



**R O C K M O R E**  
**I N T E R N A T I O N A L**

*Rock Drilling Tools*



# Failure Troubleshooting

- Drill Bits – Top Hammer and DTH
- Drill Rods – Hand-held, Extension, and Drift & Tunneling
- Couplings & Coupling Adapters
- Shank Adapters



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# Common Problems

ROCKMORE's rock drilling tools are manufactured to the highest quality standards. Even in the most challenging environments that rock drilling can offer, our products will exhibit expected performance.

The most common causes of failure are:

- Improper working practices
- Incorrect service operations
- Poor operating procedures
- Extreme field conditions
- Incorrect tool selection for required rock conditions



**R O C K M O R E**  
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*Rock Drilling Tools*

Failure Troubleshooting

***Drill Bits***

Top Hammer and DTH



# Drill Bits: Top Hammer and DTH - Proper Maintenance -

Drill bits will last longer and cut faster when carbides are sharpened and the steel matrix is properly maintained.

Button carbides should be sharpened when they attain flats that are 1/4 (one quarter) of their major diameter. Blade carbide should be sharpened when it attains flats that are no greater than 1/8" or 3.175 mm.

Dull carbide buttons will drill slower and fatigue faster, encouraging failure of the carbides and the steel matrix.

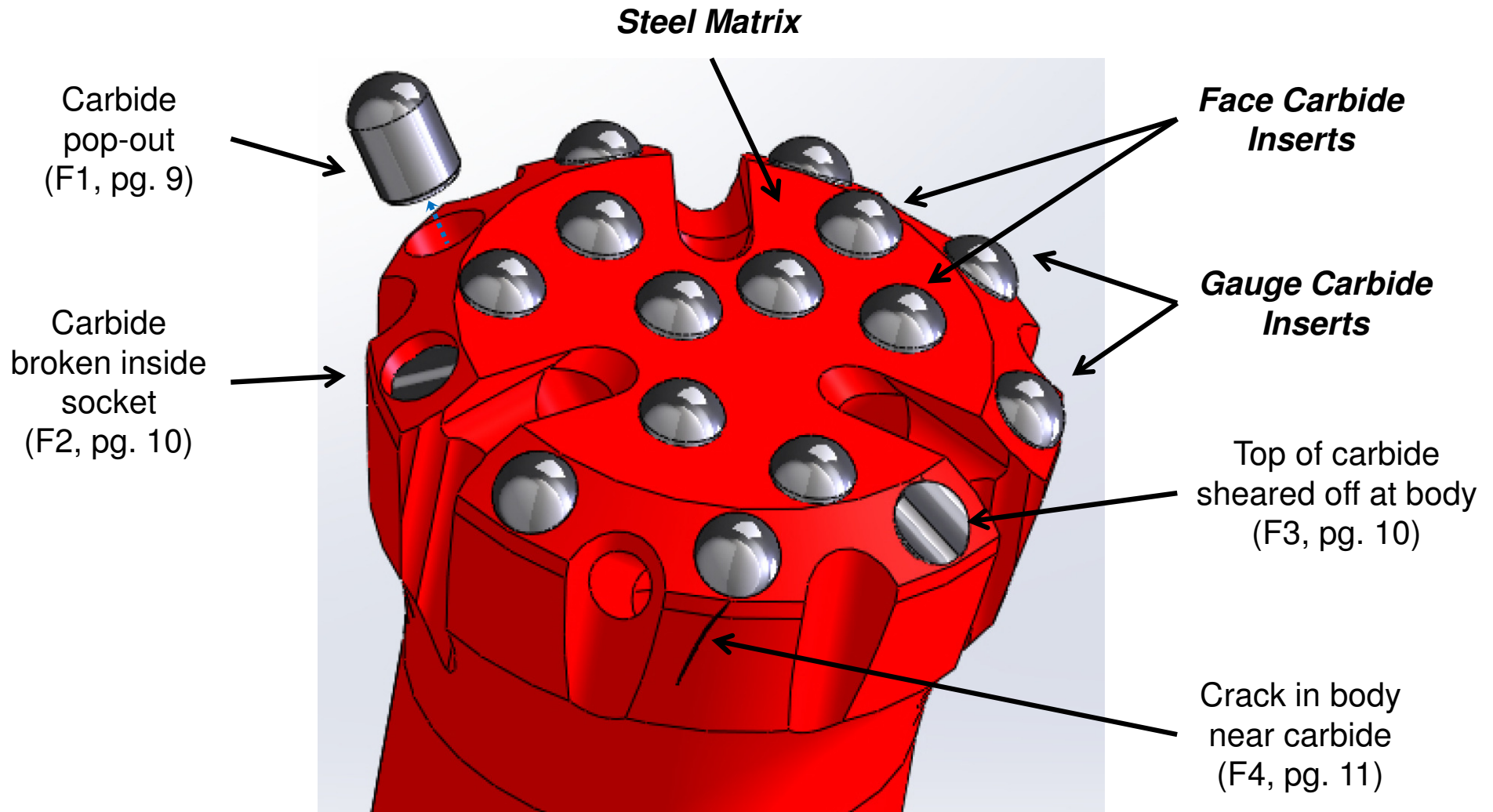
Before drilling, inspect the condition and lubrication of all drill string components, including the hammer or drifter. Replace any worn out parts, following manufacturer's recommended discard limits closely.



# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Common Problems & Failures

Diagram 1 of 3







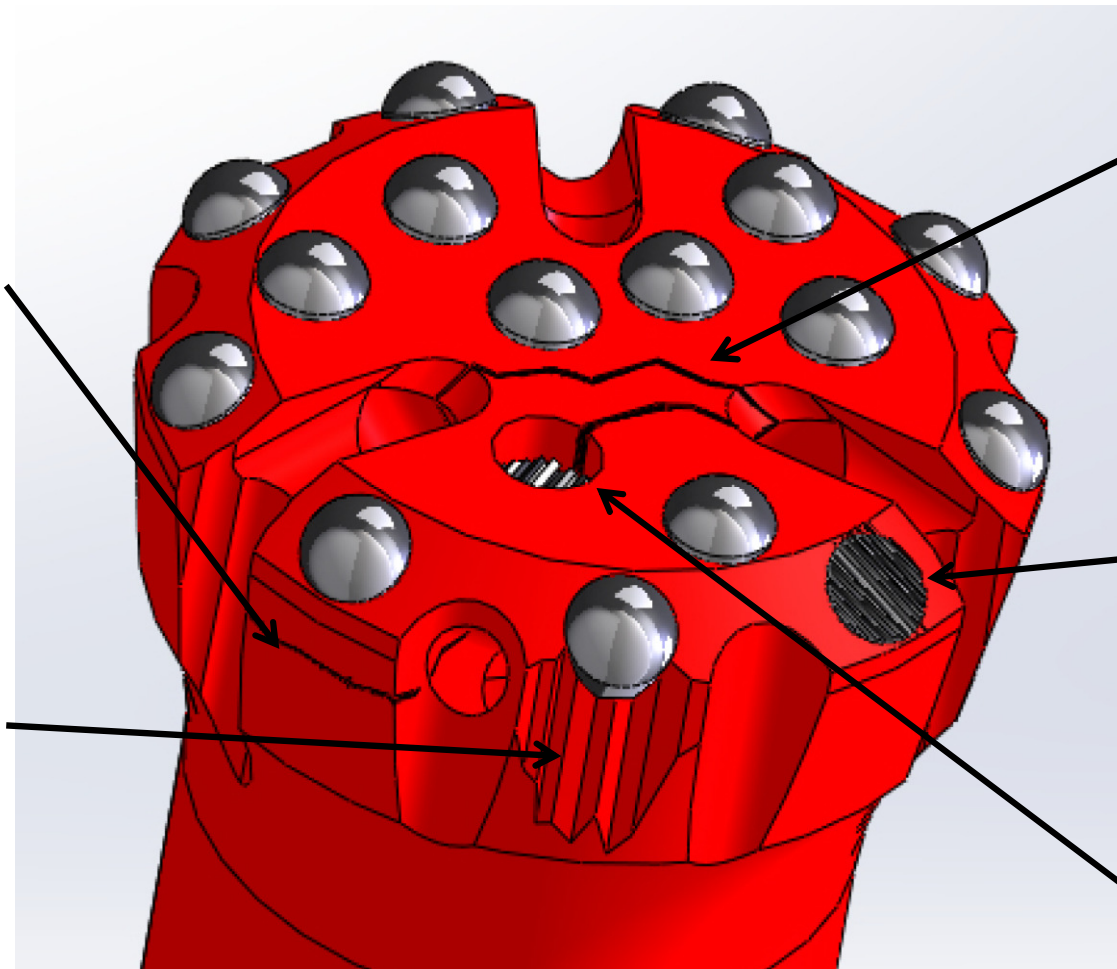
# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Common Problems & Failures

Diagram 2 of 3

Crack in body  
originating from  
bottom of carbide  
socket  
(F5, pg. 11)

Carbide intact,  
surrounding matrix  
damaged  
(F6, pg. 11)



Crack on face  
between flushing  
holes, flushing hole  
and carbide, or  
between carbides  
(F7, pg. 12)

Top of carbide  
crushed down to  
level of body  
(F8, pg. 13)

Carbide crushed  
inside body  
(F9, pg. 13)



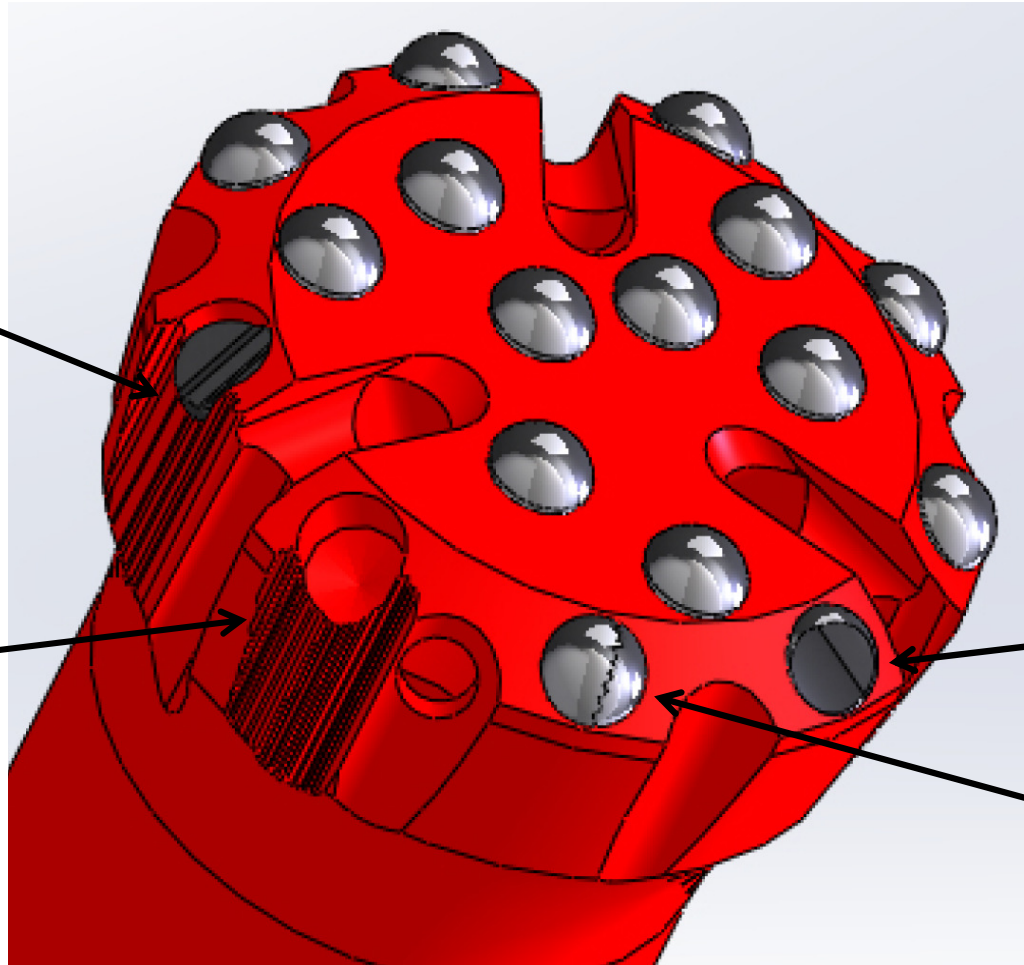
# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Common Problems & Failures

Diagram 3 of 3

Carbide partially missing,  
surrounding matrix  
damaged  
(F10, pg. 14)

Carbide completely missing,  
surrounding matrix  
damaged  
(F11, pg. 14)



Carbide chipped  
(F12, pg. 15)

Carbide cracked  
(F13, pg. 15)





# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

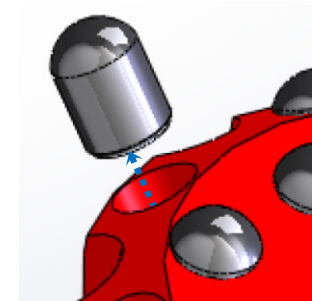
## Failure: Carbide pop-out

### Cause of failure:

- Excessive body wash
- Excessive bit body grinding
- Drilling in very soft or extremely abrasive conditions
- Drilling in excessive unconsolidated rock
- Excessive energy produced by the piston or drifter
- Insufficient feed pressure
- Back hammering / dry firing

### Action required:

- See page 17 for body wash problems
- Follow proper carbide sharpening procedures to avoid over grinding bit body; replace worn out bits
- Adjust drilling parameters to rock conditions
- Adjust feed pressure to rock conditions
- Stop percussion until the bit is in full contact with rock



**F1**

(see pg. 6)



# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

Failures:

Carbide broken inside socket &  
Top of carbide sheared off at body

Cause of failures:

- Over heating of the bit
- Drilling with flat carbides
- Forceful rotation against obstacles in rock

Action required:

- Adjust rotation speed and other drilling parameters to rock conditions
- Sharpen dull carbides, following proper carbide sharpening procedures
- Adjust feed pressure to rock conditions; in difficult drilling conditions--such as loose or fractured material, or when encountering obstructions--use already damaged bits to avoid damaging bits in good condition



