

Handheld Surgical Instruments

Care, Handling and Maintenance

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AESCULAP®

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Discussion Points

- ▶ What is Stainless Steel?
- ▶ What makes a good instrument?
- ▶ Why do some instruments have gold handles?
- ▶ How to treat new instruments “out of the package”
- ▶ Why older instruments sometimes look better than new instruments

Discussion Points

- ▶ Key factors in surgical instrument reprocessing - both MDR and OR
- ▶ How an instrument should function
- ▶ What should be repaired

What is Stainless Steel

- ▶ A high grade steel that can Stain, Rust, Pit and Crack if subjected to adverse environments
- ▶ Many factors can influence the outcome of high quality handheld surgical instruments
- ▶ When you think of Stainless Steel think:

Stain.....Less

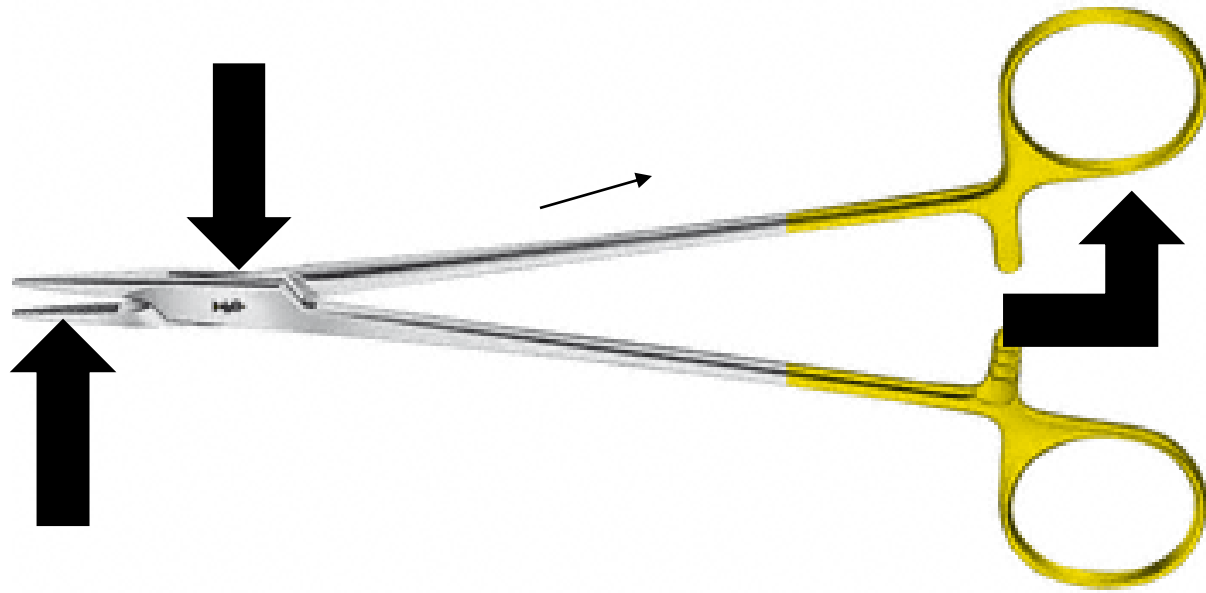
What is Stainless Steel

- ▶ A selected high grade steel (420 grade) consisting of:
 1. Carbon steel
 2. Between 12 and 15% Chromium - the anti-corrosion factor - 12% is regulated
 3. Other elements depending on how sharp and flexible the instrument requires

What makes a Good Instrument

- ▶ 420 Grade steel - Softer steel doesn't sharpen as well or stay sharp as long
- ▶ Chromium content - 20% provides greater anticorrosion effect
- ▶ Pins and Screws should be the same composition
- ▶ High quality TC inserts (**inserts**)
- ▶ Consistent Patterns (**patterns**)
- ▶ Warranty - how to identify (**Instrument coding**)

