Handpiece Maintenance and Repair

A Peer-Reviewed Publication
Written by Tija Hunter, CDA, EFDA, CDIA, MADAA

Abstract
Dental handpieces have evolved greatly over the years, and they remain a vital part of dentistry today. The care and maintenance of these instruments are essential to preserving not only the lifespan of these instruments but their proper function as well. While traditional air-driven handpieces are still a mainstay in dentistry, electric handpieces are now being more widely used. The newest technology takes components from both electric and air-driven handpieces. Understanding how to clean and maintain handpieces and their components properly will help the clinician achieve optimal results. Knowing when to replace or rebuild handpiece turbines and who to send the handpiece to for repairs, is essential for handpiece performance and turnaround times.

Educational Objectives
The primary goal of this course is to familiarize the reader with dental handpieces and how to preserve their lifespan with proper care and maintenance. Upon completion of this course, the clinician will be able to do the following:
1. Implement proper cleaning and sterilization techniques;
2. Provide proper lubrication for each handpiece and its components;
3. Avoid common mistakes;
4. Provide proper care for a fiber-optic or LED lens;
5. Demonstrate proper sterilization techniques for various handpieces;
6. Discuss handpiece turbines and the factors to consider when repair or replacement is necessary.

Author Profile
Tija Hunter, CDA, EFDA, CDIA, MADAA, is a dental office manager in O'Fallon, Missouri. She is a 1981 graduate of Missouri College and holds certification for expanded functions in Missouri and Illinois. Tija is a member of the ADA and an ILDAA board member. She serves as the educational director of the Dental Careers Institute and is the founder of the Dental Assistants Study Club of St. Louis.

Author Disclosure
Tija Hunter, CDA, EFDA, CDIA, MADAA, has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.

Go Green, Go Online to take your course

Earn 2 CE credits
This course was written for dentists, dental hygienists, and assistants.
Educational Objectives
The primary goal of this course is to familiarize the reader with dental handpieces and how to preserve their lifespan with proper care and maintenance. Upon completion of this course, the clinician will be able to do the following:
1. Implement proper cleaning and sterilization techniques;
2. Provide proper lubrication for each handpiece and its components;
3. Avoid common mistakes;
4. Provide proper care for a fiber-optic or LED lens;
5. Demonstrate proper sterilization techniques for various handpieces;
6. Discuss handpiece turbines and the factors to consider when repair or replacement is necessary.

Abstract
Dental handpieces have evolved greatly over the years, and they remain a vital part of dentistry today. The care and maintenance of these instruments are essential to preserving not only the lifespan of these instruments but their proper function as well. While traditional air-driven handpieces are still a mainstay in dentistry, electric handpieces are now being more widely used. The newest technology takes components from both electric and air-driven handpieces. Understanding how to clean and maintain handpieces and their components properly will help the clinician achieve optimal results. Knowing when to replace or rebuild handpiece turbines and who to send the handpiece to for repairs, is essential for handpiece performance and turnaround times.

Introduction:
The evolution of today's dental handpieces
The history of dental handpieces has evolved over the last 200 years. In 1790, John Greenwood constructed the “first known dental foot engine”. (1)
In 1868, George F. Green, receive a patent for the first electric “dental engine” with a self-contained motor and handpiece. (2) Early dental drills were heavy and very slow, typically operating at 3,000 rotations per minute (RPM). Procedures took a long time to complete and were uncomfortable for the patient. The drills were straight and cumbersome for the dentist to use. In the 1940s, a handpiece that used air to rotate a cutting bur was developed by John Patrick Walsh of New Zealand. This air-driven handpiece incorporated a contra-angle design, making it easier to position in the mouth. (3) By the 1950s, air-turbine handpieces were introduced in America by Dr. John Borden, who improved on Walsh’s design. This high-speed, air-driven, contra-angle handpiece, called the Airotor, could reach speeds up to 300,000 RPM and launched a new era in high-speed dentistry. Air-turbine handpieces are widely and most commonly used today. These modern-day marvels can produce speeds unthought-of 100 years ago. Today, a slow-speed handpiece can typically operate from 3,000 to 40,000 RPM; high-speed electric handpieces typically operate at 200,000 RPM; and air-turbine handpieces can operate beyond 400,000 RPM but average in the preferred range of 180,000 to 330,000 RPM. (4) Handpieces now reduce the time it takes to perform a procedure, with less stress and trauma to the tooth. They are more comfortable for the patient, and better ergonomically for the clinician.