F2

(see pg. 6)



F3

(see pg. 6)



# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Problems:

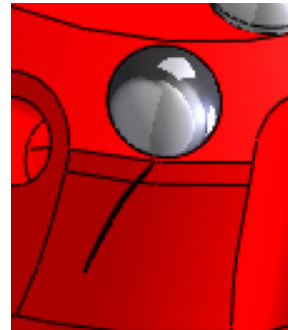
Crack in body near carbide; Crack in body originating from bottom of carbide socket; & Carbide intact, surrounding matrix missing

### Cause of problems:

- Excessive interference between the bit and the carbide

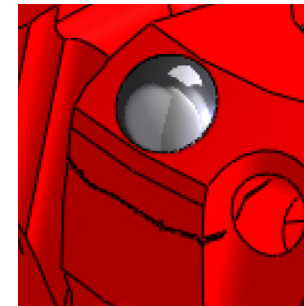
### Action required:

- Return to manufacturer for analysis



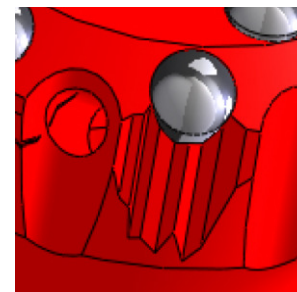
F4

(see pg. 6)



F5

(see pg. 7)



F6

(see pg. 7)



## Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

### Problems:

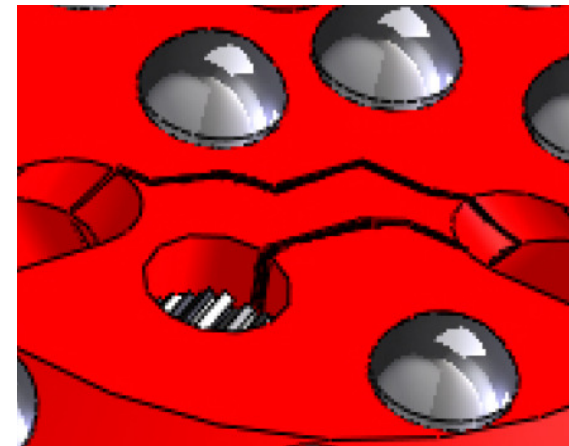
Crack on face between flushing holes, flushing hole and carbide, or between carbides

#### Cause of problems:

- Excessive feed force
- Drilling with flat carbides

#### Action required:

- Adjust feed force to rock conditions
- Sharpen dull carbides, following proper carbide sharpening procedures



F7

(see pg. 7)



# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Failures:

Top of carbide crushed down to level of body &  
Carbide crushed inside body

### Cause of failures:

- Over drilling in a non-abrasive rock, such as limestone
- Improper carbide grinding intervals
- Excessive carbide protrusion from poor grinding practices

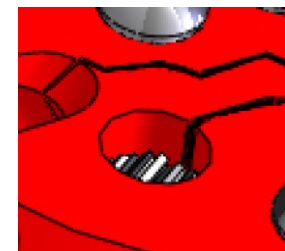
### Action required:

- Inspect carbides frequently for snake skin wear pattern (see page 18)
- Shorten grinding intervals when drilling in non-abrasive rock
- Sharpen carbides when dull or micro cracks begin to form, following proper carbide sharpening procedures
- When sharpening carbides do not remove excessive body; carbides should not protrude more than 3/4 of the carbide diameter



F8

(see pg. 7)



F9

(see pg. 7)



## Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

### Failures:

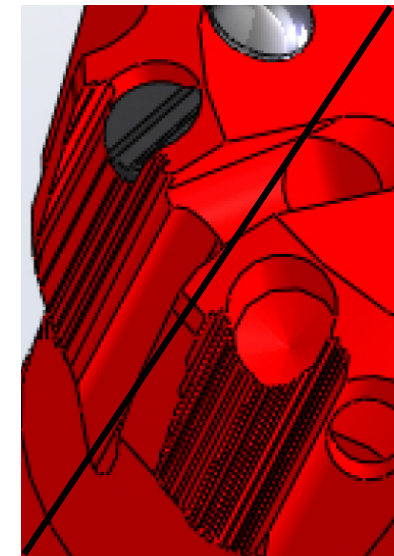
Carbide partially missing, surrounding matrix damaged & Carbide completely missing, surrounding matrix damaged

#### Cause of failures:

- Over drilling of bit
- Drilling with flat carbides
- Improper grinding intervals
- Drilling with a bit already missing carbide

#### Action required:

- Inspect carbides more frequently
- Sharpen dull carbides, following proper carbide sharpening procedures
- Increase grinding intervals
- Discard and replace worn out or damaged bits



**F10**

(see pg. 8)

**F11**

(see pg. 8)





# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Failures: Carbide chipped & Carbide cracked

### Cause of failures:

- Over drilling of bit
- Drilling in a non-abrasive rock
- Improper grinding intervals
- Carbide grade too hard for the rock condition
- Slow rotation and bit is not positioned into solid rock

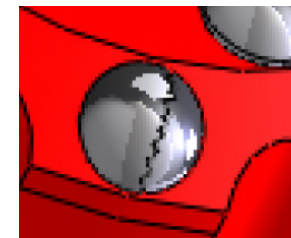
### Action required:

- Inspect carbides frequently for snake skin wear pattern (see page 18)
- Sharpen carbides when dull or micro cracks begin to form, following proper carbide sharpening procedures
- Select bits with suitable carbide hardness for drilling application
- Do not start percussion until the bit is in full contact with rock



**F12**

(see pg. 8)



**F13**

(see pg. 8)



# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

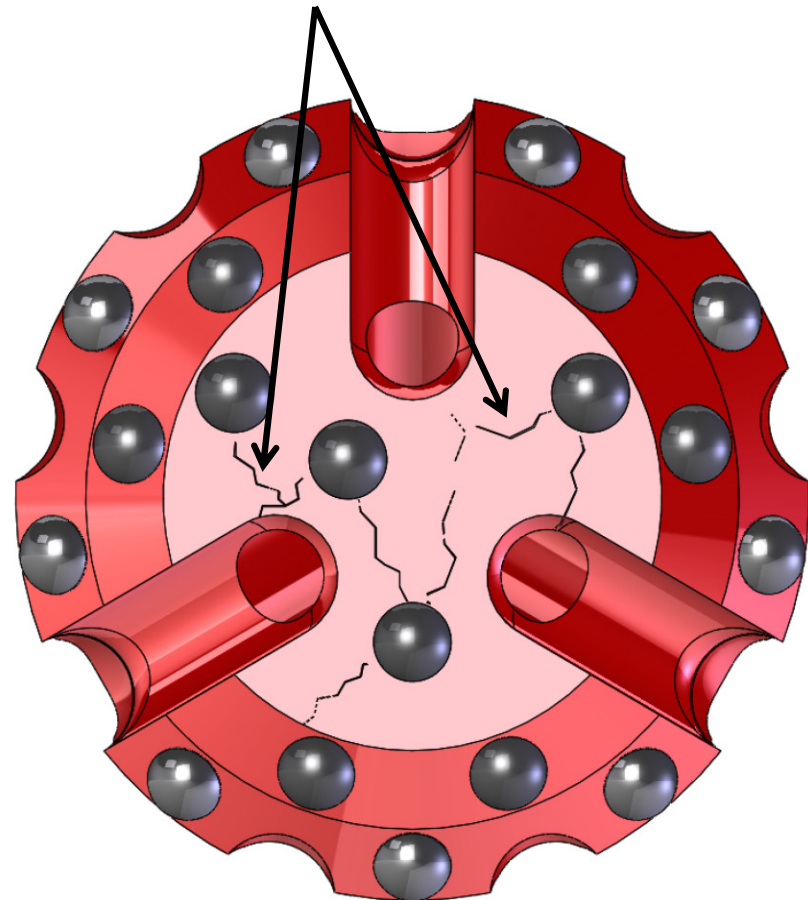
## Problem: Face cracking

Cause of problem:

- Excessive feed force

Action required:

- Reduce feed force until the carbides engage in the rock
- When drilling deep holes, “pull back” may need to be used to compensate for the weight of the drill string pushing on the bit excessively





# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

Problem:

Body wash – Excessive steel wear on the  
bit body and bit face

Cause of problem:

- Drilling in extremely abrasive conditions

Action required:

- Slow rotation as much as possible to help create larger cuttings that will flush up the hole more efficiently
- Maximize flushing
- Use drilling foam to help flush or lift the rock cuttings
- Clean drill holes regularly
- Adjust hammer choke to reduce up-hole velocity of rock cuttings





# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

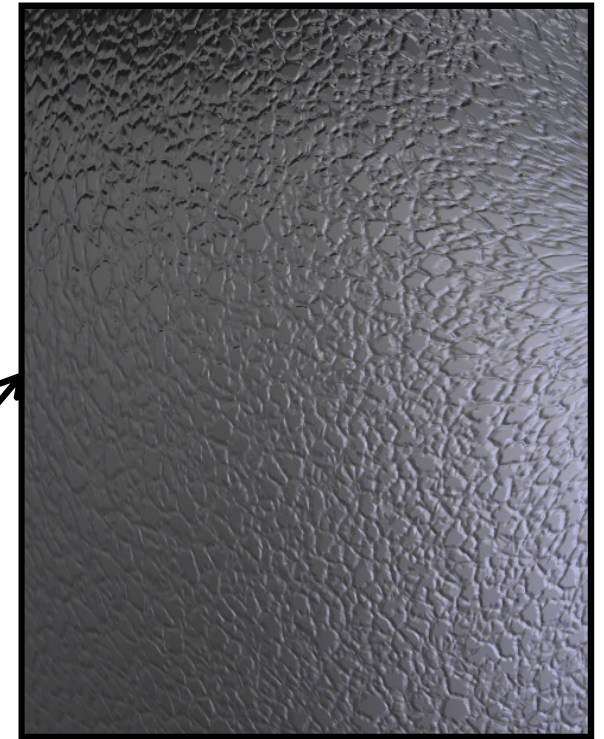
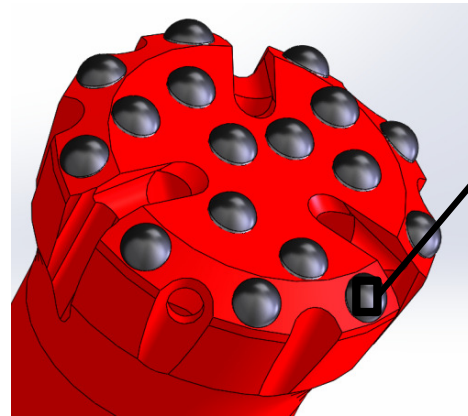
Problem:  
Carbide snake skin wear pattern \*

Cause of problem:

- Drilling in a non-abrasive rock, such as limestone
- Improper carbide grinding intervals

Action required:

- Inspect carbides frequently
- Shorten grinding intervals when drilling in non-abrasive rock
- Sharpen carbides when dull or micro cracks begin to form, following proper carbide sharpening procedures



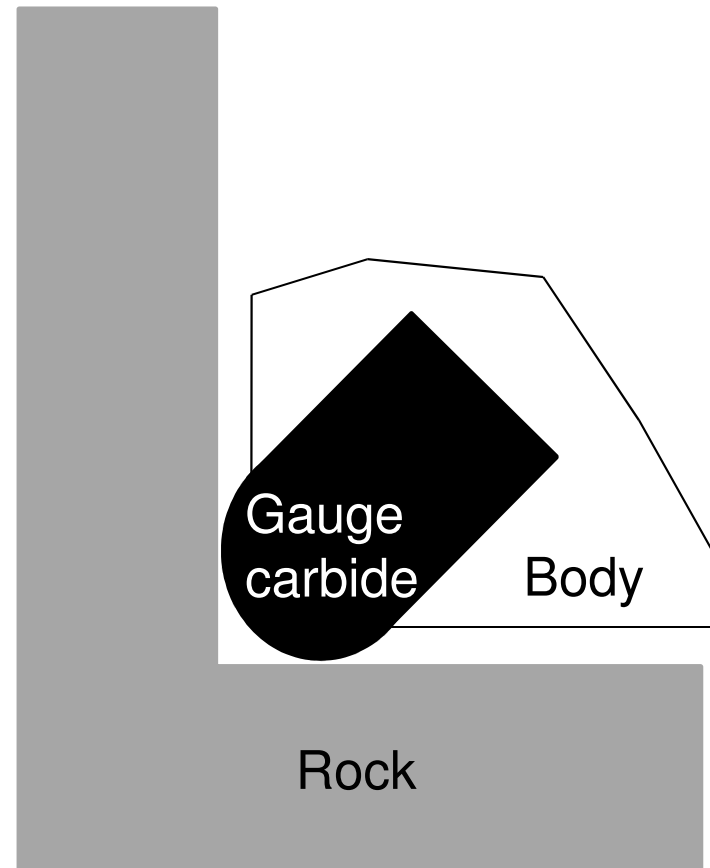
\* Snake skin is a wear pattern of micro cracks that develop from drilling fatigue in non-abrasive rock. The cracks will eventually penetrate deeper and cause large chunks to break away, see F8, F9, F12, & F13.



# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Dynamics

Diagram 1 of 2



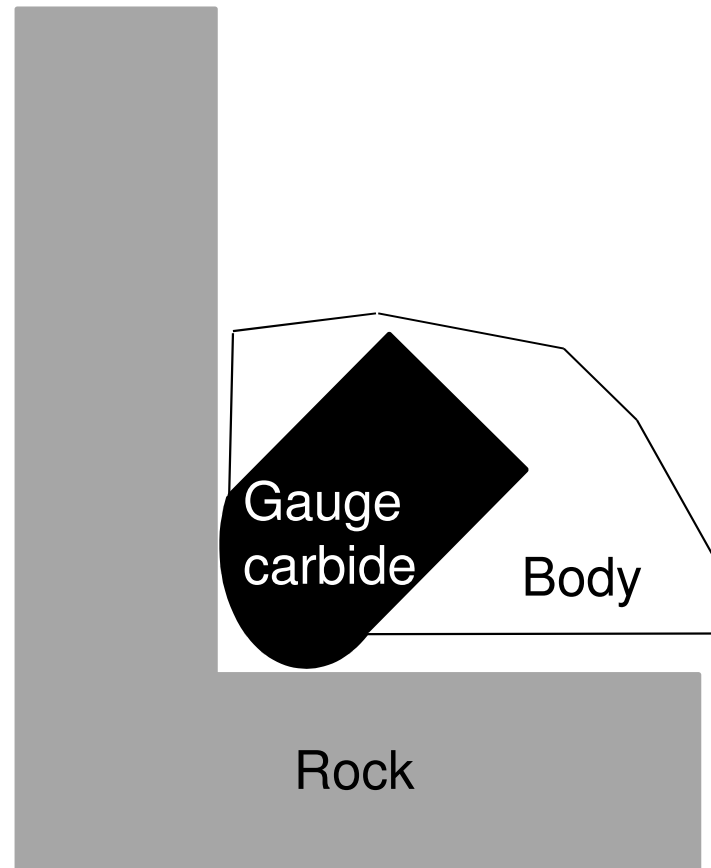
Carbide buttons are designed to resist compressive forces not shear forces.



# Drill Bits: Top Hammer and DTH - Button Carbide Bits – Head -

## Dynamics

Diagram 2 of 2



As the carbide buttons starts to wear, they develop a flat surface. As the flat enlarges the load on the carbide changes from compressive to shear.

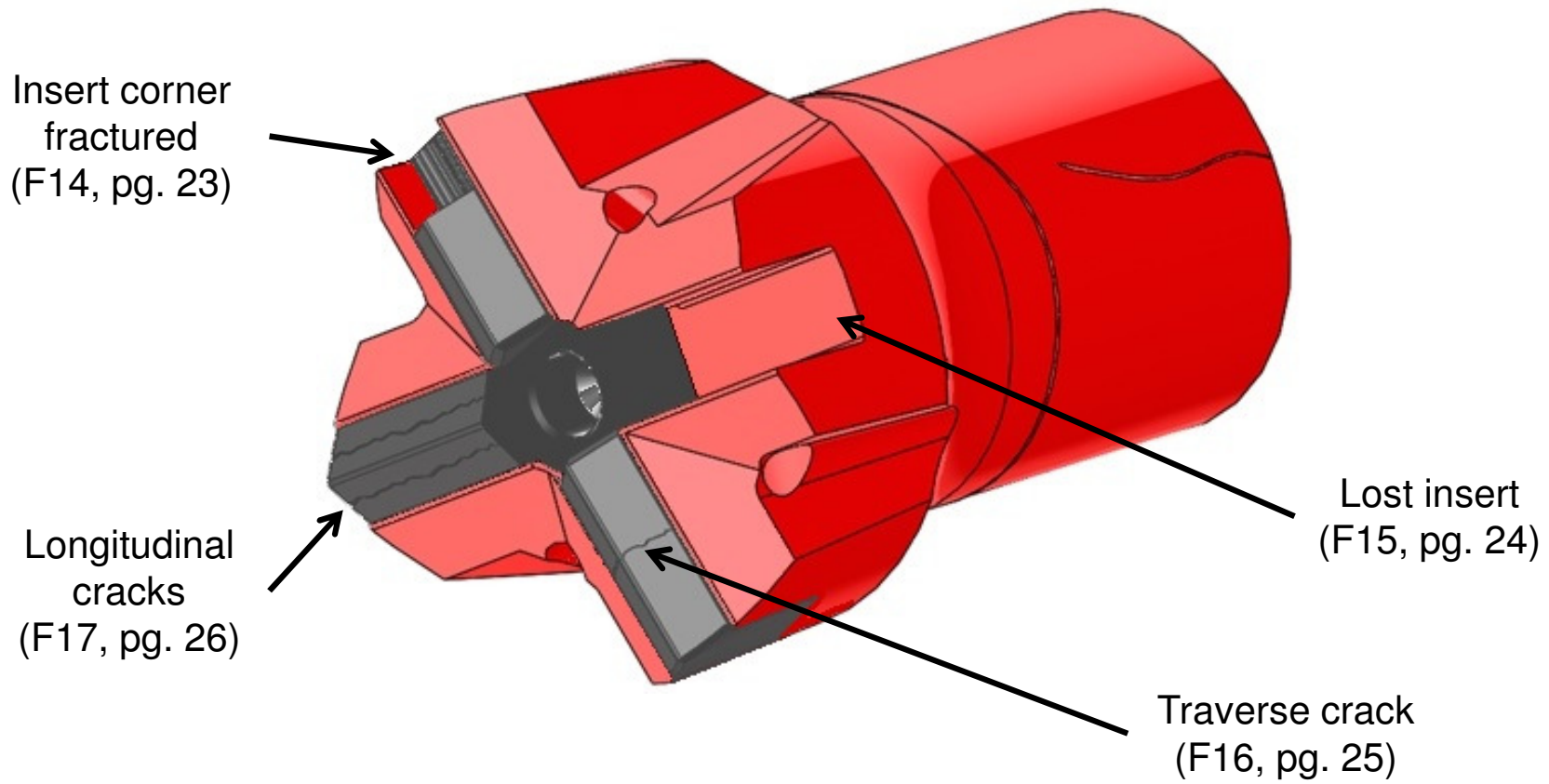




# Drill Bits: Top Hammer - Cross (Blade Carbide) Bits – Head -

## Common Problems & Failures

Diagram 1 of 2



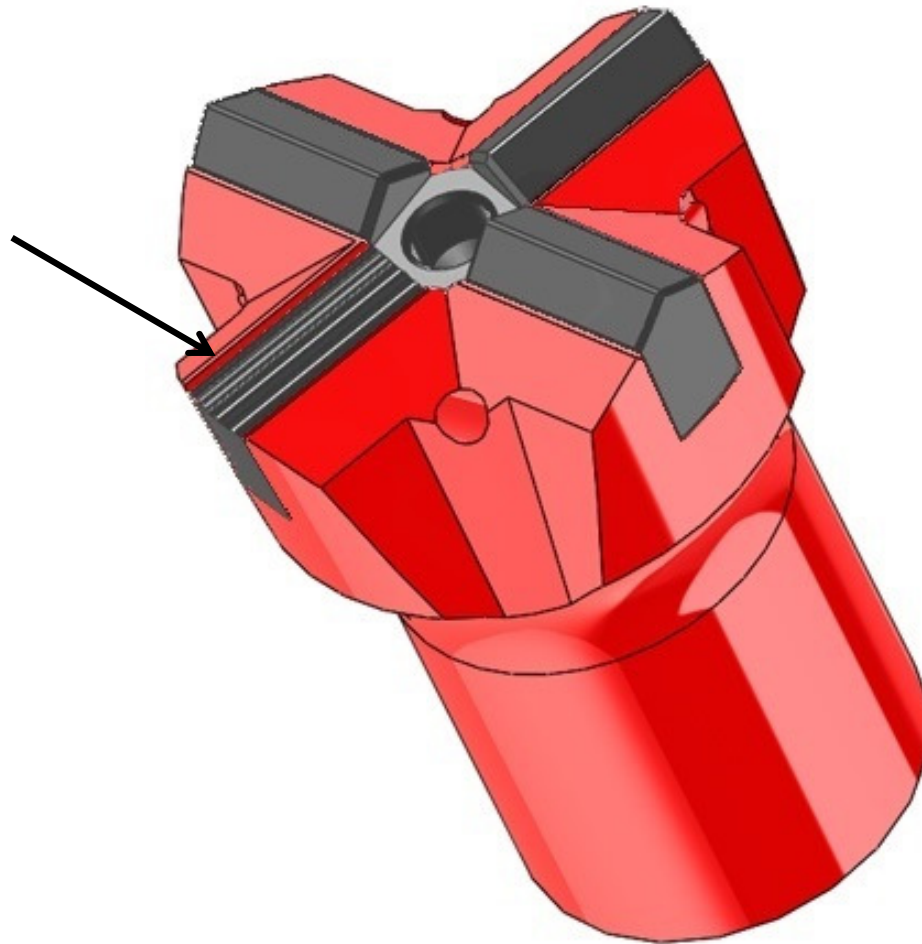


# Drill Bits: Top Hammer - Cross (Blade Carbide) Bits – Head -

## Common Problems & Failures

Diagram 2 of 2

Shattered insert  
(F18, pg. 27)





# Drill Bits: Top Hammer - Cross (Blade Carbide) Bits – Head -

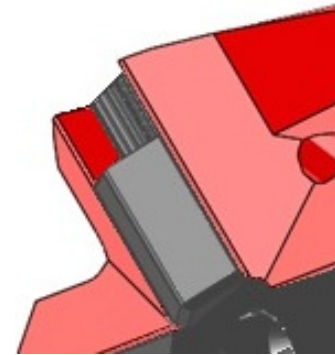
Failure:  
Insert corner fractured

Cause of failure:

- “Pinching” in the hole: hole diameter smaller than bit diameter
- Bad collaring practices
- Sharp corners or anti-taper after grinding
- Snake skin wear pattern (see page 18)

Action required:

- Do not drill into a pre-existing hole with a larger bit
- Follow drill manufacturer’s recommended collaring procedures
- For multi-use carbide: sharpen dull carbides, following proper carbide sharpening procedures
- For single-use carbide: replace bits when carbides are dull
- Inspect carbides more frequently



**F14**

(see pg. 21)



# Drill Bits: Top Hammer - Cross (Blade Carbide) Bits – Head -

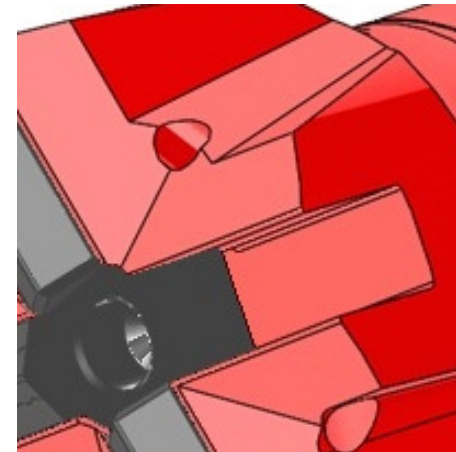
Failure:  
Lost insert

Cause of failure:

- Braze joint fatigued
- Insufficient feed pressure

Action required:

- Discard and replace worn out bits
- Adjust feed pressure to rock conditions



**F15**

(see pg. 21)



# Drill Bits: Top Hammer - Cross (Blade Carbide) Bits – Head -

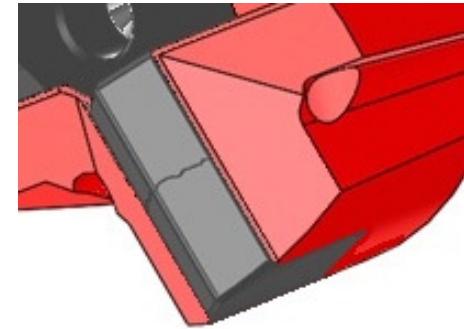
Failure:  
Traverse crack

Cause of failure:

- Over heating from improper grinding
- Grinding scratches from improper grinding wheel
- Anti-taper from abrasive rock

Action required:

- Sharpen dull carbide, following proper carbide sharpening procedures
- Shorten grinding intervals when drilling in abrasive rock



**F16**  
(see pg. 21)



# Drill Bits: Top Hammer - Cross (Blade Carbide) Bits – Head -

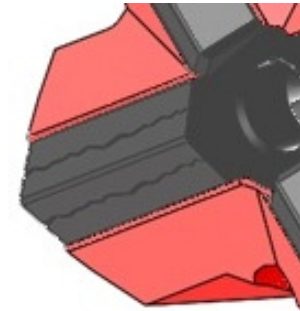
Failure:  
Longitudinal cracks

Cause of failure:

- Over drilling of bit
- Drilling when the insert has excessive flats

Action required:

- Inspect carbides more frequently
- For multi-use carbide: shorten grinding intervals when drilling in abrasive rock
- For multi-use carbide: sharpen dull carbide (when it attains flats that are no greater than 1/8" or 3.175 mm), following proper carbide sharpening procedures
- For single-use carbide: replace bits when carbides are dull



**F17**

(see pg. 21)





# Drill Bits: Top Hammer - Cross (Blade Carbide) Bits – Head -

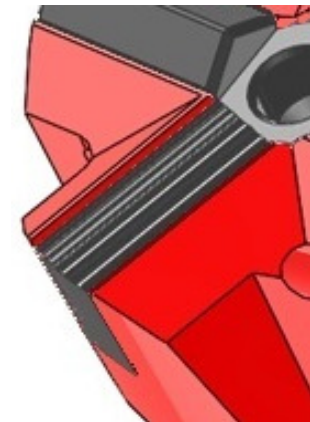
## Failure: Shattered insert

### Cause of failure:

- Over drilling of bit
- Overheating the insert when re-sharpening
- Insufficient flushing

### Action required:

- Inspect carbides more frequently
- For multi-use carbide: shorten grinding intervals when drilling in abrasive rock
- For multi-use carbide: sharpen dull carbide (when it attains flats that are no greater than 1/8" or 3.175 mm), following proper carbide sharpening procedures
- For single-use carbide: replace bits when carbides are dull
- Adjust flushing pressure to rock conditions



