Reprocessing of surgical instruments
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As of August 2011

Microsoft Tag Readers

Thanks to the Microsoft Tag Technology, anyone owning a smart phone (Android, Blackberry or iPhone) can now play videos featuring selected Komet products.

The service is easy to use:
All you need to do is to go to your phone’s Internet Browser type in the link:
http://gettag.mobi and follow the directions.
Once the application has been uploaded, you can scan the tags.

Komet goes YouTube

http://www.youtube.com/playlist?list=KOMETonline - our video on instrument reprocessing can now be accessed and played on YouTube under this address.

A film is worth a thousand words - so subscribe now and learn more about the professional use of our instruments!

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As at August 2011
Reprocessing

Hygienic reprocessing of reusable KOMET MEDICAL products

KOMET MEDICAL products are made of high-grade materials and are developed, constructed and manufactured with the greatest of care. Successful reuse and excellent work results can only be achieved by appropriate usage and gentle cleaning and disinfection of the instruments.

Successful reuse means handling the instruments with the greatest of care.

The objective of this guideline on the reprocessing of KOMET MEDICAL products is to protect patients, surgeons and nursing staff from infections caused by contaminated instruments. It is therefore absolutely essential to carry out each individual step of the reprocessing procedure with the utmost care. Another decisive factor is that surgical support staff and CSSD (Central Sterile Supply Department) personnel work closely together, to ensure that the instruments are reprocessed in a quick and efficient manner and are made available once again at the required time.

Validated processes to ensure a reproducible result.

The information provided by KOMET MEDICAL on validated reprocessing is applicable to its entire product range. This can be downloaded from our website www.kometmedical.de.

A reproducible result can be achieved with these validated procedures, thus providing increased protection from infection for both patients and operators. According to §4, section 2 of the German Medical Devices Operator Ordinance (see below), all operators of medical devices are obliged to use a validated method for the reprocessing of instruments.

§4 (Maintenance) of the German Medical Devices Operator Ordinance

“2) The reprocessing of medical devices that are to be used in a low germ or sterile condition – depending on the respective application – is to be carried out using a suitable validated method in line with the manufacturer’s instructions, so that the success of these methods is guaranteed and traceable and the health and safety of patients, operators and third parties are not at risk.…”
Reprocessing

Correct reprocessing is a decisive factor for a successful operation. All KOMET MEDICAL instruments are classed “critical B”, which is why they have to undergo a mechanical cleaning and thermal disinfection cycle, followed by steam sterilisation.

The CSSD is required to treat the instruments in a quick and efficient manner and to return them on time for the next operation in a clean and sterile condition. Any delay could jeopardise the entire schedule. The use of validated methods is absolutely essential as these ensure reliability and the reproducibility of the operation. The use of validated methods is absolutely essential as these ensure reliability and the reproducibility of the operation. Any instruments that are delivered in a non-sterile condition have to undergo the entire reprocessing cycle. After delivery, they should be forwarded to the CSSD. Instruments marked \( \text{Sterile} \) can be accepted directly by the surgical ward and placed into storage in a sterile condition. All disposable products have to be treated with the utmost care so that they are unfit for reuse should be transported separately, ready for immediate disposal.

At the end of a surgical intervention, the instruments are handed over to the CSSD where they will be reprocessed according to a predefined cycle. The reprocessing can either be done in the hospital itself, in an attached CSSD or at an external reprocessing unit. Irrespective of where the reprocessing takes place, it is of the utmost importance that the instruments be prepared properly in the operating theatre. The instruments have to be placed into the correct sieves. Heavy instruments should not be stored on top of light, delicate instruments. Any instruments that are unfit for reuse should be transported separately, ready for immediate disposal.

For successful reprocessing, the following general rules should be followed:
- The instruments should be handled with the greatest of care – both by the surgical support staff and the CSSD.
- Use of validated procedures
- Use of suitable detergents and disinfectants
- Critical evaluation of the instruments’ suitability for further use
- Use of a suitable reprocessing method

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During use and reprocessing, treat reusable instruments with due care:
- Careless handling might cause damage that prevents the reuse of the instruments.
- Instruments that are used as a lever during the operation might bend and run out-of-true. As a result, excessive amounts of tissue would be removed during the next operation.
- Light or sensitive instruments might lose their shape if they are stored under heavy hand pieces.

Reusable instruments that are treated like disposable instruments don’t last very long.