Some things to look for when choosing a handpiece
1. Is it autoclavable?
2. Does it have a sleek, smooth design? Less detail on the shell of the handpiece will help prevent the buildup of debris.
3. Can the finish on the shell hold up under long-term sterilization? Titanium withstands chemicals and the sterilization process better than chrome plate.

Air-driven high-speed handpiece maintenance
High-speed handpieces are a vital part of any dental practice. The use, care, and proper maintenance are essential to preserving their lifespan. Proper cleaning and sterilization keeps the handpiece running longer and prevents the spread of infectious diseases. (5) It is important to use the manufacturer’s recommended cleaning instructions and products so the warranty is not voided. The purpose of internal handpiece maintenance is to dissolve and remove dirt, debris, and contaminated oil, leaving clean oil behind for proper lubrication. Lubrication of handpieces is essential to their function. When these things are done correctly and consistently, you will preserve the lifespan of your handpieces.

Cleaning and lubricating
The Centers for Disease Control and Prevention (CDC) guidelines call for flushing water through the handpiece in the operatory for 30 seconds before the first patient of the day and after each use to remove potential contaminants from the internal water line. (6) Once in the sterilization area, remove the bur and scrub the handpiece under warm tap water with a sponge to remove external debris. Make sure the fiber-optic port is scrubbed well. Use a mild detergent.

Handpiece maintenance stations have become widely used and have gained popularity. They allow the handpiece to be housed in a unit with a cover while running the handpiece to prevent lubricant from being expelled on the operator’s hands. There are two types of handpiece stations. The first system calls for the operator to clean and lubricate the handpiece with the manufacturer’s recommended aerosol maintenance spray for two seconds. If a large amount of debris is expelled from the handpiece, the aerosol spray is repeated. With the second type of system the handpiece is placed onto the station and turned on. The station applies cleaner and lubricant. It usually runs for at least 20 seconds to purge all excess debris. Running the handpiece is an important part of the process as it clears all debris before being autoclaved. (5) Excess lubricant is re-
moved from the outside of the handpiece with a clean towel. The warranty can be voided if the manufacturer’s recommended oil is not used. When the warranty runs out, you may choose from a vast array of lubricants on the market. Some are synthetic, some indicate they are both cleaner and lubricant in one, and some suggest using a separate cleaner and oil.

Another overlooked but easily preformed maintenance procedure is the cleaning of the chuck. Once a week, a few drops of handpiece lubricant are placed into the chuck opening on the high-speed handpiece. An interproximal brush or microbrush can be placed into the handpiece chuck opening to remove debris. This will dislodge any residue ensuring proper retention of the dental bur. Following these steps will help extend the life of your handpiece and save on repair costs and lost time.