**F18**

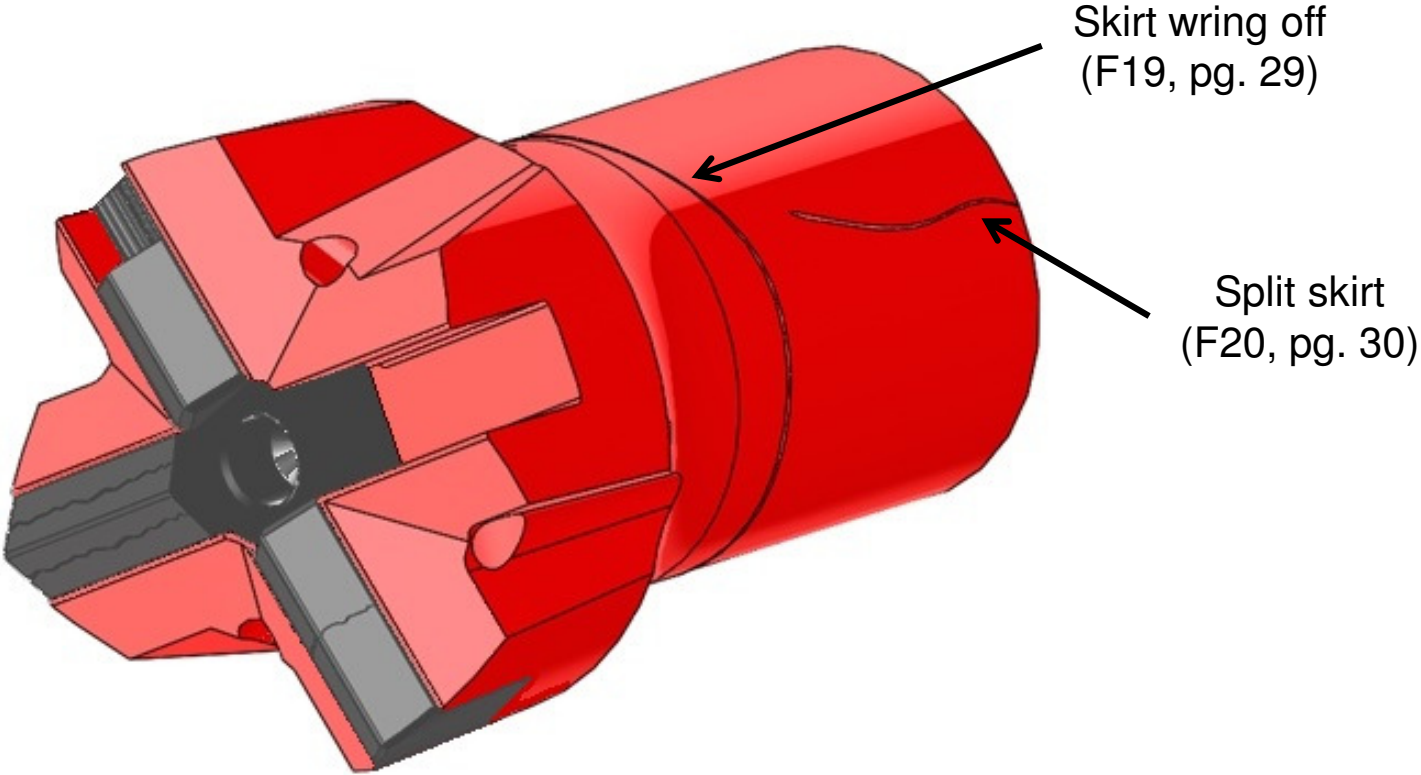
(see pg. 22)



# Drill Bits: Top Hammer - Tapered Bits – Body -

## Common Problems & Failures

Diagram 1 of 1





# Drill Bits: Top Hammer - Tapered Bits – Body -

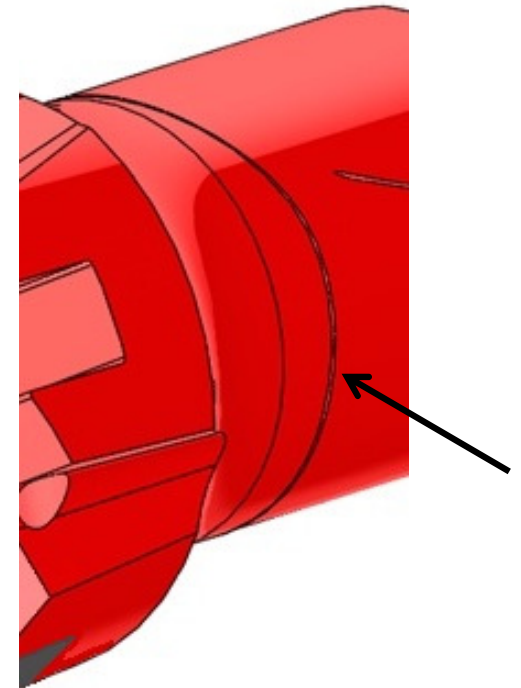
## Failure: Skirt wring off

### Cause of failure:

- Worn, broken, or mismatched taper
- Worn out or improper taper on the rod or the bit
- Excessive wear on the skirt

### Action required:

- Use a taper gauge to check bit and drill rod taper angles
- Make sure drill rod and bit connections are in good condition
- Replace worn out bits or drill rods



**F19**  
(see pg. 28)



## Drill Bits: Top Hammer - Tapered Bits – Body -

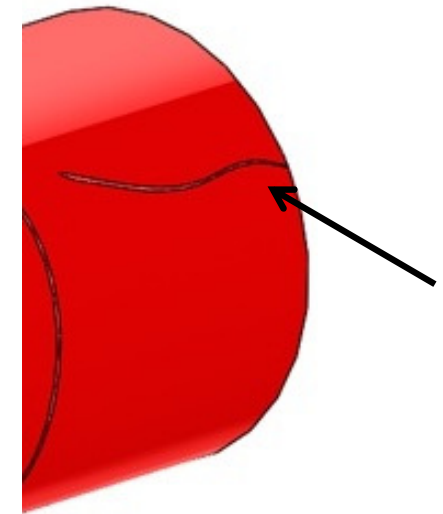
### Failure: Split skirt

Cause of failure:

- Taper mismatch
- Worn taper
- Removing the bit with a miner's wrench

Action required:

- Use a taper gauge to check bit and drill rod taper angles
- Discard and replace worn out bits
- Use a proper knock-off block when removing bit from drill rod



**F20**

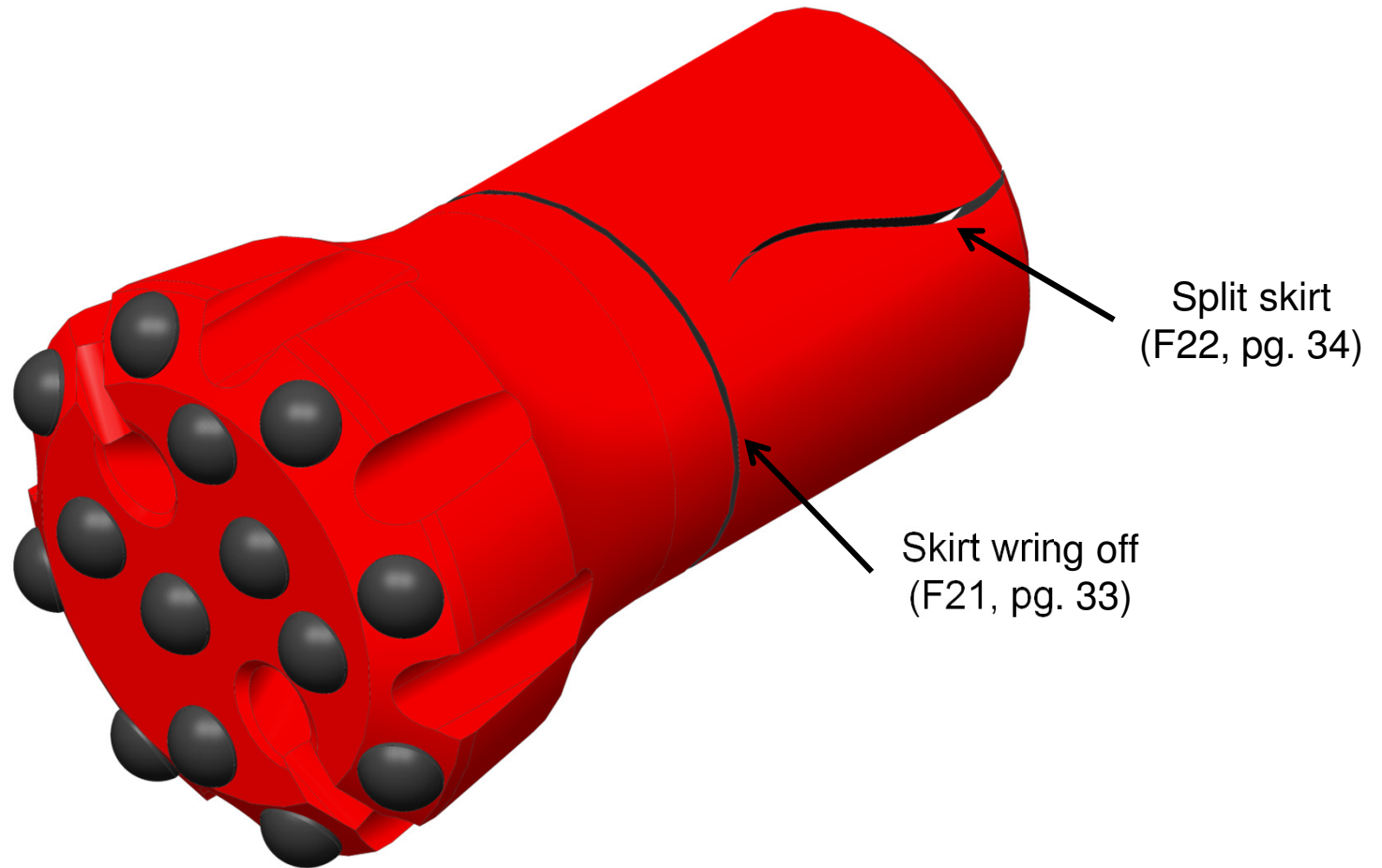
(see pg. 28)



# Drill Bits: Top Hammer - Threaded Bits – Standard Body -

## Common Problems & Failures

Diagram 1 of 2

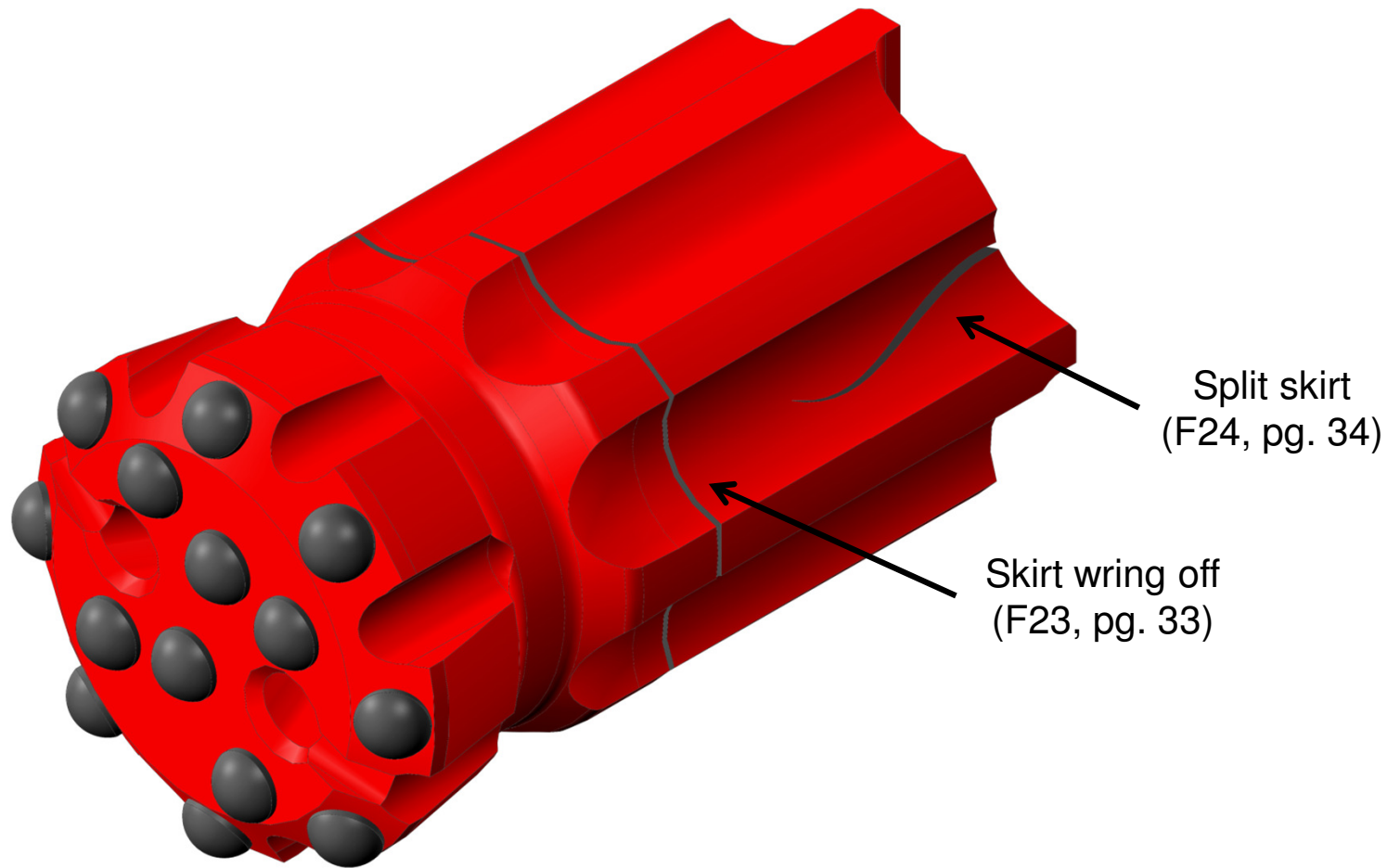




# Drill Bits: Top Hammer - Threaded Bits – Retrac Body -

## Common Problems & Failures

Diagram 2 of 2







# Drill Bits: Top Hammer - Threaded Bits – Standard & Retrac Body -

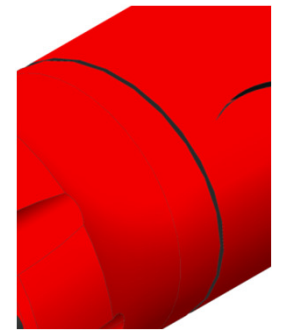
## Failure: Skirt wring off

### Cause of failure:

- Misalignment from hole deviation
- Improper feed pressure
- Excessive rotational loads from drilling with dull carbides
- Worn, broken, or mismatched threads
- Steel fatigue
- Dents on outside surface of drill rod