The number of reuses depends on the loads applied to the instrument during the operation and during reprocessing. After each cleaning and disinfection cycle, the instruments must be checked for mechanical damage, in which case they have to be discarded immediately. Imperfect instruments can considerably prolong the time needed for surgery, they can also considerably impair the quality of the operation. These factors cost money, which is why damaged instruments should not leave the CSSD. For more information, turn to page 20.

**Marking on the label:**
- \( \text{Sterile} \)
- \( \text{Sterile} \)
- \( \text{Sterile} \)
- \( \text{Sterile} \)
- \( \text{Sterile} \)

**Fig. 1: Instrument path depending on the marking**

2. Hygiene requirements during the reprocessing of medical devices:
   - Recommendation of the commission for hospital hygiene and infection prevention of the RKI and the BfArM regarding the "Hygienic requirements during the reprocessing of medical products", page 1116 - 1119
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Pre-treatment

Pre-treatment of the instrumentation should already start in the operating theatre. During use, the instruments are contaminated with blood, tissue remnants and saline solution. The chlorides in the solution attack the surface of the steel instruments.

Large remnants of tissue should therefore be removed prior to transport to the CSSD. In principal, it is advantageous to forward contaminated instruments to the reprocessing site as soon as possible, to prevent drying of the contamination.

There are two types of transport to the CSSD. The instruments are either collected in instrument trays after use and transported to the CSSD (dry transport) or they are immersed in a solution containing detergent/disinfectant during the transport in order to prevent the contamination on the instruments from drying (wet transport).

Make sure that the instruments do not suffer any mechanical damage during storage, i.e. delicate instruments should not be stored under heavy hand pieces.

Wet transport should be given preference over dry transport.

We recommend that the instruments be transported to the CSSD in a wet condition, to prevent the contamination on the instruments from drying. The combined detergent/disinfectant should contain an anticorrosive agent to prevent the formation of rust.

This type of transport has the added advantage that the use of detergents/disinfectants protects staff from infections and prevents the transmission of pathogens. For added safety, protective clothing as well as safety glasses and suitable gloves have to be worn to prevent infection 2.

In those cases where dry transport is chosen, the instruments have to be forwarded directly to the CSSD to avoid long waiting times. Dried contamination is difficult to remove and might cause corrosion.

The correct method of disposal has to be chosen for single-use instruments. After the operation, these are not conveyed to the reprocessing cycle but thrown away. In this case, the only aspect to be considered is the protection of the staff from infection. The instrument does not have to be preserved, which is why the wet transport method is to be given preference.

GENIUS Shaver Blades:

GENIUS Shaver Blades must be stripped down into their components during transport in the instrument tray in a wet condition. In the case of the GEXXXX.AC, just pull the inner tube out of the outer tube to separate the components, whereas with models GEXXXX.LI, GEXXXX.DY and GEXXXX.ST, the adapter has to be pulled off the inner tube as well.

During dry transport, the instruments remain in an assembled condition. The unique three-part design of the KOMET MEDICAL GENIUS Shaver Blades allows the inner tubes of all Shavers to be cleaned with plastic brushes. The distinctive construction also enables a visual control of the inner tube, allowing any residual contamination to be detected prior to sterilisation, in which case the instrument has to undergo another cleaning cycle.

The combined pre-cleaning/disinfection process is followed by a cleaning cycle in the CSSD to remove bulk contamination from the instruments. The next step is another disinfection cycle in order to completely disinfect hidden areas that were previously covered by encrusted contamination.

Any chemical disinfectant used must be approved for manual cleaning and disinfection and be effective as per points A and B below.

A: Killing of vegetative bacteria including mycobacteria, fungi and their spores.
B: Deactivation of viruses.
C: Killing of bacterial spores, including the pathogens of anthrax.
D: Killing of bacterial spores, including gas gangrene and tetanus (To kill these spores, make sure to use sterilisation procedures that comply with the relevant standards).3

All KOMET MEDICAL products have to be cleaned and disinfected according to a mechanical procedure using alkaline detergents.

Thermal disinfection – observing the $A_0$ value – should be given preference over chemical disinfection.

We recommend pre-cleaning the blades of our instruments with the help of a plastic brush. Metal brushes can leave undesirable scratches on the surface of the instruments.

The knee saw blades should undergo an extra cleaning step by brushing their entire surface. This is because due to their special structure, contamination might deposit in the gaps. For final rinsing, we recommend demineralised water.

