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# Dental Handpiece Maintenance and Repair

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

## Abstract

Dental handpieces have evolved significantly over the years and they remain a vital part of dentistry today. The care and maintenance of these instruments is essential to preserving not only the life of the instrument but its 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 these handpieces and their components properly will help the clinician achieve optimal results. Knowing when to replace or rebuild handpiece turbines and its pros and cons, and knowing who to send the handpiece to for repairs is essential for quality and turnaround times.

## Educational Objectives:

Upon completion of this educational activity, the participant will be able to:

1. Implement proper cleaning and sterilization techniques
2. Provide proper lubrication of 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** is a dental office manager in O'Fallon Missouri. She is a 1981 graduate of Missouri College, holds certification for expanded functions in Missouri and Illinois, a member of the ADA and an ILDA 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. She can be reached at [tijaefda@gmail.com](mailto:tijaefda@gmail.com).

## Author Disclosure

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6. Discuss handpiece turbines and the factors to consider when repair or replacement is necessary.

## Abstract

Dental handpieces have evolved significantly over the years and they remain a vital part of dentistry today. The care and maintenance of these instruments is essential to preserving not only the life of the instrument but its 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 these handpieces and their components properly will help the clinician achieve optimal results. Knowing when to replace or rebuild handpiece turbines and its pros and cons, and knowing who to send the handpiece to for repairs is essential for quality and turnaround times.

## Introduction: The evolution of today's dental handpieces

We have evidence that dentistry was practiced as early as 7000bc. A tooth dated to be 9000 years old shows signs that a dental "drill" was used. The history of dental handpieces has evolved over the last 150 years. In 1871, James B. Morrison developed and patented a pedal powered drill revolutionizing the dental handpiece world. 1871 also saw an American, George F. Green receive a patent for the first electric "dental engine" with a self-contained motor and handpiece. Early dental drills were heavy and very slow, typically 3000 rpm's. Procedures took a long time to complete and were uncomfortable for the patient. They were also straight, so therefore cumbersome for the dentist to use. In the 1940's an air driven handpiece which used air to rotate a cutting bur, had been developed by John Patrick Walsh of New Zealand which incorporated a contra angle design making it easier to position in the mouth. By the 1950's air turbine handpieces were introduced in America by Dr. John Borden which improved on Walsh's design. This high speed, air driven contra angle handpiece, called the Airotor could reach speeds up to 300,000 rotations per minute and launched a new era in high speed dentistry. Although they have evolved, air driven turbine handpieces are still 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 20,000 to 40,000 rpm's, high speed electric handpieces typically at 200,000 rpm's and air turbine handpieces beyond 400,000 rpm's (~6600 revolutions per second). The average preferred range is 180,000 to 330,000 rpm's. Handpieces now reduce the time it takes to perform a procedure, causes less stress and trauma to the tooth, with greater comfort for the patient and better ergonomics for the clinician.

## Air driven high speed handpiece maintenance

High speed handpieces are a vital part of any dental practice. The use, care and proper maintenance is essential to preserving their lifespan. Proper cleaning and sterilization will keep your handpiece running longer and prevent the spread of infectious diseases. It is important to use the manufacturers 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 oils, leaving clean oil behind for lubrication. The lubrication of any handpiece is essential to its function. When these things are done correctly and consistently, you will preserve the lifespan of your instrument.

## 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.

## 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 to remove potential contaminants from the internal water line after each use. Once in the sterilization area, remove the bur, scrub the handpiece under running water with a sponge to remove external debris. 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 expelling on the operators 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 1 second. If a large amount of debris is expelled from the handpiece, the aerosol spray is repeated. The second type of system doesn't require lubrication before being placed on the station. When ready, the handpiece will be placed

Figure 1.



Figure 2.



Figure 3.



onto the station and turned on. The station applies cleaner and lubricant. It then runs the handpiece 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. Excess lubricant is removed from the outside of the handpiece with a clean towel. Always use handpiece manufacturer's products for optimal performance. You may also choose to use a different product among the vast array of lubricants on the market. Some are synthetic, some indicate they are a cleaner and lubricant in one and some use a separate cleaner and oil.