### Action required:

- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Adjust feed pressure to rock conditions
- Sharpen dull carbides, following proper carbide sharpening procedures
- Make sure drill rod and bit joints are in good condition
- Use Rockmore International components; do not mix component brands
- Replace worn out drill string components
- Do not hammer or strike the outside body of the bit



**F21**

(see pg. 31)



**F23**

(see pg. 32)



# Drill Bits: Top Hammer - Threaded Bits – Standard & Retrac Body -

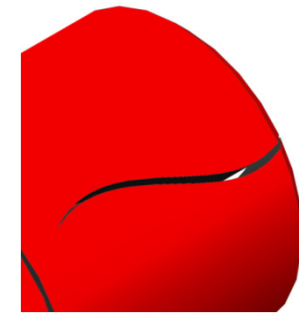
## Failure: Split skirt

### Cause of failure:

- Misalignment from hole deviation
- Worn-out threads
- Drilling with loose thread joints

### Action required:

- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Replace worn out drill string components
- Make sure thread joints are tight before starting percussion



**F22**

(see pg. 31)



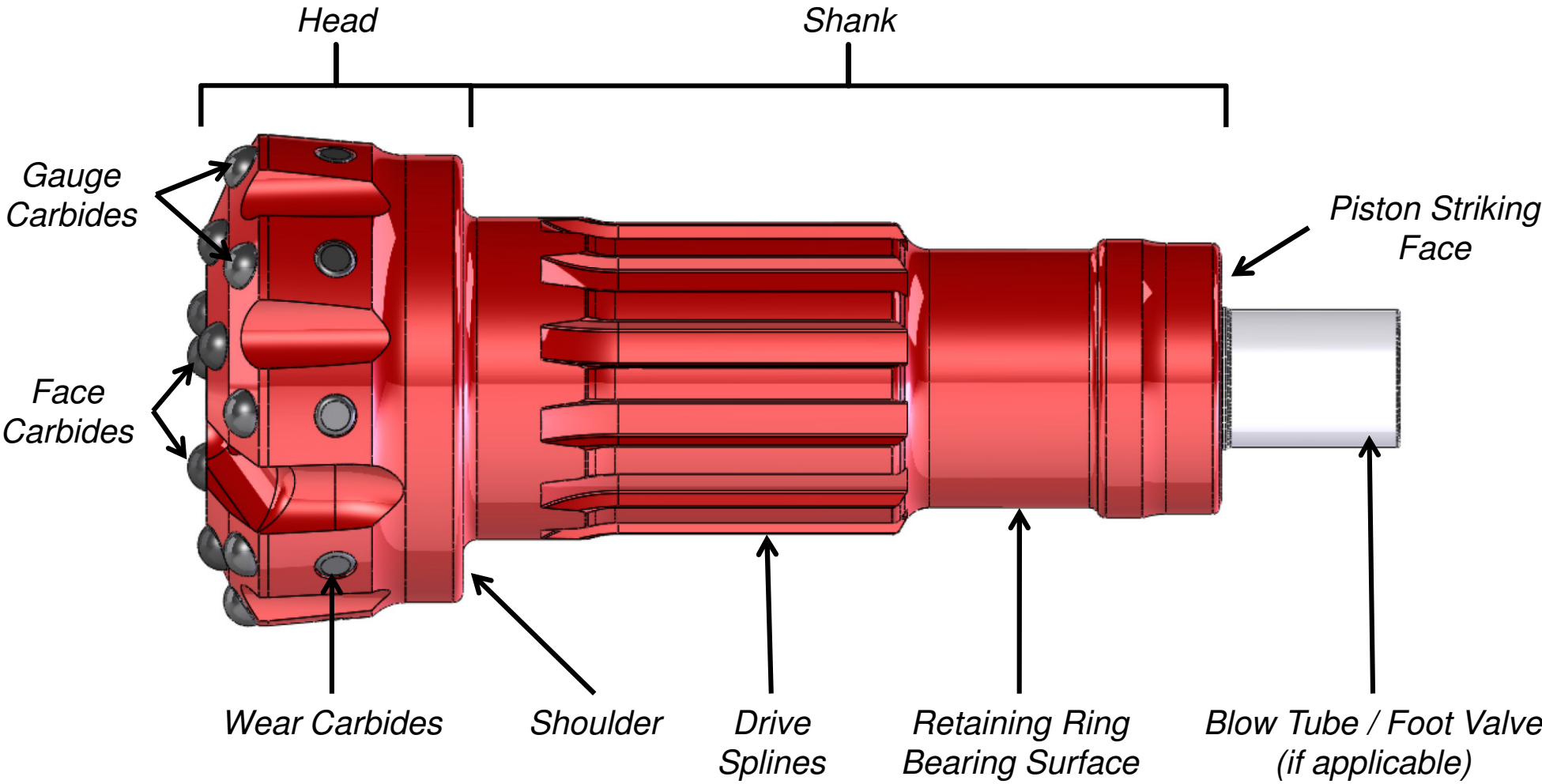
**F24**

(see pg. 32)



# Drill Bits: DTH - DTH Carbide Button Bits -

## Bit Elements





## Drill Bits: DTH - DTH Bits – Shank -

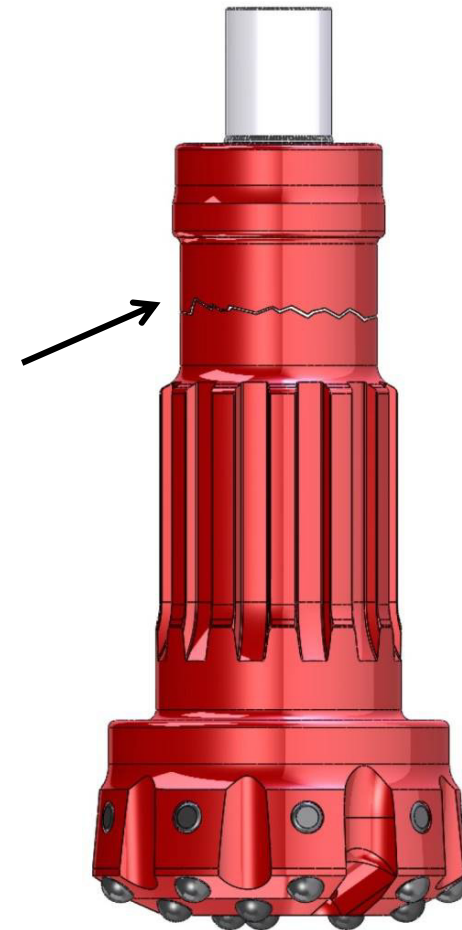
Failure:  
Shank break across the retaining ring bearing surface

### Cause of failure:

- Lack of lubrication
- Worn out bit retaining rings
- Worn out guide bushing (not applicable for Rockmore's ROK series DTH hammers)

### Action required:

- Use the correct type and quantity of hammer oil
- Inspect the condition of the bit, retaining rings, and guide bushing before drilling
- Replace worn out hammer components with new parts





# Drill Bits: DTH

## - DTH Bits – Shank -

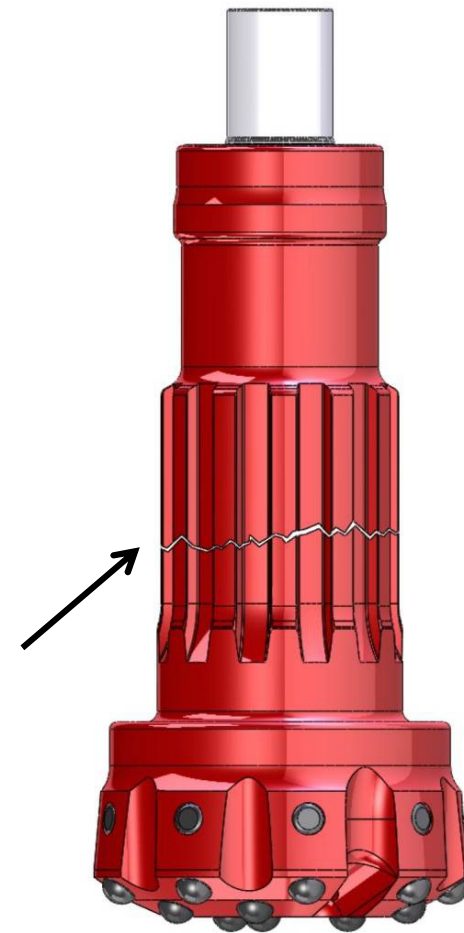
Failure:  
Shank break across the drive splines

Cause of failure:

- Oversized head diameter, in relation to DTH hammer diameter
- Excessive torque
- Worn out driver sub

Action required:

- Adjust drill settings when using oversized drill bits
- Use a larger DTH hammer recommended for that diameter of bit
- Adjust torque to rock conditions
- Inspect the condition of the bit and driver sub before drilling
- Replace worn out hammer components with new parts





# Drill Bits: DTH

## - DTH Bits – Shank -

Failure:  
Broken blow tube / foot valve

Cause of failure:

- Worn out piston, drive splines, or driver sub
- Misalignment
- Lack of lubrication

Action required:

- Inspect the condition of the piston, bit, and driver sub before drilling
- Replace worn out hammer components with new parts
- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with concave face design
- Use the correct type and quantity of hammer oil







## Drill Bits: DTH - DTH Bits – Shank -

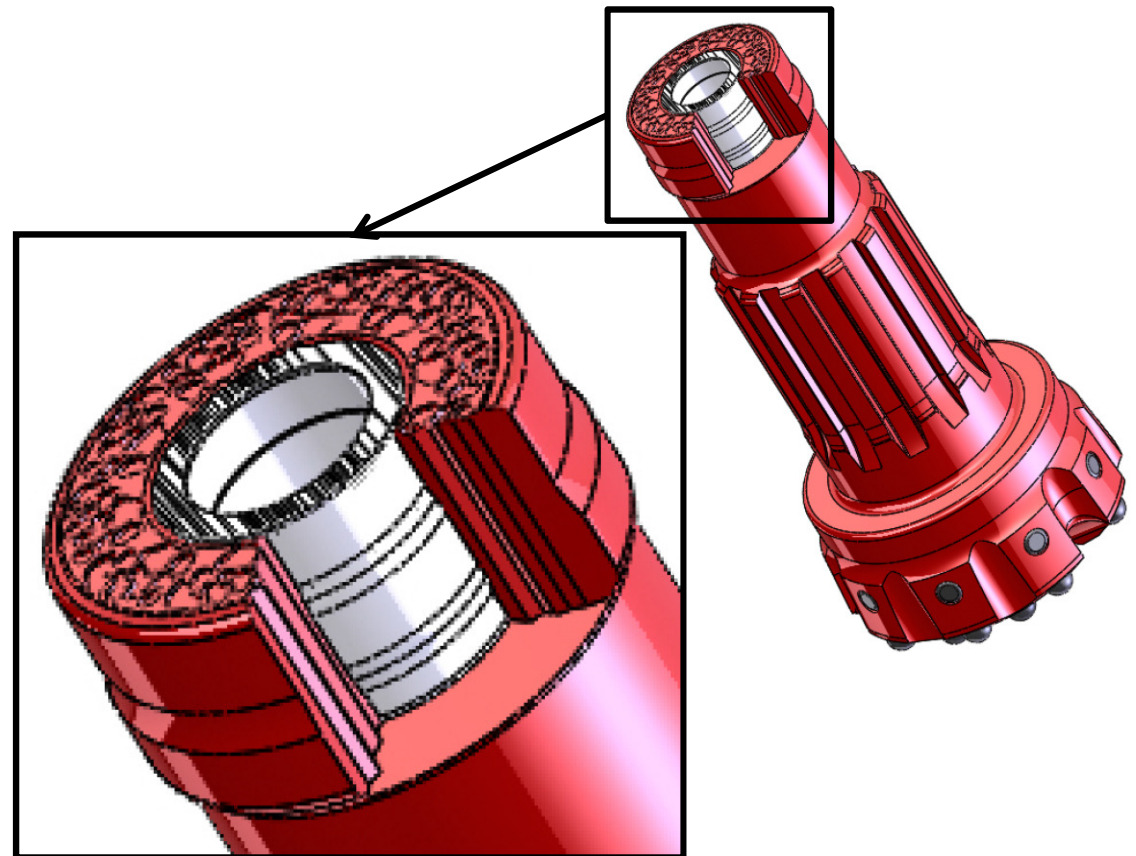
Failure:  
Broken piston striking face

Cause of failure:

- Worn out piston, bit retaining ring, or driver sub
- Worn out guide bushing (not applicable for Rockmore's ROK series DTH hammers)

Action required:

- Inspect the condition of the piston, bit retaining rings, driver sub and guide bushing before drilling
- Replace worn out hammer components with new parts