**Sterilization**

After cleaning and lubrication, the handpiece must be sterilized. Failure to sterilize the handpiece can result in a significant source of cross-contamination. In 2008, the CDC in its Guidelines for Disinfection and Sterilization in Healthcare Facilities indicated that “handpieces can be contaminated internally with patient material and should be heat sterilized after each patient. Handpieces that cannot be heat sterilized should not be used.” Proper steps in sterilization must be performed after every patient. After lubrication, place a bur in the chuck and express the oil. Remove the bur and place the handpiece in a sterilization bag. Handpieces should never be sterilized with a bur in the chuck. Use a steam heat autoclave or chemical vapor sterilizer at a maximum temperature of 135 degrees C or 275 degrees F for 20 minutes or per manufacturer’s recommendations. If using a chemical sterilizer, the handpiece must be completely dry. Excess water will cause oxidation of the handpiece in the chamber, resulting in corrosion. If using a plastic/paper bag, be sure the plastic is facing down to ensure complete sterilization. Steam-heat autoclaving is the most widely recommended form of sterilization. Autoclaves should be tested weekly with a biologic indicator to ensure proper sterilization is achieved with each cycle. Tests are sent to a facility to be verified and the results are mailed back to the office. A properly working autoclave will ensure all instruments are free of infectious and contaminated material. The autoclave should always run through the complete cycle. Never use a handpiece that has not cooled off. Running a handpiece under cool water will only cool off the shell but the turbine will remain hot. Using the handpiece while the turbine is still hot will cause stress to the turbine.

It is important to check the coupler on the dental hose on a weekly basis. O-rings should all be present and in good condition. O-rings can be obtained from the manufacturer and replaced as needed. Couplers need to be lubricated and cleaned using the lubricant and a towel or gauze pad. The towel or gauze is moistened with the lubricant/cleaner, then wiped in a circular motion to clean debris and rehydrate the O-rings, making sure the bulb cap stays snug.
Twelve tips to extend the life of your handpiece and the most common mistakes

1. A handpiece should never be wiped down with a chemical disinfectant or alcohol. When heated, the chemicals may react with the metal shell, causing buildup and corrosion. If left unattended, they will shorten the lifespan of the instrument.
2. Apply a sufficient amount of cleaner/lubricant. The cleaner/lubricant should come out of the head of the handpiece to ensure all bearings have been thoroughly covered with the lubricant.
3. Make sure you are lubricating the drive air line. Only the drive air hole goes to the turbine. Lubricating the wrong hole will result in improper turbine lubrication.
4. Use the correct cleaner/lubricant. Always use manufacturer’s recommended lubricants with their respective nozzles and expelling maintenance couplers/adapters.
5. Properly clean the chuck to remove any excess debris at least once a week to maintain the mechanism that holds the bur. This helps ensure the bur does not come out during a procedure.
6. Never place the handpiece in the ultrasonic cleaner, unless the manufacturer has a recommended product. The handpiece should never be immersed in any liquid as damage may occur.
7. Properly clean the fiber-optic/LED lens. After use it is important to run the handpiece under water and gently wipe with a sponge or soft toothbrush to remove all outer debris. Failure to do so will result in buildup on the lens and poor light quality. You may also use a cotton swab dampened with isopropyl alcohol to removed embedded debris.
8. Leaving the bur in the chuck while lubricating prevents the lubricant from flowing where it needs to go to ensure proper coverage of the bearings. Always remove all burs prior to sterilization. In the autoclave, the springs in the chuck are compressed. The heat will cause these compressed springs to weaken under tension. Debris can also accumulate around the chuck, causing it to corrode and shorten the life of the instrument.
9. Expel excess lubricant by running the handpiece after lubricating and before autoclaving. If the handpiece isn’t run to expel the lubricant, it can cause a gumming effect around the turbine where it will be essentially baked in. Many times this will cause the expulsion of excess lubricant when used for the first time after autoclaving.
10. Always place a bur in the handpiece when operating it.
11. It is important to follow the manufacturer’s guidelines on air pressure. Excessive air pressure could cause damage to the turbine bearings.
12. Always maintain a properly working autoclave.

Weekly or as-needed maintenance

1. If the button gets stiff or to prevent bur slippage: Place one drop of lubricant into the chuck. Swab the inside of the chuck with a microbrush.
2. To clean water spray holes: Run the cleaning wire (supplied with most handpieces) through the spray hole to loosen and remove any mineral buildup.
3. To remove debris from the fiber optic: Soak in a handpiece cleaner.