If the instruments have to be immersed in a combined cleaning/disinfecting solution prior to cleaning and disinfection, they can be placed in an alkaline-based bath (with anticorrosive protection). The cleaning performance of alkaline agents remains almost constant even in the case of varying degrees of water hardness. We recommend changing the solution every day or more frequently in the case of heavy contamination, since this might lead to a decrease in the disinfecting effect. In addition, a severely contaminated solution might cause corrosion of the instruments or lead to the displacement of impurities. The same risk exists if the concentration of the solution does not comply with the manufacturer’s instructions.

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1 German magazine: Bundesgesundheitsblatt – Gesundheitsforschung – Gesundheitsschutz 2007
As a basic principle, mechanical cleaning and disinfection procedures should be preferred over manual cleaning and disinfection. This is because validated processes guarantee identical results every time, whereas the quality of manual cleaning depends on human performance—which can vary considerably from person to person.

Detergents should be alkaline but free of aldehydes!

KOMET MEDICAL products can be reprocessed with any detergent and disinfectant with proven material compatibility. The detergents should be alkaline-based and free of aldehydes, to avoid protein fixation on the material— we recommend decohex 28 ALKA ONE (made by the co. Borer Zuchwill, alkaline).

All KOMET MEDICAL instruments are unsuitable for cleaning and disinfection in the chemical disinfectant. We advise against the use of hydrogen peroxide for KOMET MEDICAL GENIUS Shaver blades and Tungsten Carbide instruments.

We recommend using the gentle cycle (e.g. Vario TD) of a washer/disinfector. Please follow the instructions below:
- Fill the washer/disinfector after validation in the CSSD
- Do not overload the mesh trays
- Arrange the instruments in such a way that they are accessible from all sides and no damage can occur
- Do not obstruct the movement of the flexible parts of the washer/disinfector

The GENIUS Shaver Blades:
The GENIUS Shaver Blades must always be subjected to a manual pre-cleaning cycle, which entails the Shaver Blades being stripped down to their component parts.

First of all, superficial contamination must be rinsed off thoroughly. The next step is cleaning the inner and outer tubes by means of plastic brushes with a suitable diameter and an appropriate detergent and disinfectant (e.g. Komet DC1). The final rinse should be carried out with the help of the GENIUSadapters which were specially developed by KOMET MEDICAL for this very purpose.

The Luer-Lock connection at the GENIUSadapter allows the use of a water gun for subsequent rinsing of all blades or trocars with lateral bore hole.

Ultrasound can be used to improve the cleaning effect.

Ultrasound treatment constitutes a mechanical treatment supplementary to manual cleaning and is recommended for particularly stubborn contamination of the instruments as well as sensitive and hard-to-access instruments. For correct dosage of the detergents and length of exposure please refer to the instructions provided by the manufacturer.

The following parameters must be given for a successful ultrasonic treatment:
- The instruments must be fully immersed in the solution.
- Change the solution according to the degree of contamination in order to minimise the risk of corrosion.
- The mesh trays used must not jeopardise the ultrasonic effect.
- Do not overload the mesh trays.
- The instruments must not be allowed to come into contact with each other, in order to prevent damage to the blades.
- Clean specially marked instruments separately.

Once the treatment is completed, rinse instruments first under clear, running water and then with fully demineralised water. Failure to do so may lead to corrosion.

At the end of the ultrasonic treatment, the instrument can be prepared for the mechanical cleaning and disinfection in the washer/disinfector. All KOMET MEDICAL instruments are suitable for mechanical reprocessing.
Mechanical cleaning and disinfection

Thermal disinfection must take place under consideration of the A0 value and in compliance with the relevant national provision (prEN/ISO 15883).

Avoid temperatures of more than 55°C during the cleaning cycle to prevent the risk of protein fixation.

To avoid pitting corrosion caused by an excessive chloride content of the water, we recommend rinsing the instruments with fully demineralised water.

Discolorations caused by residual detergent during the thermal phase in the washer/disinfector can be prevented by using a neutraliser.

A validated procedure for the reprocessing of KOMET MEDICAL instruments can be downloaded from our website www.kometmedical.de at any time. The procedure illustrated on our website shows that after validated reprocessing, KOMET MEDICAL instruments are returned in a perfectly clean and sterile condition, ready for reuse.