# Drill Bits: DTH

## - DTH Bits – Shank -

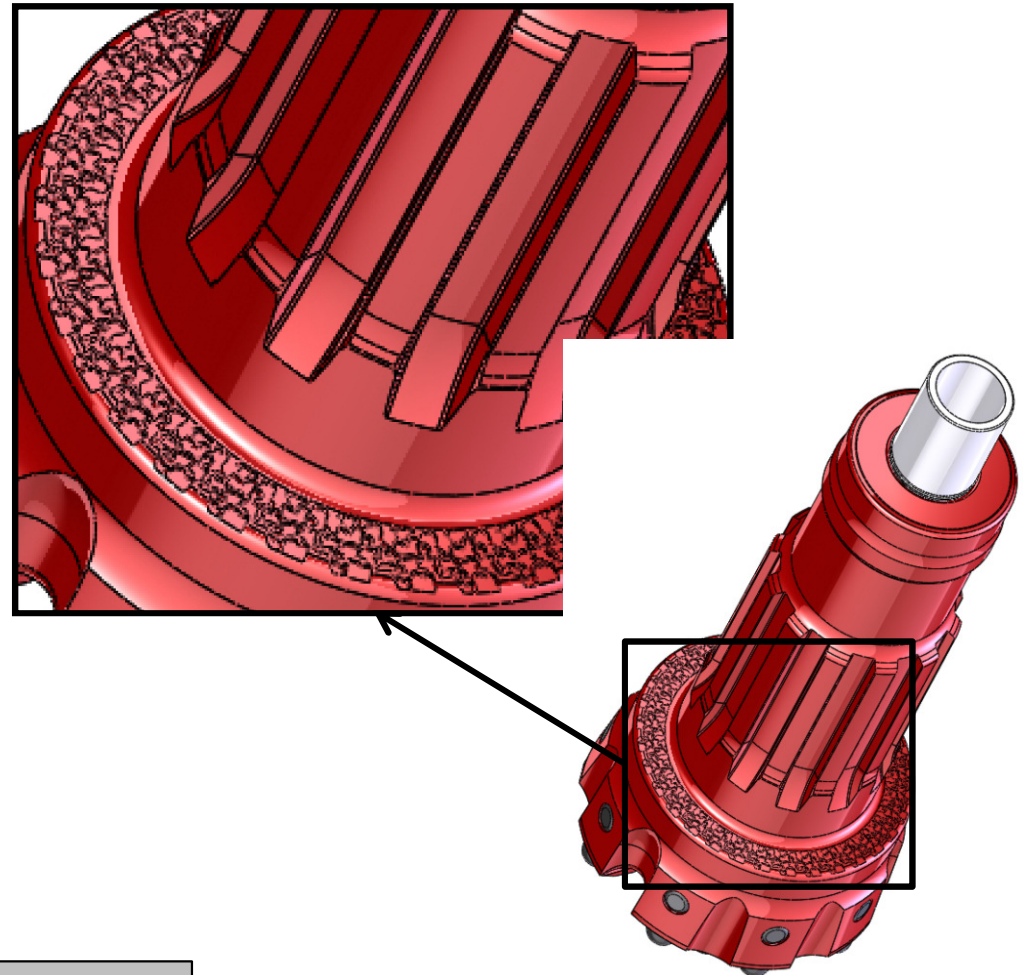
Problem:  
Shoulder damage

Cause of problem:

- Incorrect feed force

Action required:

- Adjust feed force to keep the carbide engaged in the rock. More will need to be applied when drilling into soft rock. Less will be needed as drill pipe is added and weight from the drill string increases the feed force.





# Drill Bits: DTH

## - DTH Bits – Shank -

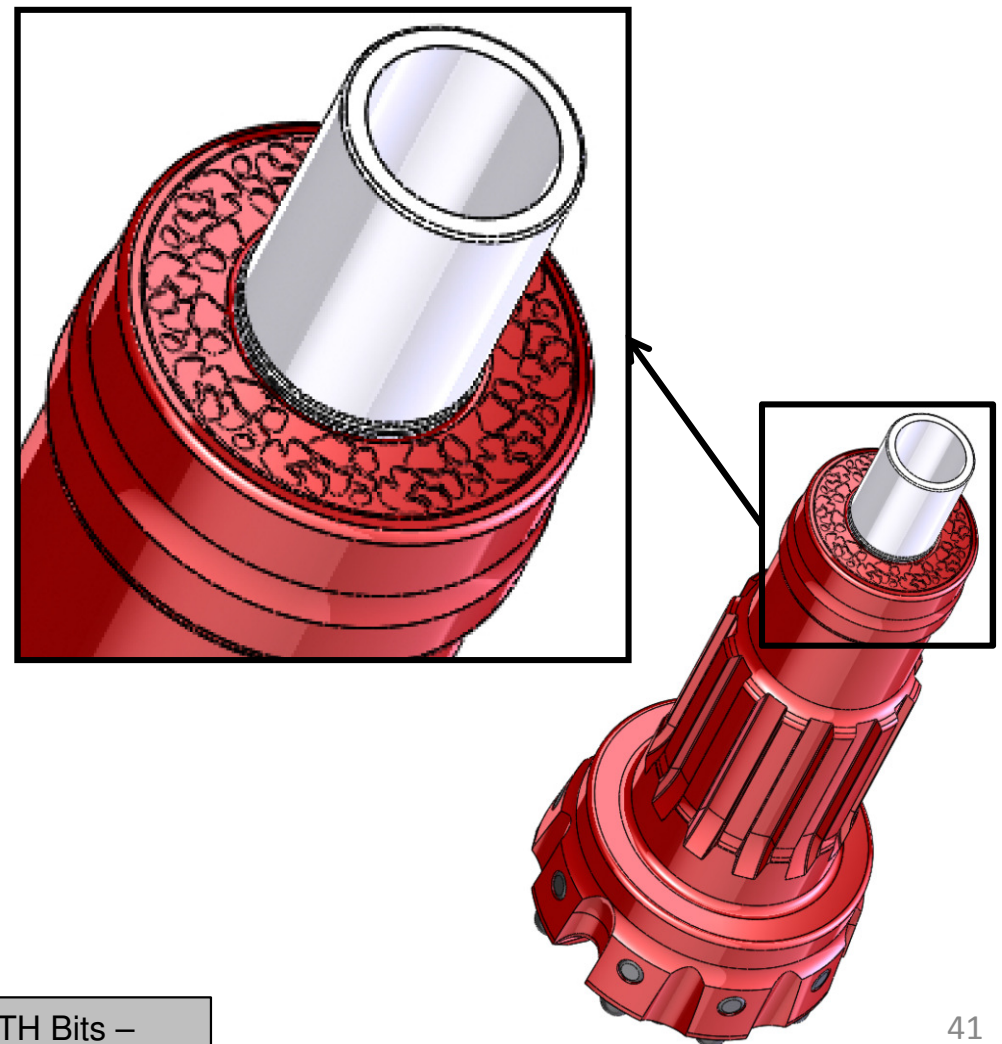
Problem:  
Piston striking face damage

Cause of problem:

- Insufficient lubrication
- Foreign material trapped between the bit and piston

Action Required:

- Use the manufacturer's recommended type and quantity of hammer oil
- Keep the hammer joints tight; and clean the driver sub, bit retaining ring, and drive splines regularly
- Inspect hammer check valve assembly for proper function





**R O C K M O R E**  
**I N T E R N A T I O N A L**

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*Rock Drilling Tools*

Failure Troubleshooting  
***Couplings & Coupling Adapters***





# Couplings & Coupling Adapters

For Bit Adapters see male and female threads in drill rod section.

## Problem:

## Dented, chipped, or damaged striking end

### Cause of problem:

- Employing percussion or rotation with the male rod thread end resting against the shoulder of the coupling (not fully connected)
- Feed misaligned
- Misalignment from hole deviation
- Threading rod too far

### Action required:

- Do not rotate or employ percussion until the male threads are fully connected inside the coupling
- Ensure feed mechanism is aligned
- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Do not thread rod past center of coupling; for adapters connect larger thread first





# Couplings & Coupling Adapters

For Bit Adapters see male and female threads in drill rod section.

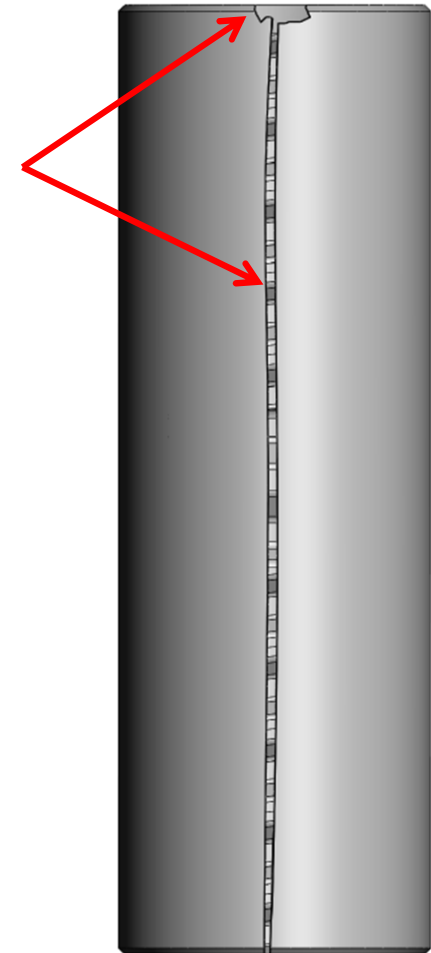
## Failure: Longitudinal crack

### Cause of failure:

- Drilling with loose thread joints
- Reverse rotation with percussion
- Dents on surface of steel
- Steel fatigue
- Hole deviation

### Action required:

- Make sure all joints are properly lubricated and tight before employing percussion
- Do not reverse rotation
- Do not hammer or strike the outside of the coupling
- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body







# Couplings & Coupling Adapters

For Bit Adapters see male and female threads in drill rod section.

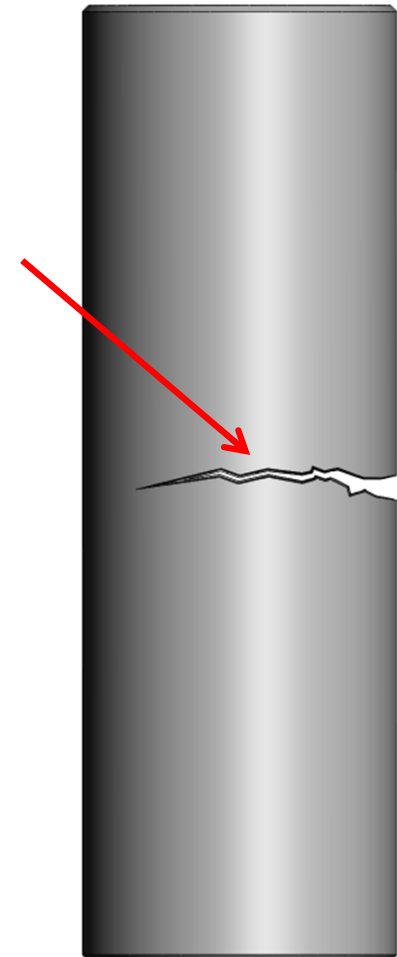
## Failure: Transversal crack

### Cause of failure:

- Dents on surface of steel
- Steel fatigue
- Misalignment from hole deviation
- Inadequate feed pressure
- Excessive rotational loads from drilling with dull carbides
- Mismatching or poor quality threads

### Action required:

- Do not hammer or strike the outside of the coupling
- Replace worn out couplings or drill rods
- Adjust drilling practices to achieve a straighter hole
- Adjust feed force to rock conditions.
- Use bits that have carbide in good condition
- Use Rockmore International components; do not mix component brands





**R O C K M O R E**  
**I N T E R N A T I O N A L**

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*Rock Drilling Tools*

Failure Troubleshooting

***Drill Rods***

Hand-held, Extension, and Drift & Tunneling



# Drill Rods: Integral, Tapered, & Shank Rods - Shank (Collared) End -

## Common Problems & Failures, on Forged Shank End

Diagram 1 of 1

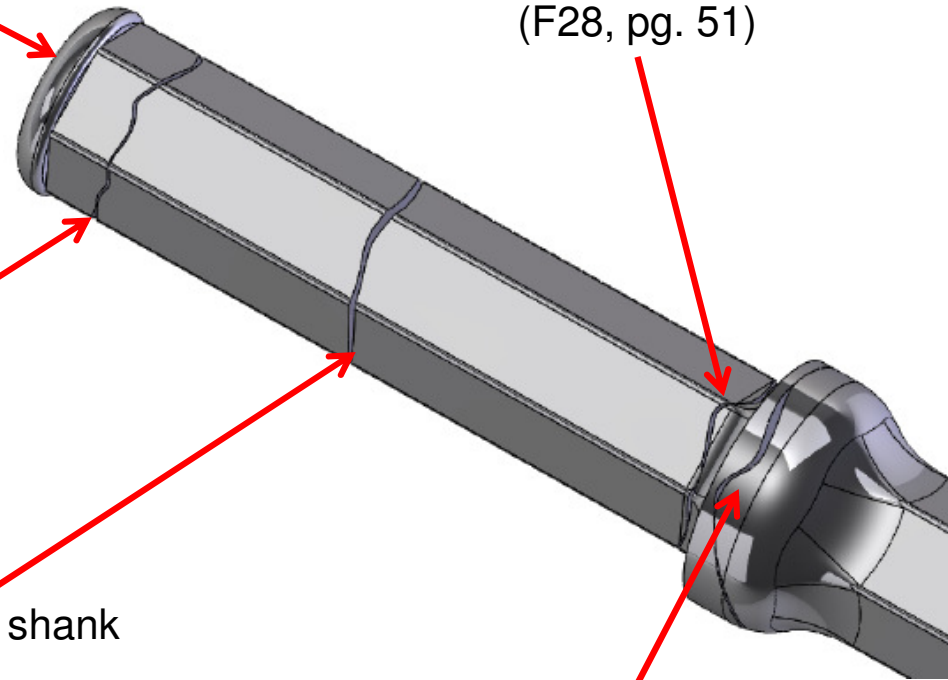
Striking end mushrooming  
(F25, pg. 48)

Failure in collar radius  
(F28, pg. 51)

Failure at shank end  
(F26, pg. 49)

Failure in middle of shank  
(F27, pg. 50)

Failure in collar  
(F29, pg. 52)





# Drill Rods: Integral, Tapered, & Shank Rods - Shank (Collared) End -

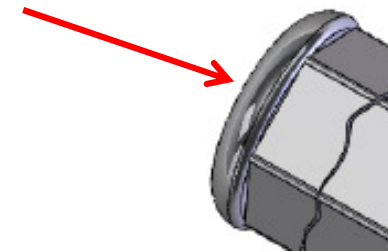
Problem:  
Striking end mushrooming

Cause of problem:

- Worn drill chuck bushing
- Deformed piston in drill
- Excessive operating pressures
- Improper heat treatment

Action required:

- Replace worn out drill chuck bushing
- Replace drill piston
- Adjust operating pressures to drilling conditions
- Return to manufacturer for analysis



