Buyer's Guide to LED Curing Lights

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The early self-curing composite resins did not lend themselves to characterization and artistry. Their extended chemical-curing times limited the dentist's opportunity to develop esthetic tooth-like shapes and colors. The introduction of camphoroquinone containing light-cured composites in the early 1980s provided the quantum leap into appearance-related treatment that has driven the profession (and motivated the public) for the past three decades.

Composites and adhesives are only a part of the esthetic revolution, however. Most esthetic/cosmetic procedures depend on a single, essential dental apparatus, the curing light. The advantages of photo curing include: virtually unlimited clinical working time, improved restorative properties and longevity, and on-demand polymerization. The practitioner is free to place, reposition, reshape, and otherwise manipulate the composite in a tooth cavity or on a tooth surface until functional and esthetic objectives are attained. Once the function and form are to the clinician's satisfaction, the resin is cured within seconds.

The first curing lights projected in the ultra-violet range and were potentially harmful to the eyes (patient, dentist, and assistant). Mercifully, they were quickly replaced by the halogen curing lights that became the profession's mainstay for the next two decades. Currently, the LED (light emitting diode) curing light is by far the most popular selection among dentists.

Just about every direct and indirect restorative procedure involves light curing. Since the dental profession is so dependent on this single piece of equipment, understanding the curing light, its properties and uses, is highly important for the progressive dental practice. There are numerous choices. Generally, the cost of a curing light is influenced by the quality of the unit itself and the optional features that are included. Some of the options enhance and simplify the curing process, while others are simply bells and whistles. Not every option is required, or useful, in every practice. Dentists operate under different clinical parameters, reflecting the many types of practices and personal preferences. Manufacturers have developed curing lights in many shapes and forms to answer these needs. The optimal purchase involves matching the needs of the practice with the parameters of the light curing unit.

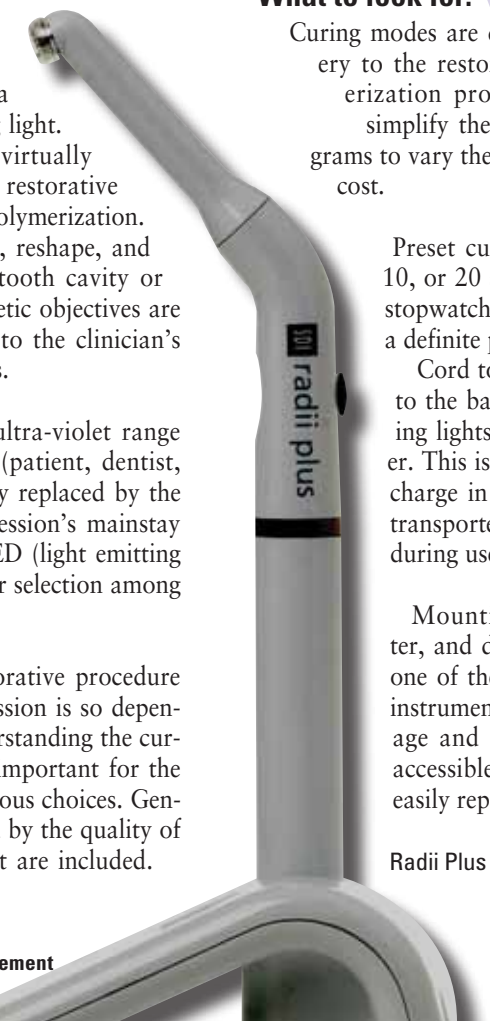
What to look for:

Curing modes are designed to optimize photon delivery to the restorative material during the polymerization process. These convenience settings simplify the curing process using built-in programs to vary the light output but may increased the cost.

Preset curing intervals in multiples of five, 10, or 20 seconds are a standard feature. No stopwatch required. A clearly audible beep is a definite plus.

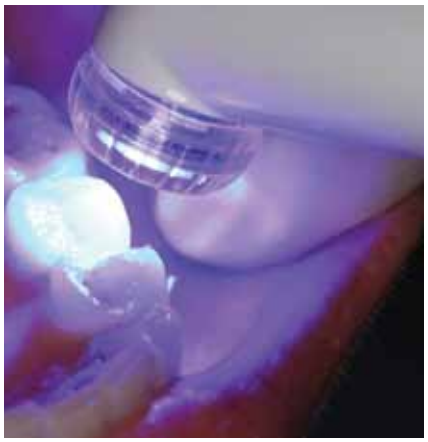
Cord to base connects the handheld wand to the base charger. Most current LED curing lights are cordless and portable, however. This is a major chairside advantage. They charge in the corded base unit but are then transported cordlessly to the patient's mouth during use.

Mounting options include wall, counter, and dental unit. The light curing unit is one of the two most commonly used dental instruments and must have a practical storage and charging spot. It must be readily accessible, conveniently usable, and just as easily replaceable into its cradle.



Radii Plus curing light.


Positioning Radii Plus.