TC Inserts and Gold Handles



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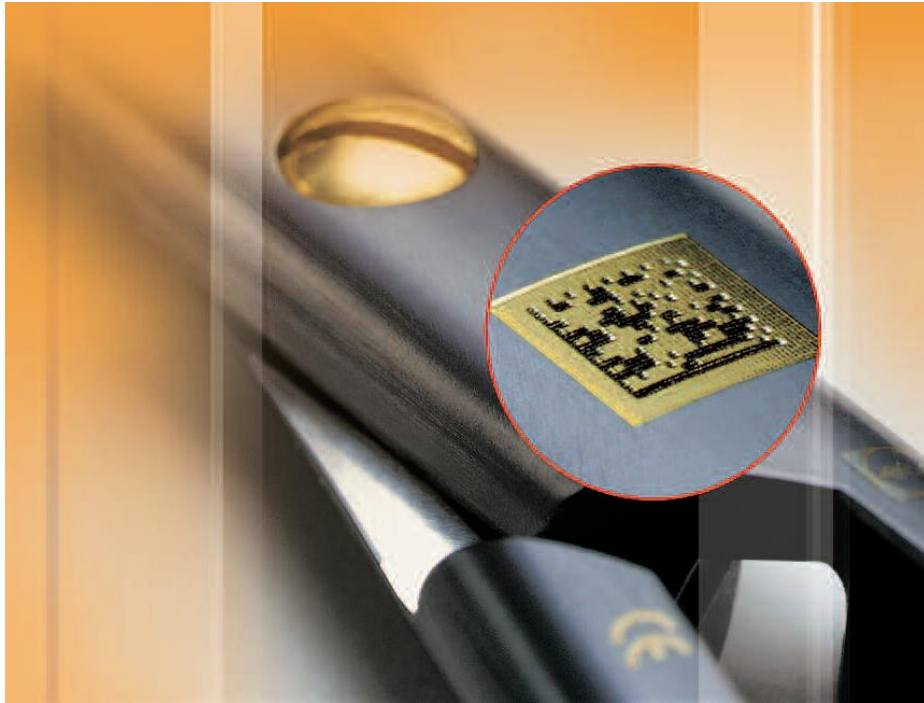
Pattern Consistency



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Machine-Readable Individual Instrument Coding



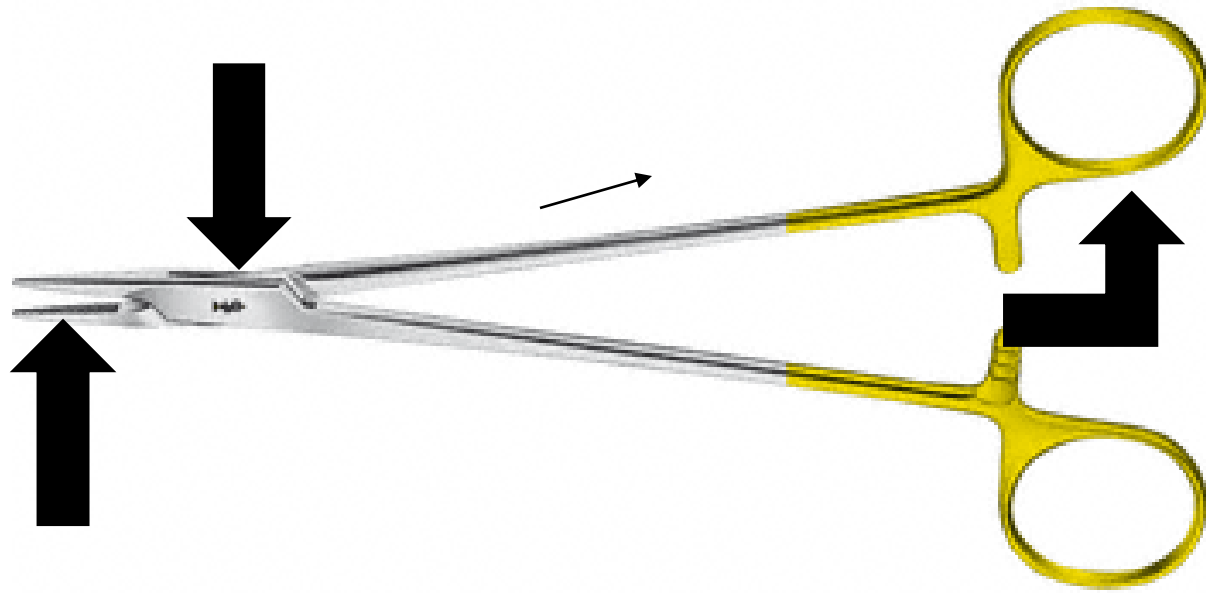
Crucial advantages
for customers
through DATA
MATRIX coding

Each Instrument
marked with a tracking
code is uniquely
identifiable

Why do some Instruments have Gold Handles?