**F25**  
(see pg. 47)



# Drill Rods: Integral, Tapered, & Shank Rods - Shank (Collared) End -

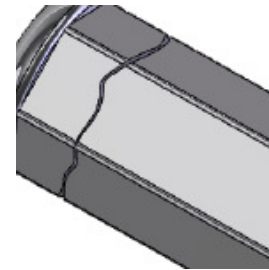
Failure:  
At shank end

Cause of failure:

- Worn drill chuck bushing

Action required:

- Replace worn out drill chuck bushing



**F26**  
(see pg. 47)



## Drill Rods: Integral, Tapered, & Shank Rods - Shank (Collared) End -

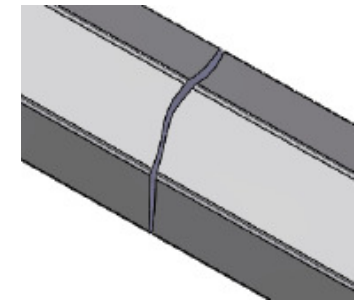
Failure:  
In middle of shank

Cause of failure:

- Worn drill chuck bushing
- Insufficient lubrication
- Excessive feed pressure

Action required:

- Replace worn out drill chuck bushing
- Ensure that sufficient amounts of shank lubrication oil is reaching the shank
- Adjust feed pressure to rock conditions



**F27**  
(see pg. 47)





## Drill Rods: Integral, Tapered, & Shank Rods - Shank (Collared) End -

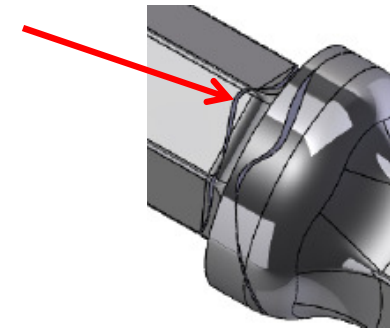
Failure:  
At the beginning of collar radius

Cause of failure:

- Over heating from lack of lubrication
- Inadequate drill chuck bushing radius deforming the collar
- Misalignment from excessive play in worn drill bushing

Action required:

- Use the proper type and quantity of drill lubrication, checking often
- Check condition of drill chuck bushing, replace if necessary



**F28**

(see pg. 47)



## Drill Rods: Integral, Tapered, & Shank Rods - Shank (Collared) End -

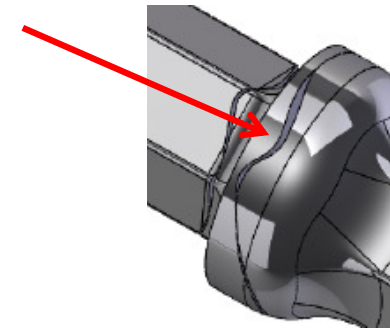
Failure:  
At the collar

Cause of failure:

- A distorted flush hole produced by the forging process

Action required:

- Return to manufacturer for analysis



**F29**

(see pg. 47)

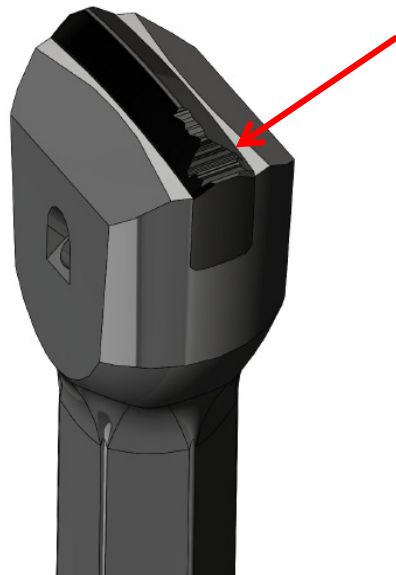


# Drill Rods: Integral Rods - Integral End -

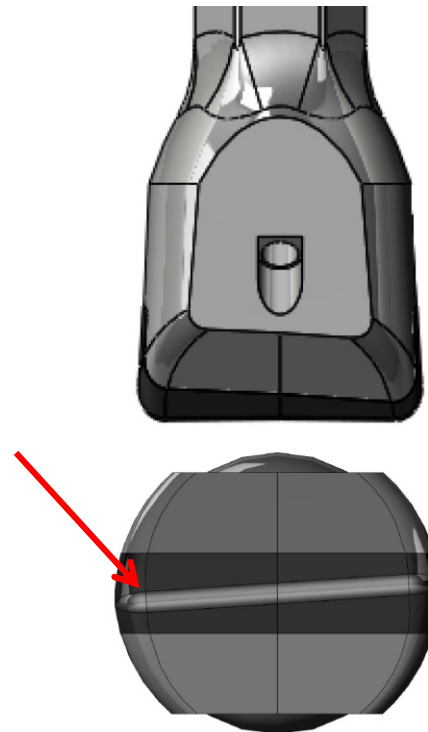
## Common Problems & Failures, on Carbide End

Diagram 1 of 1

Failure of the carbide  
(F30, pg. 54)



“Propeller” carbide wear  
(F31, pg. 55)





## Drill Rods: Integral Rods - Integral End -

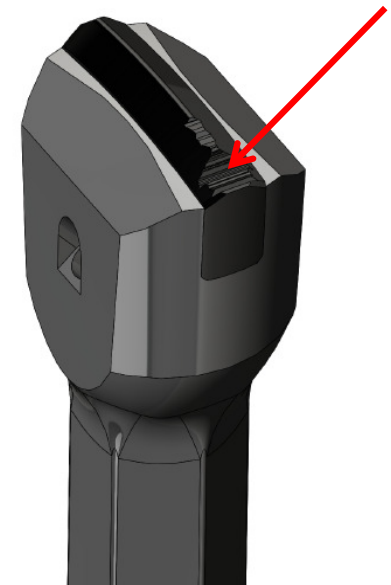
Failure:  
Carbide failure

Cause of failure:

- Improper grinding
- Overheating when sharpening
- Reverse taper
- Snake skin wear pattern (see page 18)

Action required:

- Sharpen dull carbide, following proper carbide sharpening procedures
- Inspect carbides more frequently
- Discard and replace worn out drill rods



**F30**

(see pg. 53)



# Drill Rods: Integral Rods - Integral End -

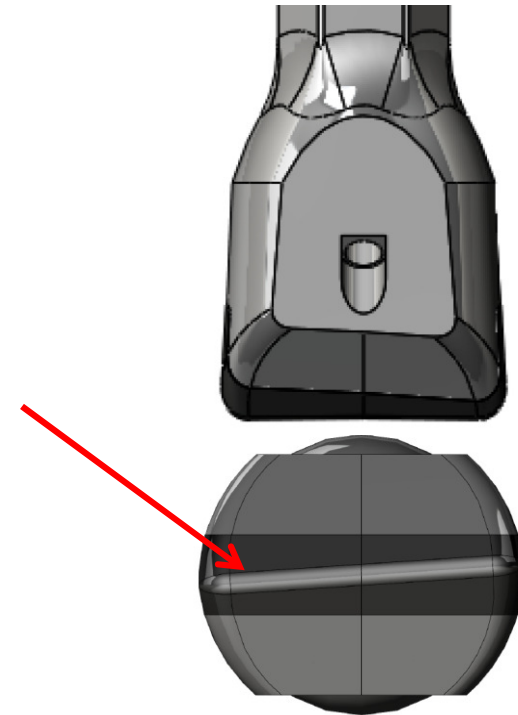
Failure:  
“Propeller” carbide wear

Cause of failure:

- Insufficient flushing pressure
- Slow rotation

Action required:

- Increase flushing pressure
- Increase rotation speed



F31

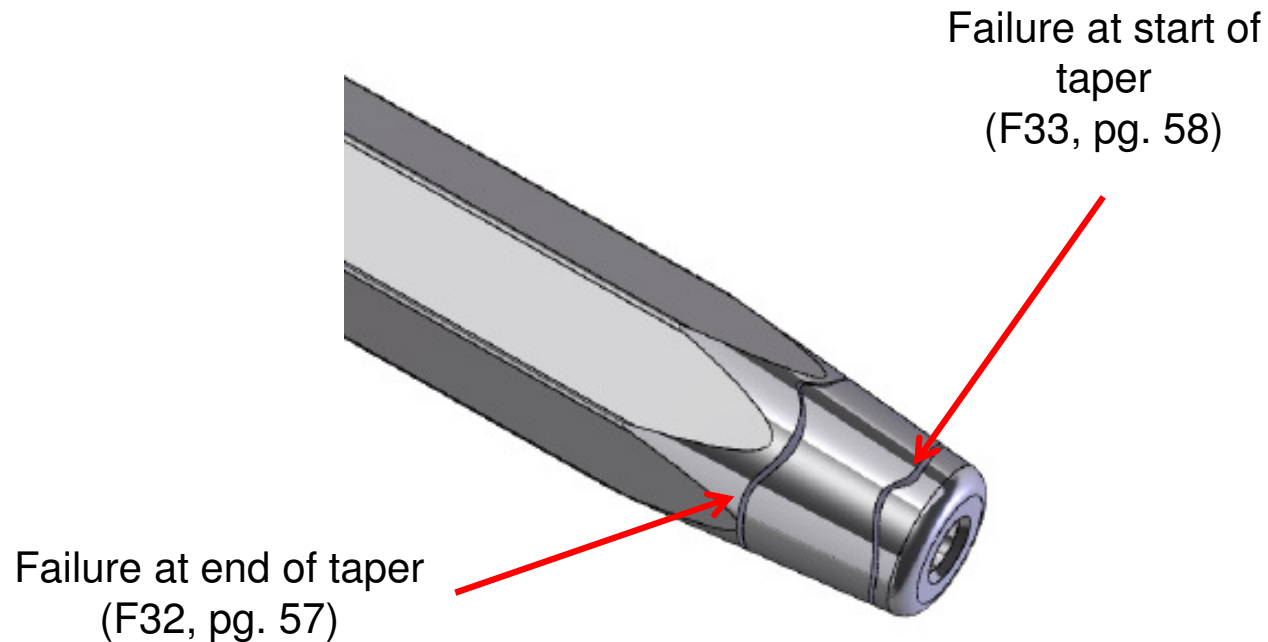
(see pg. 53)



# Drill Rods: Tapered Rods - Tapered End -

## Common Problems & Failures, on Taper End

Diagram 1 of 1







## Drill Rods: Tapered Rods - Tapered End -

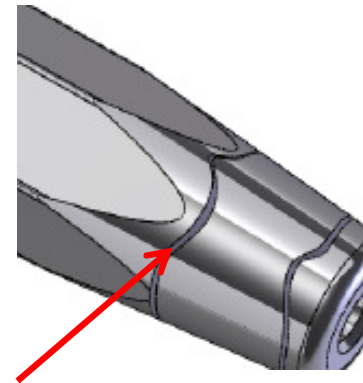
Failure:  
At the end of taper radius

Cause of failure:

- Using a bit with a worn, damaged, or mismatched taper
- Using a bit with worn carbides in gauge row

Action required:

- Use a taper gauge to check bit and drill rod taper angles
- Discard and replace worn out or damaged bits
- Sharpen dull carbides, following proper carbide sharpening procedures



**F32**  
(see pg. 56)



## Drill Rods: Tapered Rods - Tapered End -

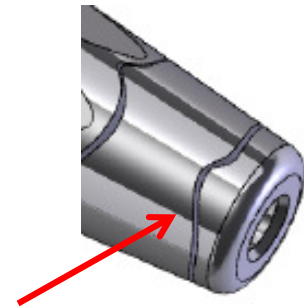
Failure:  
At the beginning of taper radius

Cause of failure:

- Using a bit with a worn, damaged, or mismatched taper
- Spinning in the socket

Action required:

- Use a taper gauge to check bit and drill rod taper angles
- Discard and replace worn out or damaged bits
- Adjust feed force and/or use a bit with a symmetrical carbide design



**F33**  
(see pg. 56)



# Drill Rods: M/F Extension and M/F Drift & Tunneling Rods - Female Thread End -

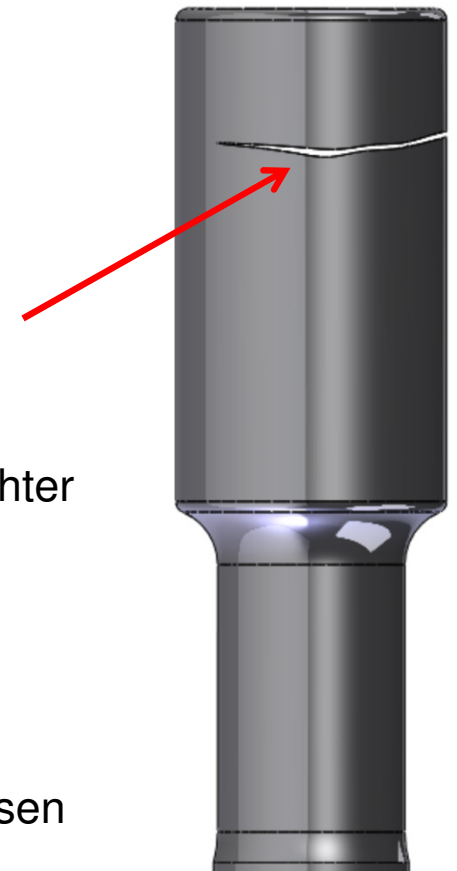
## Failure: Across the female threads

### Cause of failure:

- Drill string misalignment
- Hole deviation
- Inadequate feed pressure
- Excessive torque from drilling with dull bits
- Mismatched threads
- Dents or deformation from striking the steel surface

### Action required:

- Make sure threads are tight and in good condition
- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Adjust feed pressure to rock conditions
- Sharpen dull carbides on bit, following proper carbide sharpening procedures
- Do not mix manufacturers' components in the drill string
- Do not strike outside of the connection; use a proper wrench to loosen joints





# Drill Rods: M/F Extension and M/F Drift & Tunneling Rods - Female Thread End -

## Problem: Deformation of female end

Cause of problem:

- Drilling with loose thread joints
- Misalignment when threading rods together

Action required:

- Make sure thread joints are tight before starting percussion
- Make sure drill rods are aligned before threading together





