Gold Dentistry 2024

What’s changed?

EVERYTHING!

There is no more
need to cast.

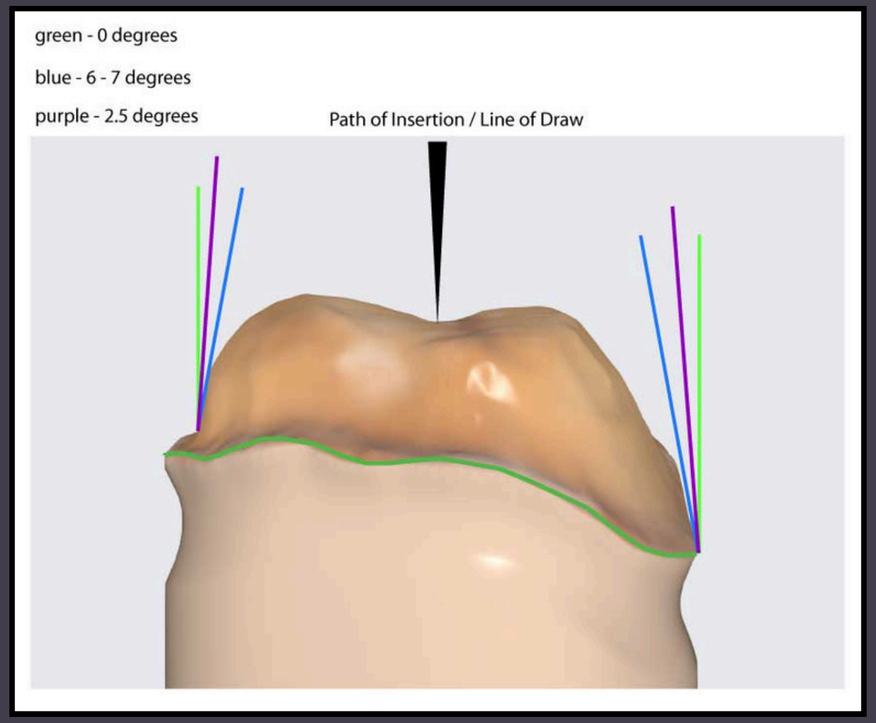
Milled gold has advanced beyond what we are capable of through traditional methods.

Preparation Considerations for Milled Gold

1. Margin can be feather, chamfer, or chamfer/bevel. A .5mm to 1mm chamfer is best.
2. Traditional 4-6 degree prep taper feels loose; 2 degrees of taper per side is best.
3. Minimum occlusal gold thickness is .4mm, but we can mill as thin as .1mm.
4. Boxes are good with softened transitions to the occlusal aspect.
5. Grooves are good with softened transitions to the occlusal aspect.
6. The floor/wall transition area of inlays and onlays is your control center for fit.

Margin Preparation

Chamfer - this results in very stable seating and an undetectable margin when completed.



Feather Edge - gold can be milled to a feather edge. No cement gap is applied the last 1mm to the margin.

Shoulder/Bevel - this is also very stable, but the angles from shoulder to the bevel must be oblique, open. Convex (or external) angles must be oblique enough to allow for precise removal of uneeded material during milling.

Prep Internal angles...

Chamfer to vertical wall, box bottoms, inlay and onlay floors, staples can all be very crisp, sharp, and nearly 90 degree angles. These angles will control the fit of your parts depending on their taper and size in area.