- ▶ Gold handled instruments have inserts which are harder than any stainless steel - inserts are made of tungsten carbide
- ▶ Tungsten carbide is mostly seen on needle drivers and scissors
- ▶ Tungsten carbide allows for better holding capability for needle drivers and a sharper edge for scissors that will stay sharper longer
- ▶ Warranty is typically 3 years on TC inserts
- ▶ Results in better holding power + sharper cutting edge

TC Inserts and Gold Handles



How to treat new instruments “out of the package”

- ▶ All new instruments have a protectant (oil) just like new cars
- ▶ All new instruments could have “filings” on the new instrument from the manufacturing process
- ▶ Therefore.....all new instruments once removed from their package need to be completely washed as per contaminated instruments at least 1-2 times prior to sterilization to eliminate any baking of the “oils” on the instrument

Why older instruments sometimes look better than new instruments

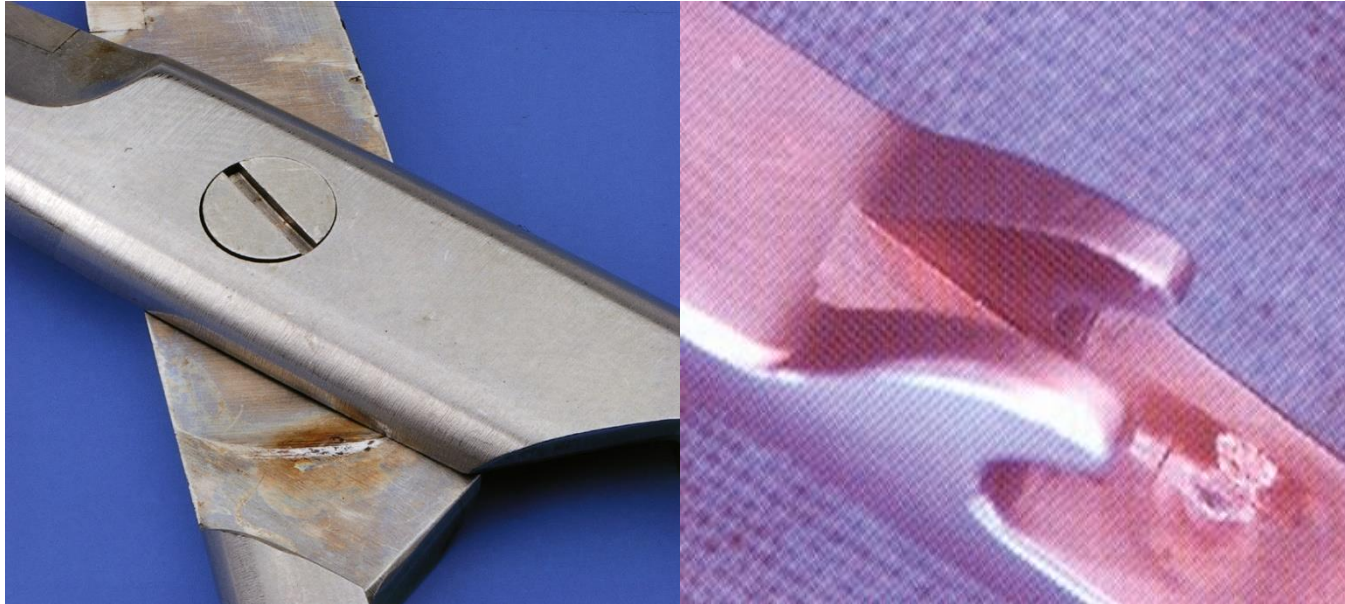
- ▶ **The Passivation Layer** - a protective chemical layer on the external surface of an instrument - like a “clear coat” on a car
- ▶ **The Passivation Layer** - a chemical reaction between the chromium alloy in the stainless steel and oxygen in the air - the greater amount of chromium in the instrument the better the passivation layer
- ▶ **Passivation Layer** - becomes thicker over the life of an instrument and therefore better protects the instrument surface from it's harsh environment - older instruments look better.
- ▶ **Passivation Layer** - on new instruments it's thinner and therefore more susceptible to an initial poorer outward appearance
- ▶ Typically as quality instruments get older they improve their appearance provided proper processing techniques are utilized