GENIUS Shaver Blades:

The new GENIUSadapters allow validated cleaning of the GENIUS Shaver Blades in the cleaning/disinfecting device. The direct water connection provided by the GENIUSadapters guarantees an even and thorough flushing of the Shaver Blades, so that no traces of contamination are left after rinsing.

To use the GENIUS adapter with three-part GENIUS Shaver Blades, the fixture of the blade must be connected to the inner tube.

The GENIUS Shaver Blades are firmly fixed to the GENIUSadapters and then joined to the cleaning/disinfecting device via the Luer-Lock connections. For more detailed information, refer to the assembly instructions which are included with the new GENIUSadapters!

A description of the validated method can be downloaded from our website www.kometmedical.de.
The visual inspection is as important as cleaning, disinfection and sterilisation.

Instruments that are not totally clean must undergo another cleaning and disinfection cycle. Damaged instruments always have to be discarded. The same applies to discoloured instruments in most cases. The following factors decide whether an instrument is fit for reuse or if it has to be re-cleaned or even discarded:

- **Shape:**
  - Due to bent tubes, the instrument cannot be chucked properly into the power system and vibration-free operation cannot be guaranteed.
  - **Disposal**

- **Surface:**
  - Nicks on blades, saws, blades, inner or outer blades of GENIUS Shaver Blades etc.
  - **Disposal**
  - Blunt instrument due to excessive abrasion
  - **Disposal**
  - Residues of corrosion are to be removed in a special cleaning cycle.
  - If the corrosion of an instrument is so far advanced (i.e. pitting corrosion) that its resistance to fracture can no longer be guaranteed, it has to be disposed of.

Discoloration is not a sign of reduced quality, however it indicates:
- that certain procedures are not suitable for the respective instruments.
- that there were contaminations present during the preceding procedures, i.e. residues of medicaments and detergents
- non-conforming treatment such as the omission of the pre-cleaning step, for example in case of new instruments, or inappropriate storage.

Fading of the anodic coating of bur blocks or Shaver Blades does not constitute a reduction in quality.

**Functional capability of Shaver Blades:**

The inner blade or the inner tube with the cutter must always rotate inside the outer blade with ease. If this is not the case, check if the preceding cleaning step has been successful or if there is any damage to the material.

**Disposal**

**To ensure proper control you can download our check list CSSD Shaver Blades from our website! GENIUS Shaver Blades should be lubricated with an oil spray (e.g. Aesculap Sterilit) to minimise friction in the inner tube. The oil should not contain any silicones because these might have a negative effect on the result of the sterilisation. Only a tiny amount of oil should be applied to the inner tube. Surplus oil should be removed immediately with a lint-free cloth.**

**Download this information from our website www.kometmedical.de!**
Sterilisation

With a few exceptions, KOMET MEDICAL products are compatible with the most commonly used methods of sterilisation. The table below provides you with a detailed overview of the compatibility of KOMET MEDICAL products with the most frequently applied methods.

Steam sterilisation is the most effective method for killing germs!

According to the recommendation issued by the German Robert-Koch-institute, thermal sterilisation methods are most effective and should therefore be given preference over all other sterilisation methods. Whatever method you are using, make sure not to overload the mesh trays and ensure that the weight in the sterilisation device is evenly distributed.

Recommendations for suitable sterilisation methods

<table>
<thead>
<tr>
<th>+ suitable</th>
<th>= unsuitable</th>
<th>Sterilisation methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>KOMET MEDICAL Instruments</td>
<td>Autoclave</td>
<td>Plasma</td>
</tr>
<tr>
<td>Rotary steel instruments</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Rotary Tungsten Carbide instruments</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Rotary diamond instruments</td>
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<td>✔</td>
</tr>
<tr>
<td>Saw blades</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>GENIUS Shaver Blades</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Bur block</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>GENIUSbox</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

Storage

To guarantee that instruments remain sterile right up to their use on the patient, store them in dust-free, dry rooms at room temperature without temperature fluctuations. This minimises the risk of damage caused by corrosion during storage.

Packaging

The packaging for sterilisation should be suitable for the sterilisation method used, to ensure that the packaging material can be penetrated by the sterilisation agent (e.g., water vapour).

The packaging must protect its contents during transport and storage.

The instruments are to be packed according to DIN 58 952/58 953. The packaging protects the sterilised goods from microbial recontamination during transport and storage.

The packing units are to be kept as small as possible. They should be provided with labels indicating the contents, date of sterilisation, use-by date, batch number and sterilisation indicator.

