform over the long term. A proven investment will perform at a high level every time, letting you focus on running your business, not on calibrating each batch. HS™ Investment, which has more than a decade of success in the laboratory, provides the time-tested accuracy and consistency laboratories need.

Investment is more than a commodity: it plays a central role in determining the quality of your products and the productivity of your lab. And, with increased competition and the advent of pressable ceramics including Press-To-Metal®, investment's role is even more important. The cost of remakes, lost productivity, and troubleshooting must be factored into the purchase decision, making technical support and quality just as important as technical considerations.



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Tips for investing success

1. Use a dedicated mixing bowl for your investment, and mix die stones and lab stones separately. Contaminating your investment with other materials may accelerate setting time and reduce consistency. Always clean dried investment from your mixing bowl, and replace when excessively worn.
2. Keep older, abraded mixing bowls hydrated when not in use (fill with water 1/3 to 1/2 full). Remove any standing water with a towel before use, but do not dry with compressed air.
3. If applying debubbler, be sure to gently remove any excess material with light air pressure. Do NOT use an alcohol-based debubbler.
4. Check your vacuum. An insufficient vacuum will compromise your investment's strength by leaving bubbles in your investment. Make sure there are no blockages in your line and that full vacuum is being reached inside the bowl. You may need to remove the filter in your mixer to verify this.
5. Always vacuum mix for only 60 seconds. A greater mixing time will yield greater expansion.
6. Wax instruments can be used to "paint" the investment onto the patterns, which helps minimize the chance of bubbles forming in your patterns. Do NOT use a brush with this technique, as air bubbles can be released from between the brush hairs.
7. Pressure pots can be helpful in reducing the size of air pockets and bubbles, resulting in a smoother surface finish and greater ring strength.
8. When *casting alloy*, scrape the surface of your invested ring before burnout. This will help reduce the chance of finning and failure. It is NOT recommended that you do this when *pressing ceramic*.
9. When using the overnight technique, set your burnout oven for a slow heat rate of 15-18° F per minute. This will reduce the chance of failure during or after burnout.
10. Always pay close attention to your expansion liquid. Never use liquid that has accumulated excessive crystals at the bottom of the container. Old investment liquid can cause significant problems, including poor fit and pressing failure.

RUSH TECHNIQUE (1560-1600 F high temp)

Ring size	Bench Set		Burnout hold time (min)*
	Before removing flex ring (min)	After removing flex ring (min)	
100g	15	1	45
200g	17	2	60
300g	22	3	100

*Add 10 min of hold time for every 100g of additional investment in the oven.

EXPANSION LIQUID: WATER RATIOS FOR HS™ INVESTMENT

	Application	Expansion liquid (mL)	Water (mL)
Pressing	Crown & bridge (all ceramic)	17	8
	Crown & bridge (Press-To-Metal®)	17	8
	Veneer	17	8
Casting	High noble	14	11
	Noble	17	8
	Base	25	0