Key Factors in Surgical Instrument Reprocessing for the MDR

- ▶ **Water** - Demineralized water should be used as a minimum for the final rinse
- ▶ **Lubrication** - essential (**fretting corrosion**)
- ▶ **Avoid Metal cleaning brushes** - destroys the protective passivation layer
- ▶ **Cleaning of instruments asap** - within 6 hours (enzymatic may be required)
- ▶ Instruments should be as dry as possible prior to the sterilization cycle (lumens to be moist)
- ▶ Process instruments in the “open” position (**stress corrosion**)
- ▶ Follow manufacturer detergent instructions
- ▶ Correct loading for machine based processes



Fretting Corrosion - Insufficient Lubrication = can cause metal abrasion which destroys the passivation layer

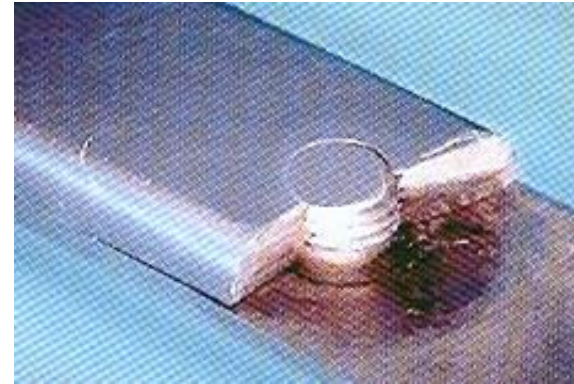
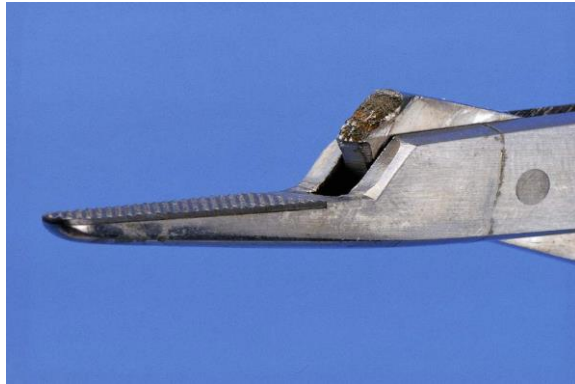


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**Stress Corrosion - Manufacturing = Poor Rivet/Pin Construction
and/or
Cleaning/processing in a high state of tension (ratchet in closed
position)**