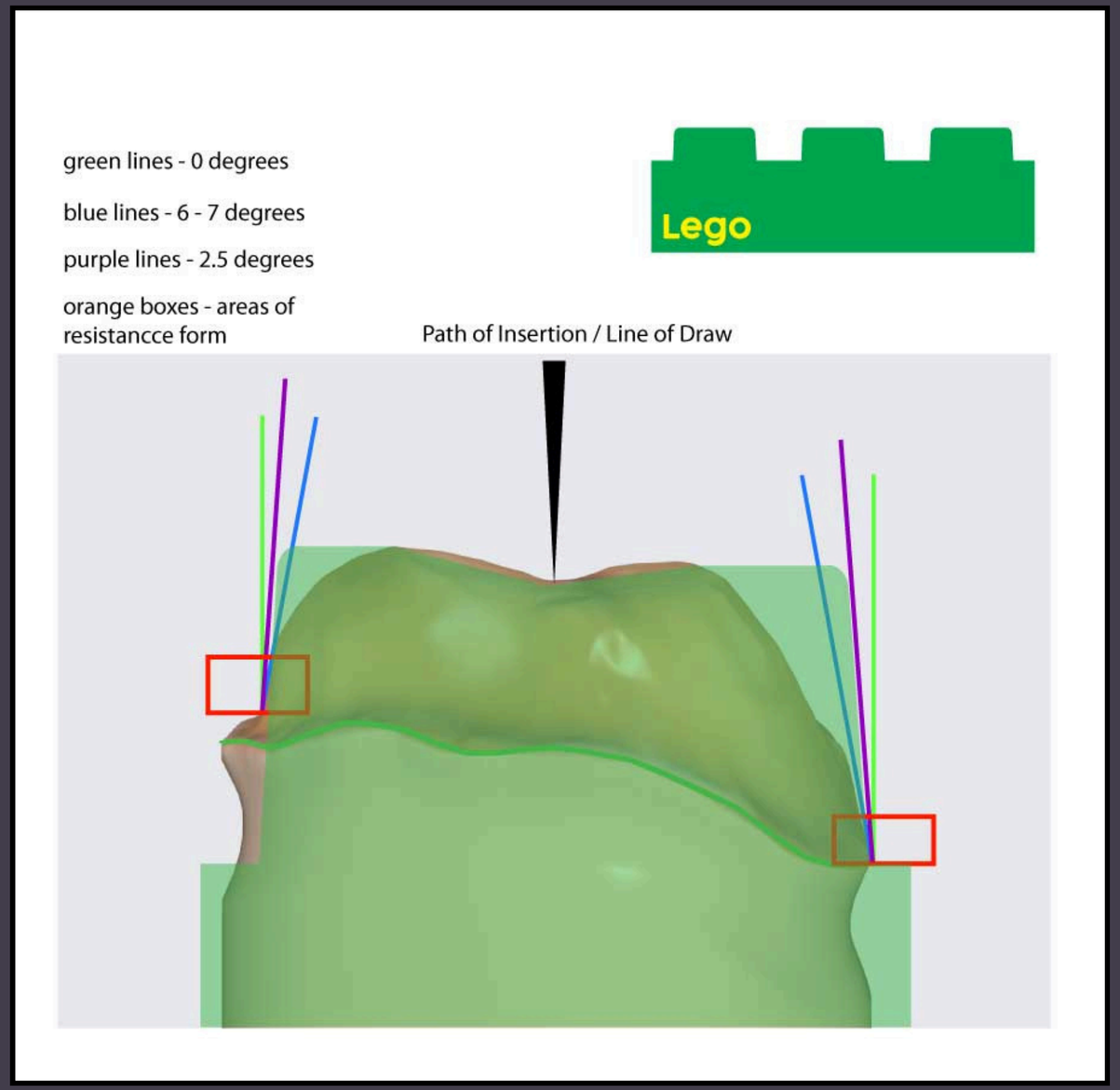
Prep External angles...

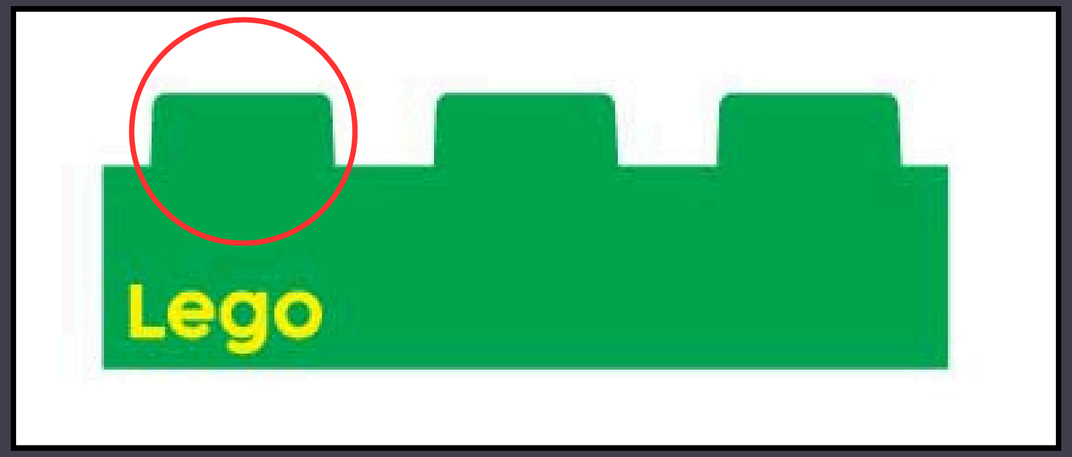
The vertical wall to occlusal aspect, AND transitions from grooves and boxes to vertical walls, all must be softened to a curvature of at least .66mm radius to allow the mill to reproduce the intaglio without over milling.