The packaging should be suitable for the sterilisation method used, to ensure that the packaging material can be penetrated by the sterilisation agent.

The packaging must protect the instruments from getting bent and from other external factors.
Regrinding

Surgical saw blades are medical devices of class IIa. The range provided by KOMET MEDICAL includes disposable saw blades (KMS series) and reusable saw blades (EZ series). The term reusable comprises reprocessing, i.e. cleaning, disinfection and sterilisation according to a validated procedure – but not a possible regrinding of the saw blades.

Regrinding of or mechanical changes to the saw blades on the instructions of the user, for example the hospital, and carried out by a third party, will have the following consequences:

1. The saw blades of the EZ series will lose their required cutting performance. Making incisions will take longer, which will lead to heat generation on the bone. What’s more, regrinding completely destroys the characteristic cut of the saw teeth which leaves them considerably shorter than in their original condition. The sawing properties of reground saw blades no longer correspond to those of original EZ saw blades.

2. The same applies to KMS knee saw blades which will also lose their required cutting performance after regrinding. Regrinding will considerably shorten the saw teeth, thus decreasing the space required for the removal of bone chips. Again, the reground saw blade no longer corresponds to the original KMS saw blade.

Regrinding the toothing of the saw blades leads to mechanical changes and legal repercussions.

1. Once the saw blade has been reground, all warranty claims against Gebr. Brasseler/KOMET MEDICAL shall be excluded because the instrument made by Gebr. Brasseler/KOMET MEDICAL no longer complies with the strict quality requirements of the Medical Device Act and because the saw blade has lost its required characteristic properties. A considerable loss of quality has to be expected during use. Likewise, we do not assume product liability for reground saw blades.

2. In case of incorrect reprocessing, the user, i.e. the hospital as operator of medical devices as defined by the Medizin-produktenbetreiberverordnung (MPBetreibV) (= Medical Devices Operator Ordinance) is liable for damage (to persons) caused by the use of incorrectly reprocessed saw blades. The hospital is responsible for the correct reprocessing of the medical device.

In this case, all warranty claims against Gebr. Brasseler/KOMET MEDICAL shall be excluded. Likewise, Gebr. Brasseler/KOMET MEDICAL shall not assume product liability or be held liable for claims under the Medical Device Act.
## Troubleshooting – KOMET MEDICAL Instruments

The table below gives you a concrete guide on how to solve frequently occurring problems caused by use or reprocessing:

### Defects and their prevention

<table>
<thead>
<tr>
<th>Defects</th>
<th>Causes</th>
<th>First aid</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitting corrosion</td>
<td>- Chloride content of rinsing water or saline solution during use</td>
<td>Disposal</td>
<td>- Use rinsing water with a low chloride content</td>
</tr>
<tr>
<td></td>
<td>- Use of contaminated saline solution</td>
<td></td>
<td>- Do not allow contamination to dry after use</td>
</tr>
<tr>
<td></td>
<td>- Organic residues (blood, tissue etc.)</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tarnished (brown-violet) surfaces</td>
<td>- Mineral ingredients in the rinsing water or vapour condensate</td>
<td>Removal with special cleaner</td>
<td>- Use fully demineralized water for final rinse</td>
</tr>
<tr>
<td></td>
<td>- Sterilisation temperature too high</td>
<td></td>
<td>- Do not overload the mesh trays and make sure that all instruments are accessible from all sides</td>
</tr>
<tr>
<td></td>
<td>- Use of sterile, contaminated solutions</td>
<td></td>
<td>- Sterilisation temperature &lt;180°C</td>
</tr>
<tr>
<td></td>
<td>- Overcharge of the instrument</td>
<td>Disposal</td>
<td>- Do not add rusty instruments to the load</td>
</tr>
<tr>
<td></td>
<td>- Control rust content in the rinsing water</td>
<td></td>
<td>- Control rust content in the rinsing water</td>
</tr>
<tr>
<td></td>
<td>- Final rinse with fully demineralized water</td>
<td></td>
<td>- Final rinse with fully demineralized water</td>
</tr>
<tr>
<td>Flash rust</td>
<td>- Rust in the rinsing water</td>
<td>Disposal</td>
<td>- Use fully demineralized water for final rinse</td>
</tr>
<tr>
<td></td>
<td>- Other rusty instruments in the load</td>
<td></td>
<td>- Do not overload the mesh trays and make sure that all instruments are accessible from all sides</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Sterilisation temperature &lt;180°C</td>
</tr>
<tr>
<td>Faded colour of the Shaver</td>
<td>- Softened water might attack anodized aluminium during the thermal</td>
<td>No further steps are necessary</td>
<td>- Use rinsing water with a low chloride content</td>
</tr>
<tr>
<td></td>
<td>disinfection</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bent instruments</td>
<td>- Incorrect insertion</td>
<td>Disposal</td>
<td>- Follow manufacturers’ instructions when exchanging instruments</td>
</tr>
<tr>
<td></td>
<td>- Excessive speed</td>
<td></td>
<td>- Observe maximum speed</td>
</tr>
<tr>
<td></td>
<td>- “Tossing” or “dropping” of the instruments</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>- Overloaded mesh tray</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Organic residues (on the instrument(s))</td>
<td>- Unsuitable detergents/disinfectants</td>
<td>Subsequent cleaning and disinfection</td>
<td>- Avoid drying of residues caused by long waiting times</td>
</tr>
<tr>
<td></td>
<td>- Use of old, contaminated cleaning solutions</td>
<td></td>
<td>- Renew cleaning/disinfecting solution more frequently</td>
</tr>
<tr>
<td></td>
<td>- Overcharge of the final rinse</td>
<td></td>
<td>- Rinse with clean, running water. Final rinse with fully demineralized water</td>
</tr>
<tr>
<td></td>
<td>- Encrusted contamination due to dried residues</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>- Sonic shadows</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Organic residues</td>
<td>- No manual pre-cleaning</td>
<td>Subsequent cleaning and disinfection</td>
<td>- Brush the entire structured surface</td>
</tr>
<tr>
<td>Damaged shanks</td>
<td>Instruments can no longer be chuck; chucking marks, burns at the engaging piece</td>
<td>Disposal</td>
<td>- Check, clean and service surgical hand pieces and contra-angles regularly</td>
</tr>
<tr>
<td></td>
<td>- Defect or worn bur shank ends</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>- Defect chucks in the hand piece</td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Water stains caused by lime on the surface of the instrument</td>
<td>- The final rinse with demineralized water has been omitted</td>
<td>Removal with special cleaner</td>
<td>- Use fully demineralized water for final rinse</td>
</tr>
<tr>
<td>Black discoloration</td>
<td>- Unsuitable detergents/disinfectants</td>
<td>Disposal</td>
<td>- Follow the instructions provided by the manufacturers of the detergents/disinfectants</td>
</tr>
<tr>
<td>of the Tungsten Carbide instrument head</td>
<td>- Incorrect dosage</td>
<td></td>
<td>- Do not exceed the indicated immersion time</td>
</tr>
<tr>
<td>Rounded blades and metal abrasion</td>
<td>- Overcharge of the instrument</td>
<td>Disposal</td>
<td>- Careful monitoring of the blades during reprocessing</td>
</tr>
<tr>
<td></td>
<td>- Overcharge of the saw blade</td>
<td></td>
<td>- Exchange during the operation if the saw blade only cuts if high contact pressure is applied and if excessive heat generation is to be expected</td>
</tr>
<tr>
<td>Fracture</td>
<td>- Overcharge of the instruments</td>
<td>Disposal</td>
<td>- Avoid blockages during use</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Avoid leverage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Do not use for work on metal</td>
</tr>
<tr>
<td>Missing diamond coating</td>
<td>- Coating has worn off during use</td>
<td>Disposal</td>
<td>- Careful monitoring of the blades during reprocessing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Exchange during the operation in case of excessive heat generation and a simultaneous decrease of the cutting performance</td>
</tr>
<tr>
<td>Metal abrasion</td>
<td>- Overcharge of the Shaver</td>
<td>Disposal</td>
<td>- Apply oil to the inner tube prior to sterilisation      (see page 15)</td>
</tr>
<tr>
<td></td>
<td>- Leverage during use</td>
<td></td>
<td>- Replace instrument in case of blade fatigue</td>
</tr>
<tr>
<td>Bent external teeth</td>
<td>- Clashes with metal during use (e.g. saw guides)</td>
<td>Disposal</td>
<td>- Make sure that the blades do not come in contact with metal during the operation</td>
</tr>
</tbody>
</table>

In principle, the instruments can be reprocessed as often as wear and tear incurred during surgery allows. The degree of deterioration depends on the contact pressure applied during the operation, the consistency of the bone tissue and how long the instrument is used for during the operation.