An over-looked but easily performed 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 micro brush 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.

#### **Sterilization:**

Sterilization must come after the handpiece is cleaned and lubed. Failing to sterilize the handpiece can result in a significant source of cross contamination. In 2008, the Centers for Disease Control and Prevention (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. Remove any bur present in the handpiece before beginning a handpiece maintenance and sterilization cycle. Handpieces should never be sterilized with a bur in the chuck. Use of a steam heat autoclave or chemical vapor sterilizer is required, at a maximum temperature of 135 degrees C or 275 degrees F per sterilizer manufacturer's recommendations. When 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 paper is facing up to ensure complete sterilization. Steam heat autoclave 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. A properly working autoclave will ensure all of your 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 can warp the turbine. Using the handpiece while still warm will cause stress to the turbine. Allow the handpiece to completely cool down prior to use.

It's important to check the handpiece coupler on the dental hose as well, at least once a week. 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. When heated, the chemicals may react with the metal shell causing a 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 and 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 the manufacturer's recommended lubricant 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's important to run under water and gently wipe with a sponge to remove all outer debris. Failure to do this will result in a buildup on the lens and poor light quality. You may also use a cotton swab dampened with isopropyl alcohol to remove embedded debris.
8. Unless the handpiece utilizes a wrench-activated chuck, remove the bur when cleaning and lubricating and expelling. 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. This is important.

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. Let the handpiece cool down. Never run the handpiece under cold water to quickly cool it off. This damages the turbine.
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.

### Electric Handpieces

Electric handpieces have gained popularity for their quiet presence and can be used at the chair or in the lab. Maintenance of electric motors is limited and brushed motors are not autoclavable. There are two types of electric motors; those with carbon brushes and brushless. In a brushed motor, there are carbon brushes which can wear down and need to be replaced over time. The brushes produce a 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's 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. Its design is a contactless magnet system which keeps the motor quiet and smooth. It has 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. It is important to research the different handpieces before purchase to make sure you are acquiring the handpiece that best fits your needs. Make sure to follow proper manufacturers' maintenance procedures to the letter 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.

The FDA has received reports of severe burns caused by pneumatic and electric 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 the 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 is all that's needed. Also apply some oil as a preventative measure to forward/reverse valves, shift rings, and sheath attachment points.

Figure 4.



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 lubrication. Running it under water and cleaning with a sponge to remove debris is all that is needed before placing it in a bag for sterilization. Latch type or right angle attachments can be done the same way, by placing a few drops of lubricant and run for at least 20 seconds to distribute the oils before autoclaving.

## Handpiece Repair: Fiber Optic Light

The fiber optic light requires very little attention. A gentle scrubbing with a 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 commonly sold in sets of two and some require a dental explorer to remove. The bulb is located in the coupler itself while some are in the tubing. 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, a 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. A 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 work-horse turbine itself will have to be replaced.

If the turbine itself is the brains of the handpiece, the bearings are the heart of it. When these things 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. The turbine is the workhorse of the handpiece. It's said that the "handpiece itself is just a handle to provide a means of controlling the turbine as well as serving as a conduit for air to drive the turbine and air and water to cool the surface being cut."

Figure 5.



There are a number of ways to replace the turbine including; purchasing a new or after-market turbine and install it in house, send back to the manufacturer to be replaced or use of a qualified repair service. Sending it back to the manufacturer will ensure the same consistency as the original. Keeping it in house will save on turnaround time and there are several qualified repair services either locally or nationally that can get your turbine replaced and back to you in just days. Failure to have service provided by a qualified technician has a number of pitfalls including; potential use of parts made of inferior materials and lack of training of the technician, among others, which can lead to a damaged or improperly functioning handpiece. Either way your warranty will vary from 3 months to 2 years. Be sure you follow proper procedures as not to void the new warranty.

## In house

You can choose to purchase a new turbine and have one of the dental team install it. There is help from a couple of different sources. The handpiece manufacturer sales representative is very knowledgeable and they can help train a team member on proper installation. Dealer service repairmen are also willing to help show the team how to install a turbine. If choosing this option, it's important to recognize if the dental team isn't comfortable performing the replacement, then 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 down time with the handpiece.