Retention and Resistance Form

The traditional protocol of 4-6 degrees of taper on vertical prep walls is too much taper. This results in loose-feeling fits.

If one prepares resistant areas, areas that taper about 2-3 degrees convergent, at least 1mm tall on the buccal and lingual, retention form will be achieved.





If we consider how a Lego stud is shaped, we see that it is a great shape to imitate to achieve retention form when we have such precise control over our designs and final parts.

Notice the very slight taper of the vertical walls of the studs.

The more area we have vertically, the more retention you will feel in the fit of the crown.

The biggest change has been to how precisely we can control the space between the crown and tooth.

Mostly it's how accurately we can measure, design, and mill gold with today's tech. Zooming in, we are working under great magnification.

Traditionally we used calipers that measured to .1mm thickness.

Digitally, we measure and design 1000x more precisely to .01 micron.

And in THIS workflow, WYSIWYG, or WYDesignIWYG.

There is a big difference in the precision of the processes of milled dental alloys, and milled or pressed ceramics.

Dental alloys:

are milled at a 1 to 1 ratio

do not chip during the process

exit the mill nearly polished in exact size

nearly all variables are eliminated

what you design is what you get

Milled ceramics:

--require sintering from green state, shrinking in this process alters the size

Pressed ceramics:

--require an investment and burnout step which can alter the size

Both Milled & Pressed

--require an extra cement gap increasing it to 100 microns to avoid fracturing

--they frequently chip and fracture at the margins

Traditionally, we paint liquid spacer on a stone die which dries in an uneven layer, several to a few microns thick, and apply more coats as needed for each dentist's preference.

And each crown intaglio is hand fitted to the die adjusting the fit to be "just so".

In the end, we cannot guarantee a cement layer that meets luting agent manufacturers' recommendations of an even 30 microns thick layer.

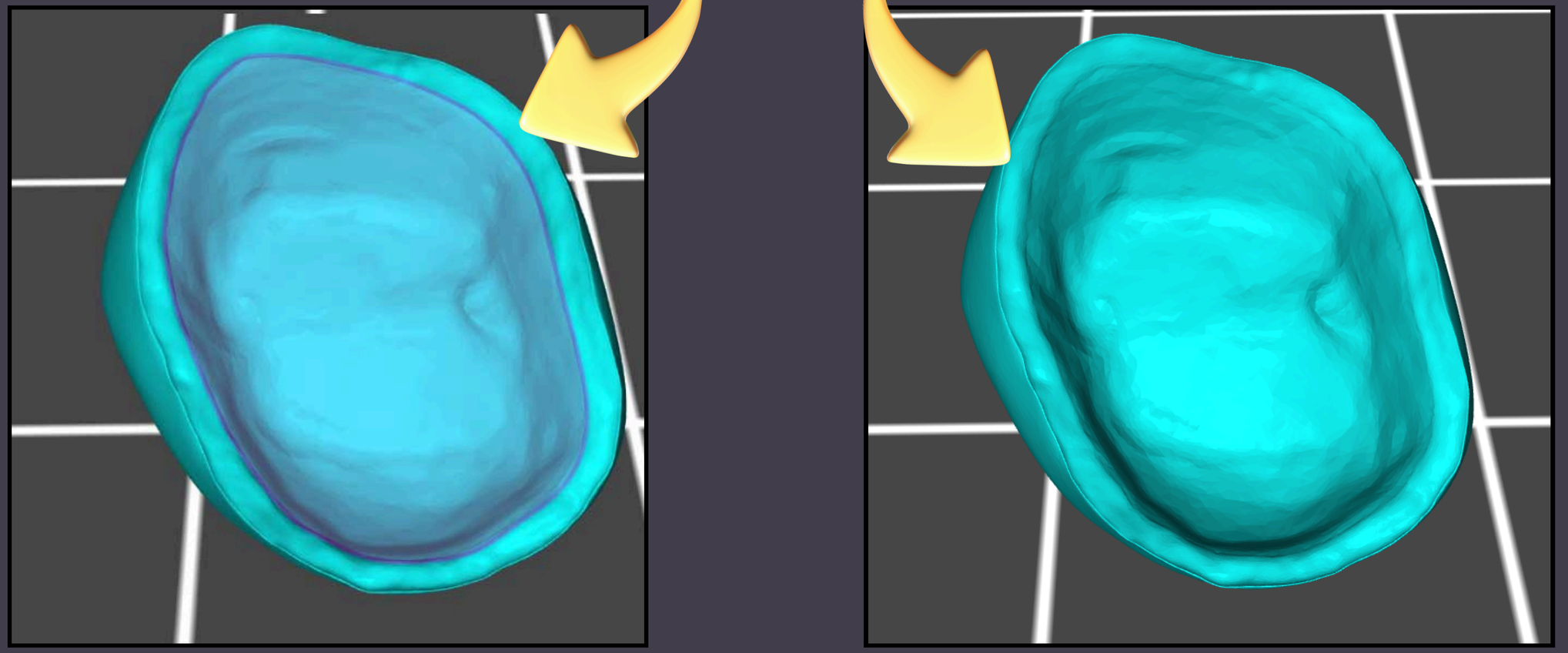
That has changed.