General precautions

Practice proper sterilization methods and always allow handpieces to thoroughly dry and completely cool before use. Never use a hot/warm handpiece or attempt to cool it under running water. This will crack or warp the turbine and shorten its lifespan.

CDC guidelines and recommendations

Hepatitis C kills more Americans than any other infectious disease, according to the CDC. As stated previously, the CDC guidelines call for flushing water through the handpiece in the operatory for 30 seconds to remove potential contaminants from the internal water line after each use. Studies show that even an accidental drop of the hepatitis C virus (HCV) can remain on surfaces for up to six weeks at room temperature. Therefore, strict infection control practices are needed in the clinical setting to avoid contact with infectious agents that can survive on surfaces.

Electric handpieces

Electric handpieces have gained popularity for their quietness and can be used at the chair or in the lab. There are two types of electric motors: those with carbon brushes and brushless. Maintenance of electric motors is limited, and brushed motors are not autoclavable. In a brushed motor, there are carbon brushes that can wear down requiring replacement over time. The brushes produce carbon dust that can build up in the motor and shorten its life. The oil from the attachment can mix with the carbon dust producing black grease that is hard to remove. It is recommended to clean the motor weekly and replace the brushes twice a year. This usually requires a special instrument to unscrew the brushes if you choose to do it yourself. The manufacturer has recommendations for use and care. The newest electric motors on the market are brushless. Their design is a contactless magnet system which keeps the motor quiet and smooth. They have very low vibration and, in most cases, there is no maintenance.

In many models, lubricating the electric handpiece attachments is done the same as the traditional air-driven style. Sterilization for each handpiece varies. Some electric handpieces are autoclavable while others are not. Some suggest bagging while others suggest not to bag. You must only autoclave the motor according to manufacturer instructions. Manufacturers vary on
maintenance of the cord itself. It is important to research the different handpieces before purchasing to make sure you are acquiring the handpiece that best fits your needs. Make sure to follow manufacturers’ maintenance procedures exactly so as not to void the warranty. When an electric handpiece begins to show signs that the mechanics are slowing down, stop using it immediately. Continued use of the handpiece can result in more costly repairs. (8)

The FDA has received reports of severe burns caused by pneumatic and electric micromotor handpieces. In most of these cases, burns were caused by overheating of various handpiece components. After research, it was found that overheating was due to failure to service and maintain the handpieces in accordance with manufacturer’s recommendations. When electric handpiece systems aren’t well-maintained, the handpiece head can overheat very rapidly. As a safety precaution, it is necessary to maintain the handpiece properly. Failure to properly clean and maintain the electric handpiece will also void its warranty.

**Slow-or low-speed motor maintenance**

Slow-speed motors require less maintenance and do not require as much lubrication as high-speed motors. The viscosity of the oil is different as well. Some models of slow-speed motors require higher viscosity oil. A couple of drops in the drive air line are all that’s needed. Also apply some oil as a preventative measure to forward/reverse valves, shift rings, and sheath attachment points. Run the motor to distribute the oil. Wipe away the excess oil with a paper towel. Periodically disassembling the motor and cleaning it of buildup and debris will ensure longer life. Straight attachments require periodic lubrication. Running them under water and cleaning them with a sponge or soft toothbrush to remove debris is all that is typically needed before placing them in sterilization bags. Latch type or right angle attachments can be done the same way, by placing a few drops of lubricant and running for at least 20 seconds to distribute the oils before autoclaving.

![Figure 4.](image)

**Handpiece repair: fiber-optic light**

The fiber-optic light requires very little attention. A gentle scrubbing with a soft toothbrush or sponge will keep the lens free of debris. Replacement of the light is easily done by any member of the dental team. Replacement bulbs are sold usually in sets of two and some require a dental explorer to remove. The bulb is usually located in the coupler itself. Place the explorer in the tiny hole located just under the bulb and gently lift up. The bulb should easily slide out of the socket. Simply place a new bulb back in the socket the same way, securing it with an explorer.