## Sending your handpiece out for repairs

Two options exist for this choice. Sending it back to the manufacturer to have a new turbine installed will guar-

antee the quality and the same consistency you had when the handpiece was new. The warranty is usually best with this option as well. One drawback is down time since this option usually takes a little longer to return to the office.

With handpiece maintenance costs rising with routine 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 that 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 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 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’s important to know your source and use a trusted technician. It is not only important to trust your source, 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 decision must be evaluated in the context of impact on the teeth.

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 should be properly sterilized before it is sent.

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 would

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 and expanded function dental assistants rely on them daily for optimal performance. Although they are used in every procedure, little is known about them from the stand point of the dental team. Understanding how they work and how to properly clean and lubricate them will extend their life and keep repair costs down. When it does come time to repair your handpiece, be sure to be aware of what is best for the patient.

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## Author Profile

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## Questions

- Evidence indicates that dentistry was practice as early as what year?
  - 6000bc
  - 6200bc
  - 7000bc
  - 7200bc
- A tooth demonstrating signs of a dental "drill" being used on it was how many years old?
  - 6000
  - 7000
  - 8000
  - 9000
- Which of the following inventors received a patent for the first electric "dental engine" in 1871?
  - James B. Morrison
  - John Patrick Walsh
  - George F. Green
  - Dr. John Borden
- In what year did James B. Morrison develop and patent the first pedal powered "drill"?
  - 1861
  - 1871
  - 1800
  - 1950
- In the 1940's a handpiece which used air to rotate a cutting bur, was developed by:
  - John Patrick Walsh
  - Dr. John Borden
  - Dr. C. Edmund Kells
  - Henry Patrick Walsh
- Although an air driven high speed handpiece can run beyond 400,000 rpm's, typically it is runs at:
  - 200,000 rpm
  - 400,000 rpm
  - Under 100,000 rpm
  - Between 180,000 and 330,000 rpm
- Electric handpieces are typically designed to run at what speed?
  - 200,000 rpm
  - 250,000 rpm
  - 300,000 rpm
  - 350,000 rpm
- Which of the following is not true regarding slow speed handpieces?
  - The viscosity of the oil is different
  - Requires less maintenance
  - Does not need be sterilized
  - Straight attachments do not require lubrication
- Proper cleaning and sterilization will help prevent which of the following?
  - Cracks in turbine
  - Infectious diseases
  - Loss of lubricant
  - Broken burs
- After each use it is important to:
  - Autoclave the handpiece before lubricating.
  - Place a clean bur in the handpiece before lubricating
  - Remove the bur, scrub the handpiece under running water
  - Wipe handpiece off with a disinfectant before lubricating
- Which one of the following is not true regarding proper handpiece lubrication?
  - Remove bur from handpiece
  - Use manufacturer's recommended lubricant
  - Run handpiece to express excess oils
  - Replace bur in handpiece while it is being sterilized
- Wiping down the handpiece with a chemical disinfectant is not recommended due to which of the following?
  - It is redundant if you are rinsing and autoclaving
  - The chemicals can cause a reaction when heated resulting in corrosion
  - Disinfectants can cause a build up
  - Never mixed chemicals
- Which of the following is the most widely recommended form of sterilization?
  - Chemical vapor
  - Submersion in a cold sterile solution
  - Autoclave
  - Ethylene oxide gas
- Which of the following must be implemented to avoid a manufacturers' warranty violation?
  - Use the manufacturer's recommended burs
  - Use the manufacturer's recommended sterilization methods
  - Use the manufacturer's recommended cleaner
  - Use the manufacturer's recommended lubricant
- Electric handpieces have gained popularity due to which of the following?
  - Lower cost
  - Quiet presence
  - Portability
  - No sterilization required
- In what year did the CDC recommend that handpieces should be heat sterilized after each patient?
  - 2000
  - 2003
  - 2007
  - 2008
- At what temperature should a handpiece be sterilized in a steam heat or chemical vapor sterilizer?
  - 123 F
  - 210 F
  - 257 F
  - 275 F
- Why is it necessary to run biologic indicators on your autoclave weekly?
  - It is required by the CDC
  - To ensure proper sterilization is achieved with each cycle
  - Patients will want to view the results
  - It is required by OSHA
- When using a chemical sterilizer, which of the following statements is true?
  - Excess water will allow oxidation in the chamber resulting in corrosion
  - Excess water will trap debris in the chamber
  - Excess water will trap bacteria making it impossible to properly sterilize
  - Excess water will dilute the chemicals used resulting in improper sterilization
- Which statement is true if using the handpiece while still warm?
  - It cause it to overheat
  - It will cause it to lock up
  - It will cause stress to the turbine
  - It will cause stress to the ball bearings
- Which of the following statements is not true when caring for a handpiece?
  - Properly clean the chuck
  - Use the correct lubricant
  - Run the handpiece after lubricating and before autoclaving
  - Use the manufacturers recommended burs
- Which of the following is not true regarding brushed electric handpieces?
  - Must be taken apart and lubricated weekly
  - Produce a carbon dust that can build up in the motor
  - Carbon brushes can wear down and need to be replaced over time
  - Oil from the motor can mix with the dust producing black grease
- The FDA has received reports that burns have been caused by?
  - Slow speed handpieces
  - High speed handpieces
  - Hygiene handpieces
  - Electric handpieces
- The only moving part of a high speed handpiece is the:
  - Sheath
  - O-rings
  - Turbine
  - End cap
- Which of the following components are not found in a turbine?
  - Impeller
  - Chuck
  - Bearings
  - Coupler
- What repeated function shortens the life of a turbine?
  - Running higher than normal rpm's
  - Failure to use manufacturer's recommended burs
  - Sterilization
  - Multiple uses
- Which of the following is the most common repair you will encounter in a high speed handpiece?
  - Replacement of the coupler
  - Replacement of the fiber optic light
  - Replacement of the end cap
  - Replacement of the turbine
- Which of these is not true in an aftermarket turbine?
  - Shorter warranty
  - Inconsistent quality
  - Guaranteed work
  - Lower cost
- What is the most important consideration when rebuilding or replacing a turbine?
  - Lowest cost
  - Best warranty
  - Fastest turnaround time
  - A qualified technician
- When caring for your handpiece, which of the following is true?
  - Always use manufacturer's recommended lubricants
  - Always ensure a properly working autoclave
  - Always use a trusted technician to service your handpiece
  - All of the above