Now we can produce those conditions. This workflow gives us the ability to apply a cement gap exactly 30 microns thick to any virtual die and the ability to control how that gap feathers out at the margin. This is visible in the images of the designs.

These parameters are repeatable, OR adjustable as required.

We never apply cement gap to the outer most 1mm of the intaglio, so theoretically, a 0.0 micron margin gap is possible and will depend on the resolution of our scanners and mills. Studies show a 25 micron gap is average for milled gold. For comparison, the best cast gold still has an average margin gap of 50 microns, ceramics have average gaps of 100 microns.

We can see in the intaglio of thedesign where no cement gap/spacer has been applied to the last 1mm to the margin.



When milling the sharp corners in the depths of a crown, the mill has to remove additional material we would prefer would remain. This has been given the name “over milling.”

These corners relate to the transitional angles from the vertical walls of the prep to the occlusal table of the prep.

If we soften these transitional areas on the prep to match the radius of the tool that will mill the crown, there will be no need to over-mill these areas of the crown intaglios.

As for choice of tools, that is up to you.

We suggest using an end cutting smooth finishing tool with minimal taper to cut any boxes, grooves, or inlay/onlay occlusal floors.

In general, the smoother the final prepped surface is, the better fitting your replacement part will be.

The mill uses round end tools to cut all C&B parts.

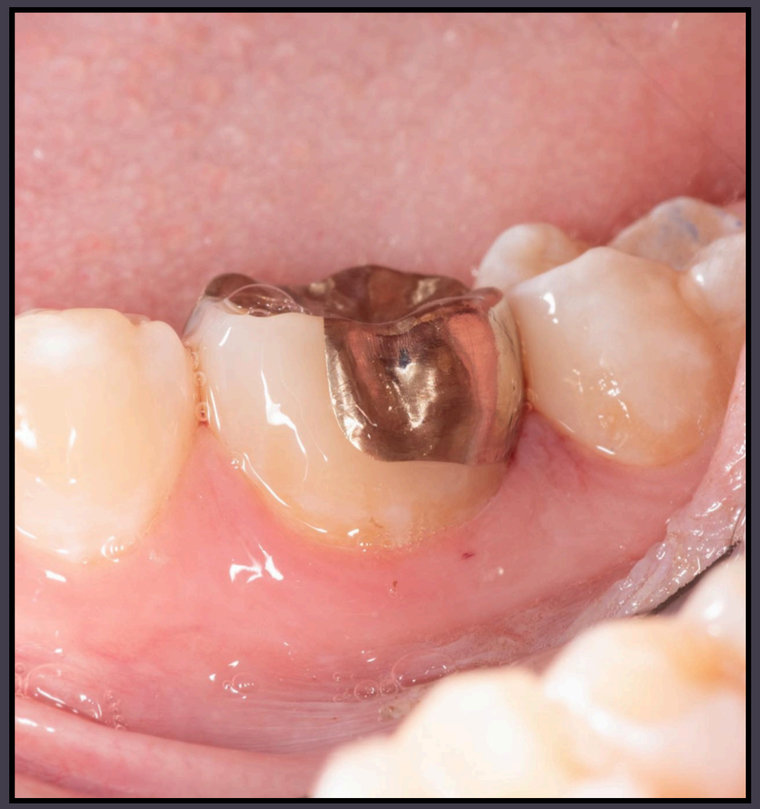
The depths of grooves and boxes of your prep are fully accessible when milling the part fitting into them.

The round-end tool cuts this exactly.

Models, Die & Prototype

Un-Polished SM-55 55%Au

This is dentist-polished 55%Au high noble alloy,
SM55, by Strategy Milling.



Easy Gold Crowns

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