**Handpiece repair: turbines**

One of the most common repairs in the high-speed handpiece is the replacement of the turbine. Before sterilization of the handpiece became a requirement, the turbine lasted for years, and most of the time replacement was performed by a dental team member in the office. Today, with repeated sterilization, the life of a turbine is limited, making repairs more frequent and costly. The turbine is the only moving part and operates at speeds beyond 400,000 RPM. Due to this high speed and the effects of sterilization, a turbine can show signs of wearing and eventually need replacement. Proper cleaning and lubrication will extend the life, but it’s inevitable that the workhorse turbine itself will have to be replaced.

![Figure 5.](image)

There are several components to an air-driven turbine (9)

1. O-rings
2. End cap
3. Cap end bearing
4. Impeller
5. Bur end bearing
6. Chuck
7. Spindle

If the turbine itself is the brains of the handpiece, the bearings are the heart of it. When the bearings wear out, the turbine will no longer rotate, causing it to stall when placed on a tooth. It may emit a loud, high-pitched sound or vibration. Studies show it is usually the bearing retainer that fails. There are a number of ways to replace your turbine; including: 1) purchasing a new or after-market turbine and installing it in-house; 2) sending it back to the manufacturer to be replaced; or 3) using a qualified repair service. Keeping it in-house will save turn-around time. Sending it back to the manufacturer will ensure the same consistency as the original. There are several qualified repair services either locally or nationally that can get your turbine replaced and back to you in just days. Your warranty will vary from three to twelve months. Be sure to follow proper procedures so as not to void the new warranty.
You can choose to purchase a new turbine and have one of the dental team install it. There is help from several different sources. The handpiece manufacturer sales representative or dealer service repair technicians are very knowledgeable and can help train team members on proper turbine installation. If choosing this option, it’s important to recognize the team’s limitations. If they are not comfortable performing the replacement, the handpiece should be sent out. Some of the more sophisticated turbines may be harder to replace, and you may risk damaging the handpiece, resulting in more costly repairs and, of course, longer downtime.

Sending your handpiece out for repairs

Two options exist for this choice. Sending the handpiece back to the manufacturer to have a new turbine installed will guarantee the quality and the same consistency when the handpiece was new. The warranty is usually best in this option as well. One drawback is downtime since this option usually takes a little longer to return to the office.

With handpiece maintenance costs rising with required sterilization, dental professionals have turned to independent repair technicians to extend the life of the handpiece by rebuilding instead of replacing the turbines. Although there is no industry standard for certification of handpiece repair, there are technicians who have been certified by manufacturers in the repair of their particular handpieces. It is advisable to request the credentials of a certified technician. It is worth noting that none of the manufacturers certify rebuilding handpieces. When seeking out a repair technician, ask if they have attended any manufacturer courses and how long they have been repairing handpieces. The big disadvantage with this option is that if you do not have a qualified technician, turnaround time could be longer and quality of repair may vary. This option usually produces fast turnaround time, reduced cost, and a shorter warranty than the manufacturer provides.

An after-market turbine is one that is not produced by the manufacturer and can cost substantially less. Sometimes the cliché “you get what you pay for” applies to this option as these turbines can be inconsistent in quality and have a much shorter warranty, if any at all. A poor quality aftermarket product can result in more costly and more frequent repairs. It is important to know your source and use a trusted technician. You must also be aware of what goes into the handpiece. Research your options and evaluate the impact of the decision on how the handpiece performs during the procedure in a patient’s mouth. A satisfied patient refers and returns. The repair decisions must be evaluated in the context of clinical importance.

Sometimes it is not necessary to replace the entire turbine, but to rebuild it replacing only certain components such as the bearings and O-rings. It is important to ensure that the manufacturer’s tolerance standards are met. A properly trained technician can evaluate the components to determine what needs to be
replaced. Rebuilding a turbine consists of removing the broken bearings, making sure not to damage the rest of the assembly. New bearings are then pressed onto the spindle chuck assembly. The suspension O-rings are essential to handpiece performance and are replaced as well. The handpiece must be properly sterilized before being sent for repairs and the packaging must be properly labeled.

