Bridges
Laboratory failure of bridges

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Lecture 1

Recovery of the casting

After the red glow has disappeared from the button, the casting ring is plunged under running cold water into a large rubber mixing bowl. Gypsum bonded investments quickly disintegrate, and elimination of residue is easily accomplished with a toothbrush. Final traces can be removed ultrasonically. Oxides are removed by pickling in 50% hydrochloric acid (or preferably anon fuming substitute). Phosphate bonded investments do not disintegrate and must be forcibly removed from the casting ring. They can be handled as soon as they are sufficiently cooled under running water.

Evaluation

The casting is never fitted on the die until the inner surface has been carefully evaluated under magnification, even tiny imperfections can cause damage to the stone die . A die may be rendered useless in a matter of seconds if a casting is fitted prematurely.

Defects in the casting

Investing and casting requires meticulous attention to detail to obtain a successful, properly fitting casting.

1-**Roughness**

The surface of a casting should be smooth, although finishing and polishing are still required. Lines or grooves in the casting were usually present but overlooked in the wax pattern. They may necessitate a remake, particularly if they were positioned near the margin on the fitting surface. Generalized casting roughness may indicate a breakdown of the investment from excessive burnout temperature.

2- Nodules

Bubbles of gas trapped between the wax pattern and the investment produce nodules on the casting surface. Even minute nodules can limit the seating of the casting to a considerable degree. When they are large or situated on a margin, they usually necessitate remaking of the restoration. When

small, they can often be removed with a no.1/4 or 1/2 round bur. A binocular microscope is extremely helpful to detect and remove nodules. Remove a slight excess of metal to ensure the nodule does not interfere with complete seating. The key to avoiding nodules is a careful investing technique, a surfactant, vacuum spatulation , and careful coating of the wax pattern with investment. Casting made with phosphate bonded investment are especially prone to such imperfections, and experience and care are required to produce castings that are routinely free of nodules.

3-Fins

fins are caused by cracks in the investment that have been filled with molten metal. These cracks can result from a weak mix of investment (high water-powder ratio), excessive casting force, steam generated from too- rapid heating, reheating an invested pattern, an improperly situated pattern (too close to the periphery of the casting ring), or even premature or rough handling of the ring after investing.

4- Incompleteness

If an area of wax is too thin (less than 0.3mm), which occurs occasionally on the veneering surface of a metal- ceramic restoration, an incomplete casting may result. Thickening of the wax in these areas is recommended. Incomplete casting of normal- thickness wax patterns may result from inadequate heating of the metal, incomplete wax elimination, excessive cooling (freezing) of the mold, insufficient casting force, not enough metal, or metal spillage.

5- Voids or Porosity

Voids in the casting (in particular in the margin area) may be caused by debris trapped in the mold (usually a particle of the investment undetected before wax elimination). A well waxed smooth sprue helps prevent this. Porosity resulting from solidification shrinkage (suck back) occurs if the metal in the sprue solidifies before the metal in the mold, as may happen when a sprue is too narrow, too long, or incorrectly located or when a large casting is made in the absence of a chill vent. Gases may dissolve in the molten alloy during melting

and leave porosity defects. Back pressure porosity may be caused by air pressure in the mold as the molten metal enters. Its occurrence is reduced by using a more porous investment, locating the pattern near the end of the ring (6 to 8 mm), and casting with a vacuum technique.

6- Marginal discrepancies

Inaccuracies of fit at the margin can be caused by distortion during removal of the wax pattern from the die. They may also result from increased setting expansion (hygroscopic technique) following uneven expansion of the mold.

7- Dimensional inaccuracies

The casting can be either too small or too large. Attention to detail is essential for an accurately expanded mold. A standardized procedure is needed in regards to liquid- powder ratio, spatulation, the ring liner, the amount of liquid added, and mold heating.