# Dental Handpiece Maintenance and Repair

Name:	Title:	Specialty:
Address:	E-mail:	
City:	State:	ZIP: Country:
Telephone: Home ( )	Office ( )	
Lic. Renewal Date:	AGD Member ID:	

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 2 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp. **For Questions Call 216.398.7822**

## Educational Objectives

1. Implement proper cleaning and sterilization techniques
2. Provide proper lubrication of 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? | Objective #1: Yes No | Objective #4: Yes No |
|   | Objective #2: Yes No | Objective #5: Yes No |
|   | Objective #3: Yes No | Objective #6: Yes No |

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?                            | 5     | 4   | 3  | 2 | 1 | 0 |
| 3. Please rate your personal mastery of the course objectives.                                | 5     | 4   | 3  | 2 | 1 | 0 |
| 4. How would you rate the objectives and educational methods?                                 | 5     | 4   | 3  | 2 | 1 | 0 |
| 5. How do you rate the author's grasp of the topic?   | 5     | 4   | 3  | 2 | 1 | 0 |
| 6. Please rate the instructor's effectiveness.  | 5     | 4   | 3  | 2 | 1 | 0 |
| 7. Was the overall administration of the course effective?                                    | 5     | 4   | 3  | 2 | 1 | 0 |
| 8. Please rate the usefulness and clinical applicability of this course.                      | 5     | 4   | 3  | 2 | 1 | 0 |
| 9. Please rate the usefulness of the supplemental webliography.                               | 5     | 4   | 3  | 2 | 1 | 0 |
| 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 it take you to complete this course?
- \_\_\_\_\_
- \_\_\_\_\_