There is much debate surrounding rebuilding a handpiece vs. replacing it. The “teeth” on the impeller wear down from use and sterilization. If the turbine is rebuilt, only replacing the bearings and O-rings, the lifespan of the impeller, may be questionable. In addition, the handpiece chuck has a finite life. A turbine that has been rebuilt might not be able to retain the bur with the same force as a replacement turbine with all new components. This could result in bur “walk-out” or bur ejection during handpiece operation. Again, a qualified technician will be able to assess and recommend what is best for the life of the turbine.

Summary
Various types of handpieces have revolutionized dentistry over the last 100 years. They are an essential part of any dental practice, and dentists, hygienists, and dental assistants rely on them daily for optimal performance. Although they are used in almost every procedure, frequently the dental team knows little about them. Understanding how they work and how to properly clean and lubricate them will extend their life and keep repair costs down. When it comes time to repair the handpiece, clinicians must be aware of what is best for the patient.

References
5. First Impressions; Handpieces; http://www.firstimpressionsmag.com/handpieces.html Ring ME.
6. Dental Products Report May 2012; One clinician’s view on Dentsply Midwest’s Quiet-air dental handpiece and Midwest Air Repair.

Author Profile
Tija Hunter, CDA, EFDA, CDIA, MADAA, is a dental office manager in O’Fallon, Missouri. She is a 1981 graduate of Missouri College and holds certification for expanded functions in Missouri and Illinois. Tija a member of the ADA and an ILDAA board member. She serves as the educational director of the Dental Careers Institute and is the founder of the Dental Assistants Study Club of St. Louis.

Author Disclosure
Tija Hunter, CDA, EFDA, CDIA, MADAA, has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.
1. The first pedal powered drill was developed by John Greenwood in:
   a. 1790
   b. 1821
   c. 1851
   d. 1881

2. Which inventor received a patent for the first electric “dental engine” in 1868?
   a. John Patrick Walsh
   b. Wilhelm Conrad Roentgen
   c. James B. Morrison
   d. George F. Green

3. Who developed a handpiece which used air to rotate a cutting bur in the 1940’s?
   a. John Patrick Walsh
   b. Henry Walsh
   c. John Borden
   d. Dr. C. Edmund Kells

4. Today, an air driven high speed handpiece typically runs at ________ RPM’s?
   a. 200,000 rpm
   b. 400,000 rpm
   c. Under 200,000 rpm
   d. Between 180,000 and 330,000 rpm

5. Electric handpieces are typically designed to run at ________ RPM’s
   a. 20,000 rpm
   b. 40,000 rpm
   c. 200,000 rpm
   d. 600,000 rpm

6. Proper cleaning and sterilization will help prevent which of the following?
   a. Loss of lubricant
   b. Broken burs
   c. Infectious diseases
   d. Worn turbine

7. For proper maintenance, it is important to:
   a. Remove the bur, scrub the handpiece under running water to remove debris
   b. Wipe handpiece off with disinfectant before lubricating
   c. Place a clean bur in the handpiece before lubricating
   d. Autoclave the handpiece before lubricating

8. Which of the following is not true regarding proper handpiece lubrication?
   a. Remove bur from handpiece
   b. Use manufacturer’s recommend oils
   c. Run Handpiece to express oils
   d. Replace bur in handpiece to sterilize

9. Which of these things is not true when choosing a handpiece?
   a. Is it autoclavable?
   b. Does it have a sleek smooth design?
   c. Can it be submerged in cold sterilants?
   d. Does the finish on the shell hold up under long term sterilization?