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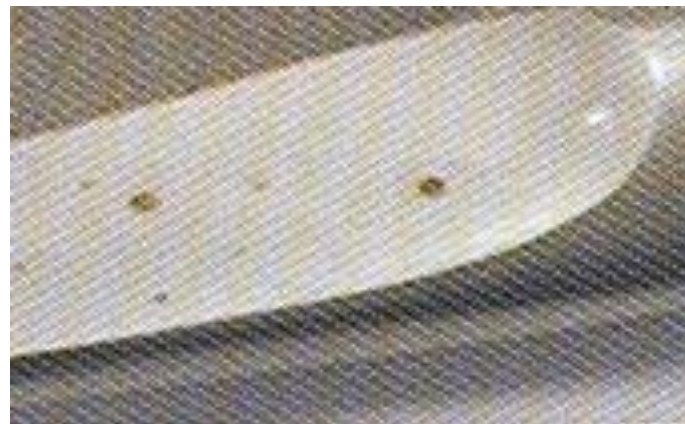
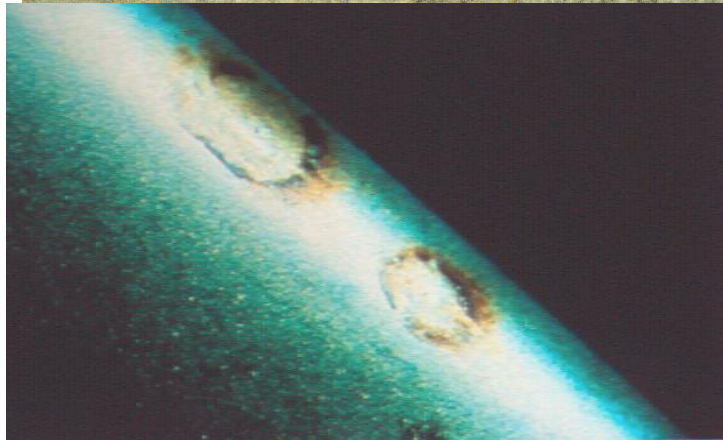
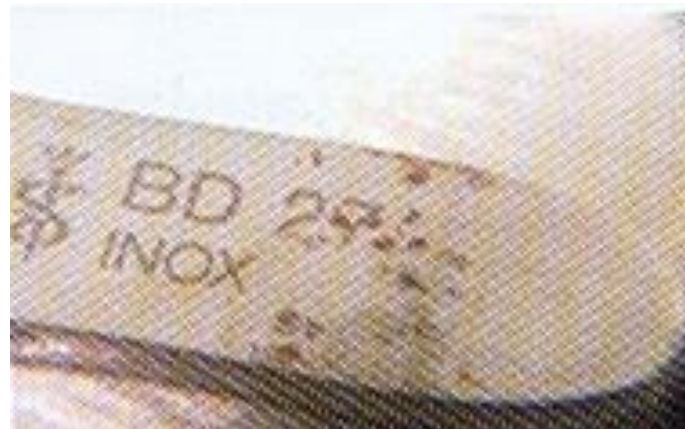
Key Factors in Surgical Instrument Reprocessing for the OR

- ▶ Do not use “Saline” solutions to wipe down or rinse instruments - This will destroy the best of instruments.
- ▶ (**Pitting corrosion**)
- ▶ In long cases wipe or rinse instruments with demineralized water to remove surgical debris and to include blood, pus and iodine tinctures to prevent attack on the passive surface of the instrument. Used instruments should be sent for reprocessing asap after the surgical procedure



Salt Solutions

Pitting Corrosion - Chloride (salt) exposure = results from dried bioburden, exposure to salt solutions. New instruments with a thin passive layer are most susceptible to pitting damage



Key Factors in Surgical Instrument Reprocessing for the OR

- ▶ Dry disposal of instruments is recommended over wet disposal - do not leave for long periods in water (bloody solutions)
- ▶ Use of an enzymatic is recommended if instruments are left in the OR for an extended period - should not exceed 2 hours and instruments should be reprocessed within 6 hours
- ▶ The right instrument should be used for the right job

How an Instrument Should Function - Repair Tests

Hands On Testing

1. Scissors
2. Needle Drivers
3. Hemostats
4. Tissue Forceps
5. Curette
6. Rongeurs, Kerrisons

Scissor



Dissecting & Cutting Instruments

- ▶ Include Scissors, Scalpels, Knives, Cutters & Saws

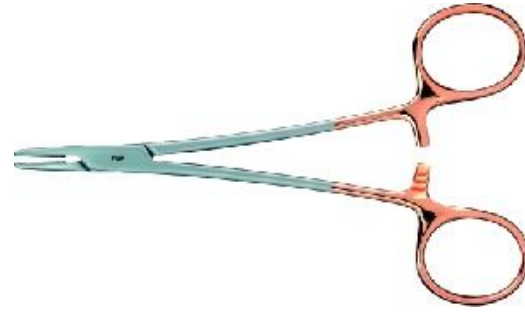
Functions

- ▶ Dissection instruments have sharp edges which are designed to cut, incise, separate & excise tissue

How to Test Scissors for Proper Function

- ▶ For sharpness & proper alignment cut a surgeons glove from the mid-point of the scissors blade to the distal end. The scissor should easily cut the glove without producing a “snag” or a chewing feeling between the blades. If a snag is felt the scissor is dull and requires to be sharpened
- ▶ Open the scissors & hold the bottom ring - then drop the top ring. The distal tips of the blades should remain $\frac{1}{2}$ to $\frac{1}{3}$ open when the top ring is dropped. Blades are too loose if they close completely & too tight if they close less than $\frac{1}{3}$ to $\frac{1}{2}$. If this doesn't occur the scissor requires repair