15. What additional continuing dental education topics would you like to see?
- \_\_\_\_\_
- \_\_\_\_\_

If not taking online, mail completed answer sheet to

**Academy of Dental Therapeutics and Stomatology,**  
A Division of PennWell Corp.

P.O. Box 116, Chesterland, OH 44026  
or fax to: (440) 845-3447

**For IMMEDIATE results,**  
**go to [www.ineedce.com](http://www.ineedce.com) to take tests online.**  
**Answer sheets can be faxed with credit card payment to**  
**(440) 845-3447, (216) 398-7922, or (216) 255-6619.**

- Payment of \$49.00 is enclosed.  
**(Checks and credit cards are accepted.)**

If paying by credit card, please complete the following:  MC  Visa  AmEx  Discover

Acct. Number: \_\_\_\_\_

Exp. Date: \_\_\_\_\_

**Charges on your statement will show up as PennWell**

- |                     |                     |
|---------------------|---------------------|
| 1. (A) (B) (C) (D)  | 16. (A) (B) (C) (D) |
| 2. (A) (B) (C) (D)  | 17. (A) (B) (C) (D) |
| 3. (A) (B) (C) (D)  | 18. (A) (B) (C) (D) |
| 4. (A) (B) (C) (D)  | 19. (A) (B) (C) (D) |
| 5. (A) (B) (C) (D)  | 20. (A) (B) (C) (D) |
| 6. (A) (B) (C) (D)  | 21. (A) (B) (C) (D) |
| 7. (A) (B) (C) (D)  | 22. (A) (B) (C) (D) |
| 8. (A) (B) (C) (D)  | 23. (A) (B) (C) (D) |
| 9. (A) (B) (C) (D)  | 24. (A) (B) (C) (D) |
| 10. (A) (B) (C) (D) | 25. (A) (B) (C) (D) |
| 11. (A) (B) (C) (D) | 26. (A) (B) (C) (D) |
| 12. (A) (B) (C) (D) | 27. (A) (B) (C) (D) |
| 13. (A) (B) (C) (D) | 28. (A) (B) (C) (D) |
| 14. (A) (B) (C) (D) | 29. (A) (B) (C) (D) |
| 15. (A) (B) (C) (D) | 30. (A) (B) (C) (D) |

AGD Code 148

## PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

### COURSE EVALUATION and PARTICIPANT FEEDBACK

We encourage participant feedback pertaining to all courses. Please be sure to complete the survey included with the course. Please e-mail all questions to: [hhodges@pennwell.com](mailto:hhodges@pennwell.com).

### INSTRUCTIONS

All questions should have only one answer. Grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a verification form. Verification of Participation forms will be mailed within two weeks after taking an examination.

### COURSE CREDITS/COST

All participants scoring at least 70% on the examination will receive a verification form verifying 2 CE credits. The formal continuing education program of this sponsor is accepted by the AGD for Fellowship/Mastership credit. Please contact PennWell for current term of acceptance. Participants are urged to contact their state dental boards for continuing education requirements. PennWell is a California Provider. The California Provider number is 4527. The cost for courses ranges from \$20.00 to \$110.00.

### PROVIDER INFORMATION

PennWell is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry.

Concerns or complaints about a CE Provider may be directed to the provider or to ADA CERP at [www.ada.org/cotocerp/](http://www.ada.org/cotocerp/).

The PennWell Corporation is designated as an Approved PACE Program Provider by the Academy of General Dentistry. The formal continuing dental education programs of this program provider are accepted by the AGD for Fellowship, Mastership and membership maintenance credit. Approval does not imply acceptance by a state or provincial board of dentistry or AGD endorsement. The current term of approval extends from (11/1/2011) to (10/31/2015) Provider ID# 320452.

### RECORD KEEPING

PennWell maintains records of your successful completion of any exam for a minimum of six years. Please contact our offices for a copy of your continuing education credits report. This report, which will list all credits earned to date, will be generated and mailed to you within five business days of receipt.

Completing a single continuing education course does not provide enough information to give the participant the feeling that s/he is an expert in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

### CANCELLATION/REFUND POLICY

Any participant who is not 100% satisfied with this course can request a full refund by contacting PennWell in writing.

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