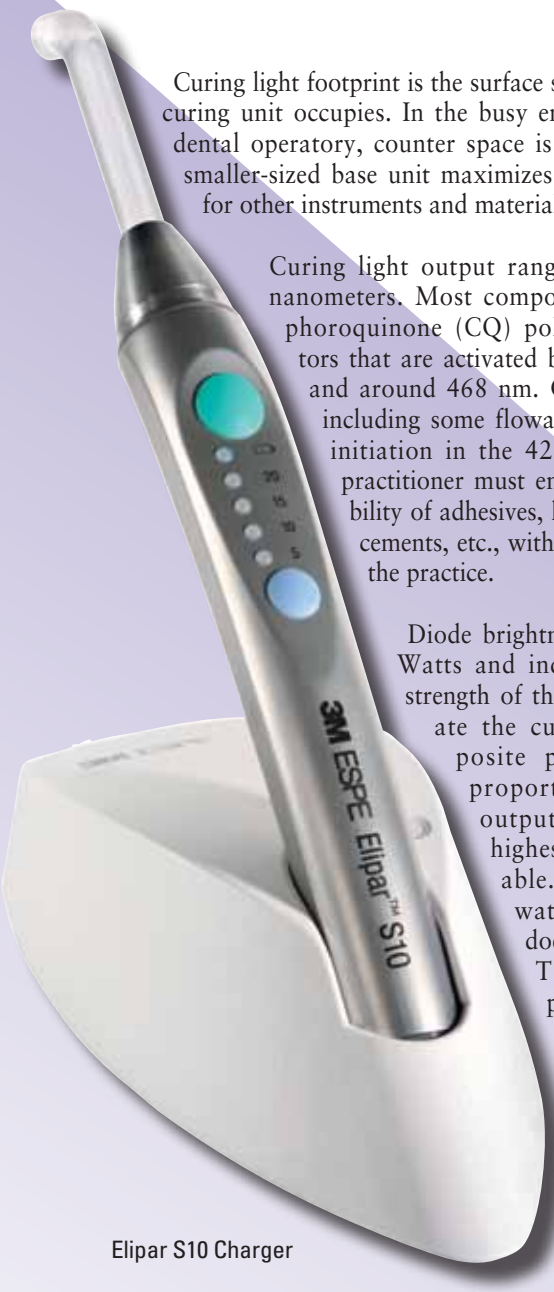

Radii Plus curing composite restoration.


Positioning Fusion Light.

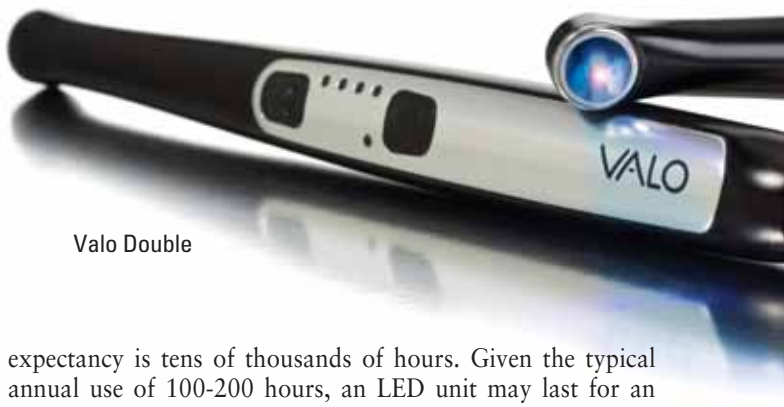
Curing light footprint is the surface space that the light curing unit occupies. In the busy environment of the dental operatory, counter space is at a premium. A smaller-sized base unit maximizes space availability for other instruments and materials.

Curing light output range is measured in nanometers. Most composites utilize camphoroquinone (CQ) polymerizing initiators that are activated by light emitted in and around 468 nm. Other composites, including some flowable resins, require initiation in the 429 nm range. The practitioner must ensure the compatibility of adhesives, hybrids, flowables, cements, etc., with the curing lights in the practice.

Diode brightness is measured in Watts and indicates the output strength of the diode(s) that create the curing beam. Composite polymerization is proportional to photon output. Intuitively, the highest output is desirable. However, as the wattage increases, so does the heat output. This creates two problems: heat at the light source n the wand, and heat at the level of the tooth. The ideal is a system that uses lower wattage more efficiently. Diode life expectancy is tens of thousands of hours. Given the typical annual use of 100-200 hours, an LED unit may last for an entire career, or longer.



Elipar S10 Charger



Valo Double

Wand tip diameters should extend beyond the margins of the restoration. A larger restoration requires a wand tip that illuminates the entire surface of the composite simultaneously. A porcelain or direct veneer requires the largest wand tip, 12mm or wider.

Curing programs and automated cycle sequences increase polymerization efficiency and make for more predictable curing. While holding a button on a wand is neither difficult nor technique sensitive, cruise control is easier.

Audible beeps signaling the beginning and the end of the curing cycle are a convenient means of freeing up the practitioner's attention for more important tasks. Visual monitoring of the curing unit to assess polymerization status is impractical. Some curing units offer an audible signal every five or ten seconds. The beep should be loud enough to be heard above the ambient operatory noise, but not so loud as to be irritating.

Weight of the wand is an important factor considering the many hours of clinical operation during which the LED curing light is actually held in the assistant's or the dentist's hand,. A

heavy curing light can cause operator fatigue. A lightweight curing unit, however, is comfortable, easy to use, and ergonomically sound.

Noise of operation is a frequently forgotten parameter. Dentists and staff are continually exposed to loud noises which can, in time, damage hearing acuity. Dental equipment should be designed to minimize this background noise. In the average operatory, the curing unit is in operation for 90-120 minutes per day. Fortunately, most LED curing lights do not require a cooling fan, and therefore emit little if any noise.

The above parameters represent the questions that the practitioner should ask before purchasing an LED curing light. They will assist in aligning the needs of the practice and the practitioner with the properties of the most suitable polymerization instrument. **DPM**

Fusion curing light.

Curing range of Fusion light.

Dr. George Freedman is a founder and past president of the American Academy of Cosmetic Dentistry, a co-founder of the Canadian Academy for Esthetic Dentistry and a Diplomate of the American Board of Aesthetic Dentistry. Dr. Freedman sits on the Oral Health Editorial Board (Dental Materials and Technology) is a Team Member of REALITY and lectures internationally on dental esthetics and dental technology. A graduate of McGill University in Montreal, Dr. Freedman maintains a private practice limited to Esthetic Dentistry in Markham, Canada.

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