Needle Driver



Closure & Approximation Instruments

- ▶ Include Needle Holders & Staplers

Functions

- ▶ Designed to grasp & hold curved surgical needles. The size of the needle holder jaw should match the size of the needle (heavy jaws for large needles - slim jaws for small needles)
- ▶ **How to Test for Proper Function**
- ▶ When the jaw tips touch, the ratchets should just touch on the 1st ratchet
- ▶ With the jaw tips touching at the 1st ratchet position light should be seen through the serrations
- ▶ With the jaw tips fully closed no light should be seen through the serrations
- ▶ Close the jaws on a piece of tin foil - on both sides of the tin foil an even mesh pattern should be visible with “no gaps”
- ▶ Repair is necessary if the instrument does not perform as above

Hemostat - Forceps



Clamping & Occluding Forceps

- ▶ Instruments that clamp & occlude to apply pressure
- ▶ May be designed to crush the structure upon application (traumatic) or non-crushing (atraumatic)
- ▶ Instruments include Hemostats (Crile & Kelly), Pean Forceps, Rochester Pean Forceps, Kockers, Hysterectomy Clamps, etc

Functions

- ▶ Crushing Hemostatic Clamps (Crile, Kelly, Pean Forcep, Rochester Pean, Kockers) are traumatic and typically used to crush tissues or clamp blood vessels
- ▶ Non- crushing Clamps (atraumatic) are used to occlude tissues such as bowel and/or temporary occlusion of major blood vessels - instruments would include vessel clips, bulldog clamps for blood vessels and Cooley or DeBakey style Clamps for tissues such as bowel

How to Test for Proper Function

- ▶ When the 1st ratchet touches the tips of the jaws should touch for standard hemostats. Also the jaws should close gradually in 3rds as the clamp is ratcheted down
- ▶ When the ratchet is completely closed the jaw is completely closed
- ▶ Open the hemostat & hold onto the top ring handle and then drop the bottom ring. The handle should not swing freely but move with minimal effort
- ▶ Vascular clamps are an exception and should have the distal tips touching only when the ratcheted handle is closed to the middle of the ratchet. This allows more precision for controlled occlusion

Tissue Forcep



Dissecting & Holding (Tissue) Instruments

- ▶ Instruments that are used for dissecting, holding and maneuvering tissue.
- ▶ Included are instruments such as Adson forceps, Dressing Forceps, Tissue Forceps, Allis Forceps and Babcock forceps, Lahey forceps, etc

Functions

- ▶ Delicate forceps are used to hold eye tissues
- ▶ Adson type forceps are used to pick up or hold soft tissues in approximation during closing
- ▶ Tissue forceps (Thumb forceps) look like tweezers and are used for holding tissues including skin
- ▶ Allis forceps are used for holding & retracting tissues with their interlocking teeth and allow maximum holding power.....they are traumatic
- ▶ Babcocks are used where compressibility of tissues is essential w/o damaging tissue.....fallopian tube, bowel are areas where Babcocks are used

How to Test for Proper Function

- ▶ Adson and Tissue forceps (look like tweezers). The tips should come together nicely & the shanks should have good tension but not too tight or too flat for good use
- ▶ Allis tissue forceps should drag across a piece of paper and have visibility of the teeth marks but no perforation of the paper

Curette



Bone Curettes

- ▶ Used to scrape away or remove fibrous tissue or other debris from bone. May also be used to scrape bone

Functions

- ▶ Same as above

How to Test for Proper Function

- ▶ Use a plastic barrel from a syringe and run the curette down the side of the barrel. If sharp you should be able to see filings from the side of the syringe barrel

Kerrison



Kerrisons (Clowers) & Rongeurs

- ▶ Used for spinal procedures & orthopedic procedures to gouge out bone

Functions

- ▶ Same as above

How to Test for Proper Function

- ▶ Take a business card and place in the jaws of the kerrison or rongeur. Close the jaw firmly against the business card and release. A piece of business card with the exact shape of the jaw tip should be cut evenly from the card. If only an indentation is discovered the instrument is tearing and not cutting as designed

Thank You!

Questions??