10. Failure to sterilize a handpiece can result in?
    a. Longer life of the handpiece
    b. A significant source of cross contamination
    c. A buildup of lubricant
    d. Cracking of the turbine

11. When using a chemical sterilizer, the handpiece must be completely dry. Excess water will cause;
    a. The turbine to lock up
    b. Oxidation of the rotor
    c. Oxidation of the handpiece
    d. The shell to bubble

12. Which of these statements is not true?
    a. The autoclave should run it’s complete cycle
    b. Run the handpiece under cool water
    c. Allow the handpiece to completely cool down
    d. Always expel the lubricant prior to autoclaving

13. Which of these is not true on extending the life of your handpiece?
    a. The handpiece should always be wiped down with disinfectant
    b. Apply a sufficient amount of lubricant
    c. Never place handpiece in an ultrasonic cleaner
    d. Always remove the bur

14. Which of these is not true of slow speed handpieces?
    a. Run the motor to distribute the oil
    b. Wipe away the excess oil with a paper towel
    c. Running it under water and cleaning with sponge
    d. Slow speed handpieces use the same oil as high speed handpieces

15. Which of the following is the most recommended form of sterilization for dental handpieces?
    a. Autoclave
    b. Ethylene oxide gas
    c. Chemical vapor
    d. Submersion in alcohol

16. In what year did the CDC recommend that handpieces be sterilized?
    a. 2000
    b. 2008
    c. 2009
    d. 2012

17. What is the most important consideration when rebuilding or replacing a turbine?
    a. Lowest cost
    b. Turnaround time
    c. A certified technician
    d. The best warranty

18. When caring for your handpiece, which of the following is true?
    a. Always wipe with disinfectant prior to autoclaving
    b. Always leave a bur in the handpiece while autoclaving
    c. Always use a technician certified to work on handpieces
    d. Always use manufacturer’s direction on proper lubrication

19. According to the CDC, more Americans are killed by ______ than any other infectious disease.
    a. HIV
    b. pneumococcal disease
    c. tuberculosis
    d. Hepatitis C

20. The turbine is the only moving part and operates at speeds beyond:
    a. 400,000 RPM
    b. 100,000 RPM
    c. 500,000 RPM
    d. 300,000 RPM
# Dental Handpiece Maintenance and Repair

## Educational Objectives
1. Implement proper cleaning and sterilization techniques;
2. Provide proper lubrication for each handpiece and its components;
3. Avoid common mistakes;
4. Provide proper care for a fiber-optic or LED lens;
5. Demonstrate proper sterilization techniques for various handpieces;
6. Discuss handpiece turbines and the factors to consider when repair or replacement is necessary.

## Course Evaluation

### 1. Were the individual course objectives met?
<table>
<thead>
<tr>
<th>Objective #1: Yes</th>
<th>No</th>
<th>Objective #2: Yes</th>
<th>No</th>
<th>Objective #3: Yes</th>
<th>No</th>
<th>Objective #4: Yes</th>
<th>No</th>
<th>Objective #5: Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

### 2. To what extent were the course objectives accomplished overall?  S  4  3  2  1  0

### 3. Please rate your personal mastery of the course objectives.  S  4  3  2  1  0

### 4. Please rate the usefulness and clinical applicability of this course.  S  4  3  2  1  0

### 5. Was the overall administration of the course effective?  S  4  3  2  1  0

### 6. Please rate the instructor's effectiveness.  S  4  3  2  1  0

### 7. Was the supplemental webliography adequate?  Yes  No

### 8. How would you rate the author's grasp of the topic?  S  4  3  2  1  0

### 9. How do you rate the references were adequate?  Yes  No

### 10. Do you feel that the references were adequate?  Yes  No

### 11. Would you participate in a similar program on a different topic?  Yes  No

### 12. If any of the continuing education questions were unclear or ambiguous, please list them.

### 13. Was there any subject matter you found confusing? Please describe.

### 14. How long did you take to complete this course?

### 15. What additional continuing dental education topics would you like to see?

---

**PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.**

---

**AGD Code 149**