Prior to course discussions of INDIRECT RESTORATIVE TECHNIQUES, it is instructive to preview the operations that occur within a dental laboratory. The following is a preview of those operations.
The class members will visit either the Drake (http://www.drakelab.com/) or [CLICK] Sherrer Dental Labs (http://www.shererdentallab.com/) sometime during the second year. Prior to those visits, the following virtual tour is provided as an introduction to some of the systems that are in place.

Both Drake Dental Laboratory and Sherer Dental Laboratory are major service laboratories for the North and South Carolina region. Drake was started by Billy Drake, a master laboratory technician, and utilizes ultra-modern management and technical systems. Scherer is managed by Jimmy Stegal who is also a significant friend and supporter of the School of Dentistry.

Most dental laboratories continue to be small mom-and-pop operations that provide standard restorations. However, newer and more exotic restorative systems require much larger investments of equipment that are only practical for larger dental laboratories.
Drake Laboratory is located on the north side of Charlotte, NC within reach of many counties in the central piedmont and parts of South Carolina. The laboratory normally services dental offices that are within 1-2 hours of driving time on almost a daily basis. Otherwise, rapid delivery services such as UPS and FEDEX are employed to mail things to and from the laboratory. Annually, the laboratory offers a special weekend tour, conference, and golf tournament to bring all of the clients closer together with the technicians and managers.

The map of the laboratory above shows the current operational characteristics. Administrative offices [CLICK] are located along the front of the building. A conference room and training rooms are connected to those areas. Despite prior training of many of the applicants to the lab, most are screened thoroughly and/or more extensively trained before becoming part of the system.
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Pick-up-and-drop-off vehicles collect or deliver items to the back side of the laboratory. Received materials are logged into the computer management system, undergo infection control procedures, and are scheduled through the system (see the Case Room above). There may be between 1500-2500 cases in the system at any one time. Depending on the specific type of case involved, it will process through different components of the laboratory preparation for fabrication (model room, occlusion and pins, waxing, investing, casting (or PFM or porcelain fabrication), welding, finishing, polishing). At each of these stations there are experts who process large numbers of cases at any single time. An occlusion expert checks the final wax-ups on everything. In the middle of the laboratory are work stations for all the laboratory technicians. At all points, there are touch screen terminals to log in the progress of any case. Every case is computer tracked and can be easily checked for it schedule and progress.

The final cases are then put through scrupulous Quality Control checks by two master technicians. It is not unusual for 15% of the cases to fail QC and be redone.

On the figure above, is a standard path for a full gold crown restoration. The frames which follow reflect steps along that path.
At the “drop off window” [CLICK] the cast is treated as though it is biologically unsafe and immediately processes for infection control. At the same time, [CLICK] the case is placed into a lab tray and then logged into the computer system for tracking and assignment to various technical people. It is then passed through a small window into the case room as a holding area until the case is officially started.
In the case room, [CLICK] different color coding is added to reflect the needs of the case.
In the center of the laboratory [CLICK] are the work stations for individual laboratory technicians. Case trays and partially processed cases are only collected by them after all the preliminary steps in fabrication are accomplished. Those preliminary steps are the described by the rest of the virtual tour.
Impressions are poured in cast stone using die stone for the specific restoration tooth. Gypsum products in the Drake Lab are managed automatically by a special machine invented by Billy Drake. It dispenses powder and liquid of the right type at the right proportions into a mixing bowl and aids in most of the mixing. The provides control of gypsum dust, protection against contamination, insures the right mixing proportions, and helps to insure that there are standard mixing and setting times. [CLICK] Poured models are then adjusted for geometry with a model trimmer.
Removable dies are created by pouring specific teeth and adding brass pins before pouring the rest of the working cast. Casts are sectioned to release the dies. [CLICK]
Quadrant working casts are mounted on standard single-hinge plastic disposable articulators. [CLICK] Articulated working casts are checked for occlusion before and after waxing.
Waxing of restorations is accomplished by just a couple of laboratory technicians. HOT POTS are used to control the temperature of the wax [CLICK] so that it is molten but at low temperatures and not prone to thermal decomposition. [CLICK] Wax can be easily added to the working dies using an electric spatula at the same temperature. No open flames are employed and spatulas can not be overheated.
Wax patterns are invested to create molds for casting metal alloy restorations. [CLICK] Wax in the molds used to be to be eliminated by heating the investment in ovens but now is more quickly eliminated using a Drake patented microwave apparatus. [CLICK] All alloys are induction melted and pressure cast (rather than using centrifugal casting machines that are slow, less well-controlled, bulky, and more dangerous).

Induction melting eliminates the dangers open gas-air or oxyacetylene torch flames and can produce very high temperatures for melting. A vacuum casting machine helps to draw the molten alloy into the mold. Pressure behind the molten alloy helps to simultaneously force the alloy into the mold space.
Casts that produced in two or more sections require soldering or welding. DRAKE uses a laser welding machine. The parts is positioned within a protective chamber. [CLICK] The spot welder is focused with microscope. [CLICK] A series of lap welds is made to join the two pieces. This is relatively efficient and protects other portions of the same item beyond the very narrow zone of welding from potential overheating.
The welded portions of the cast restoration then have the sprue removed and is processed manually through finishing and polishing. [CLICK] More complicated restorations (PFM or ceramic) will have appropriate steps handled manually from this point onward by the assigned technician.
Finished cases are then reviewed by two master technicians [CLICK] as part of quality control in a special clean area. [CLICK] After they pass this dual review, they are moved into the final room for billing and packaging.
Billing is managed by the computer. [CLICK] The fabricated restoration is packaged and scheduled for either distribution through the pick-up-and-delivery service or FEDEX.
Special thanks to DRAKE Laboratories and all the personnel for letting us include pictures of this laboratory in operation.