# Drill Rods: M/F Extension and M/F Drift & Tunneling Rods - Female Thread End -

## Failure: Vertical crack on the female end

### Cause of failure:

- Hole deviation
- Worn threads
- Misalignment of drill rods when threading
- Drilling with loose thread joints

### Action required:

- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Replace worn out drill string components
- Make sure drill rods are aligned before threading together
- Make sure thread joints are tight before starting percussion





# Drill Rods: Extension, Drift & Tunneling Rods, and Shank Rods - Male Thread End -

Problem:

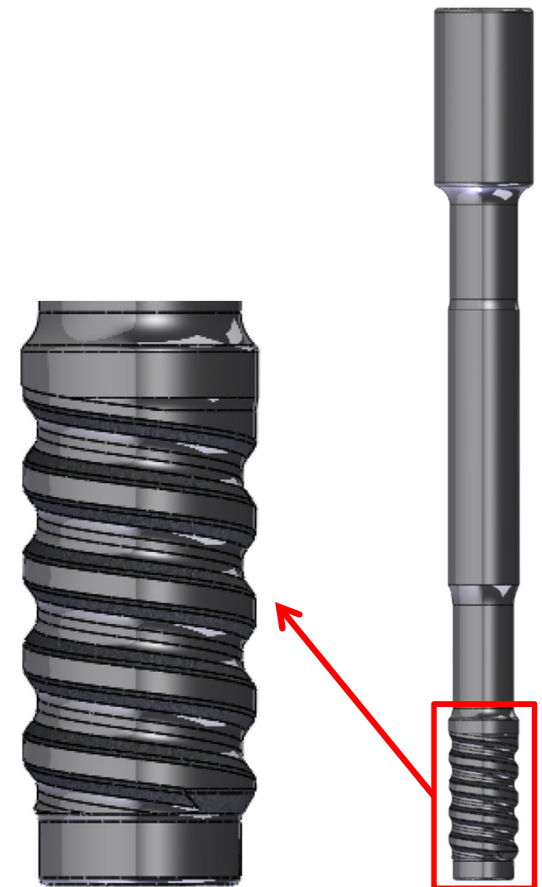
Excessive thread wear with pitting and/or galling

Cause of problem:

- Overheated threads from a loose coupling, loose bit, inadequate lubrication, or hole deviation
- Reflected percussive energy
- Free hammering (dry firing)
- Worn mating parts (coupling end or bits)

Action required:

- Make sure thread joints are tight before starting percussion
- Use the proper type and quantity of lubrication, checking often
- Adjust drilling parameters to rock conditions
- Sharpen dull carbides on bit, following proper carbide sharpening procedures
- Only employ percussion when bit is engaged in rock
- Replace worn out drill string components; do not fit a worn rod or bit onto a new rod







# Drill Rods: Extension, Drift & Tunneling Rods, and Shank Rods - Male Thread End -

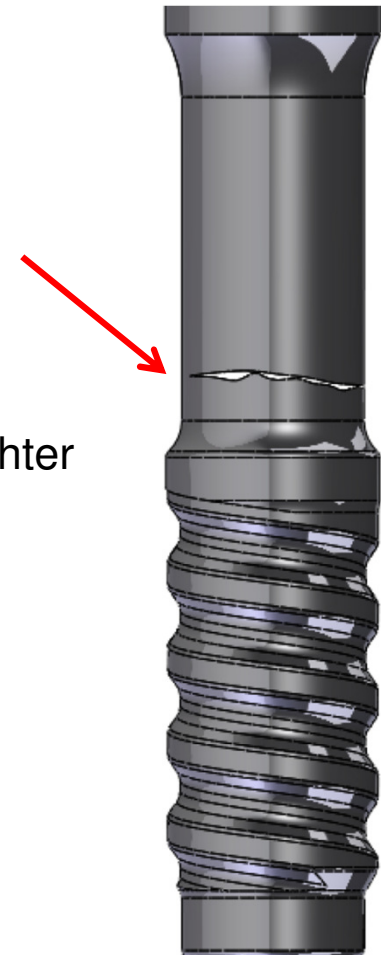
## Failure: Behind the threads

### Cause of failure:

- Hole deviation
- Worn threads
- Bending from feed overpressure, or misalignment
- Excessive rotational loads from drilling with a worn out bit
- Poor drilling conditions or unconsolidated rock formations
- Using percussion while stuck in the drill hole

### Action required:

- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Avoid coupling worn threads with new threads
- Adjust feed pressure to avoid bending of the drill string
- Sharpen dull carbides on bit, following proper carbide sharpening procedures
- Adjust drilling parameters to rock conditions
- Do not activate percussion when the drill string is stuck





# Drill Rods: Extension, Drift & Tunneling Rods, and Shank Rods - Male Thread End -

Failure:  
Male end broken at face

Cause of failure:

- Drilling with dull bits
- Inadequate feed pressure
- Worn coupling or bit threads
- Misaligned drill rods while threading
- Fatigue failure from corrosion

Action required:

- Sharpen dull carbides on bit, following proper carbide sharpening procedures.
- Adjust feed pressure to rock conditions
- Make sure mating components are in good shape and are not deformed; replace worn out components
- Make sure joints are aligned before threading
- Take steps to reduce corrosion





# Drill Rods: Extension, Drift & Tunneling Rods, and Shank Rods - Hex & Round Drill Rods – Shaft -

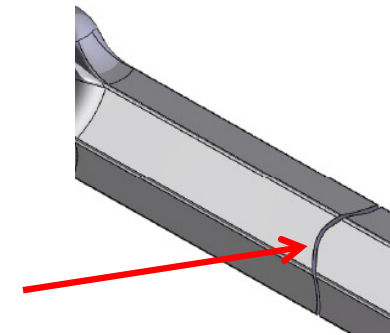
## Failure: In shaft of rod

### Cause of failure:

- Poor rod alignment
- Surface damage
- Improper heat treatment

### Action required:

- Adjust drilling practices or bit design to achieve a straighter hole
- Be cautious not to damage drill rod when handling
- Return to manufacturer for analysis





# Drill Rods: Extension, Drift & Tunneling Rods, and Shank Rods - Hex & Round Drill Rods – Shaft -

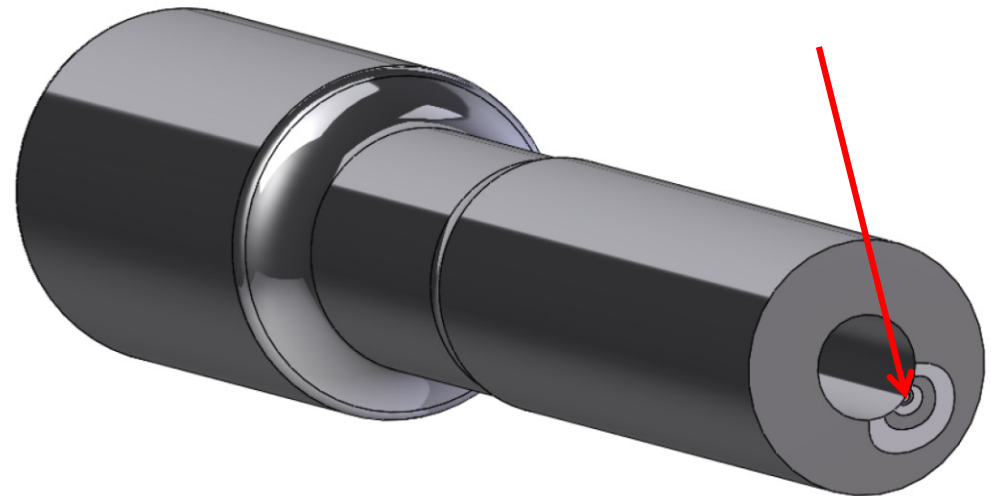
Problem:  
Inner surface compromised

Cause of problem:

- Corrosion from flushing agent
- Insufficient rust protection

Action required:

- Replace or maintain flushing agent
- Use proper storage techniques





# Drill Rods: Extension, Drift & Tunneling Rods, and Shank Rods - Hex & Round Drill Rods – Shaft -

Problem:

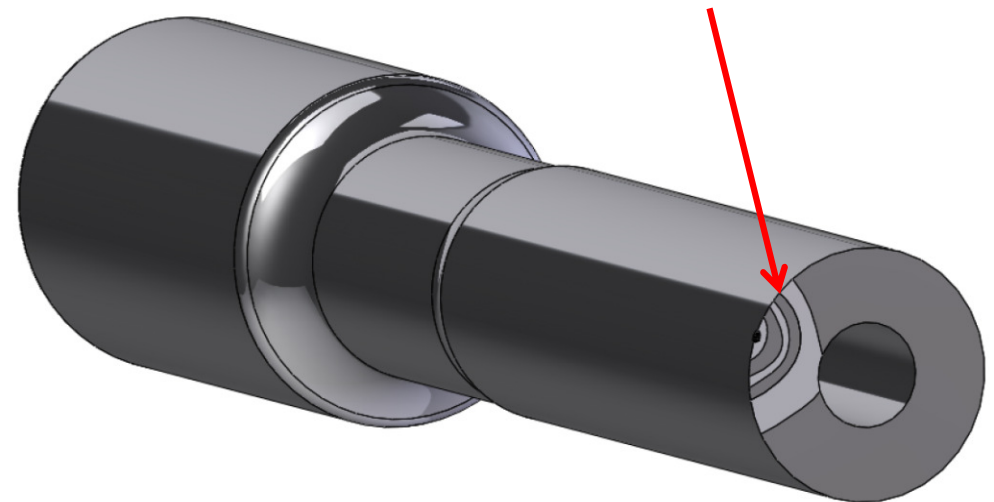
Outer surface compromised

Cause of problem:

- Bending from misalignment
- Excessive feed
- Surface damage of the rod from rubbing against steel
- Strikes from a hammer
- Improper handling
- Difficult drilling conditions

Action required:

- Make sure centralizer is in good working order; use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Adjust feed pressure to rock conditions
- Do not strike outside of drill rod; use a proper wrench to loosen joints
- Store rods in a rack when not in use; do not leave drill rods on the ground
- Adjust drilling parameters to rock conditions





**R O C K M O R E**  
**I N T E R N A T I O N A L**

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*Rock Drilling Tools*

Failure Troubleshooting  
***Shank Adapters***

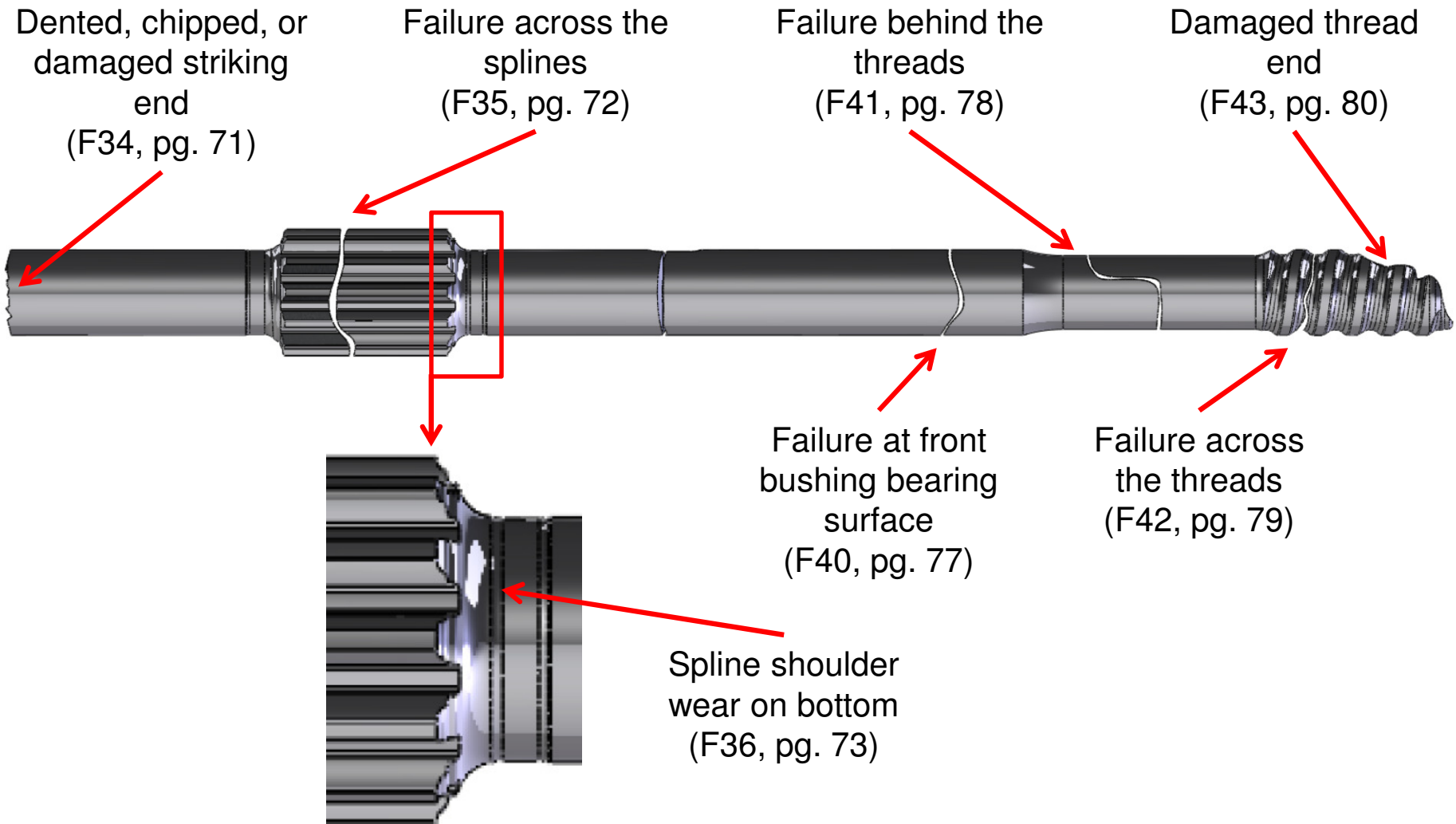




# Shank Adapters

## Common Problems & Failures

Diagram 1 of 2

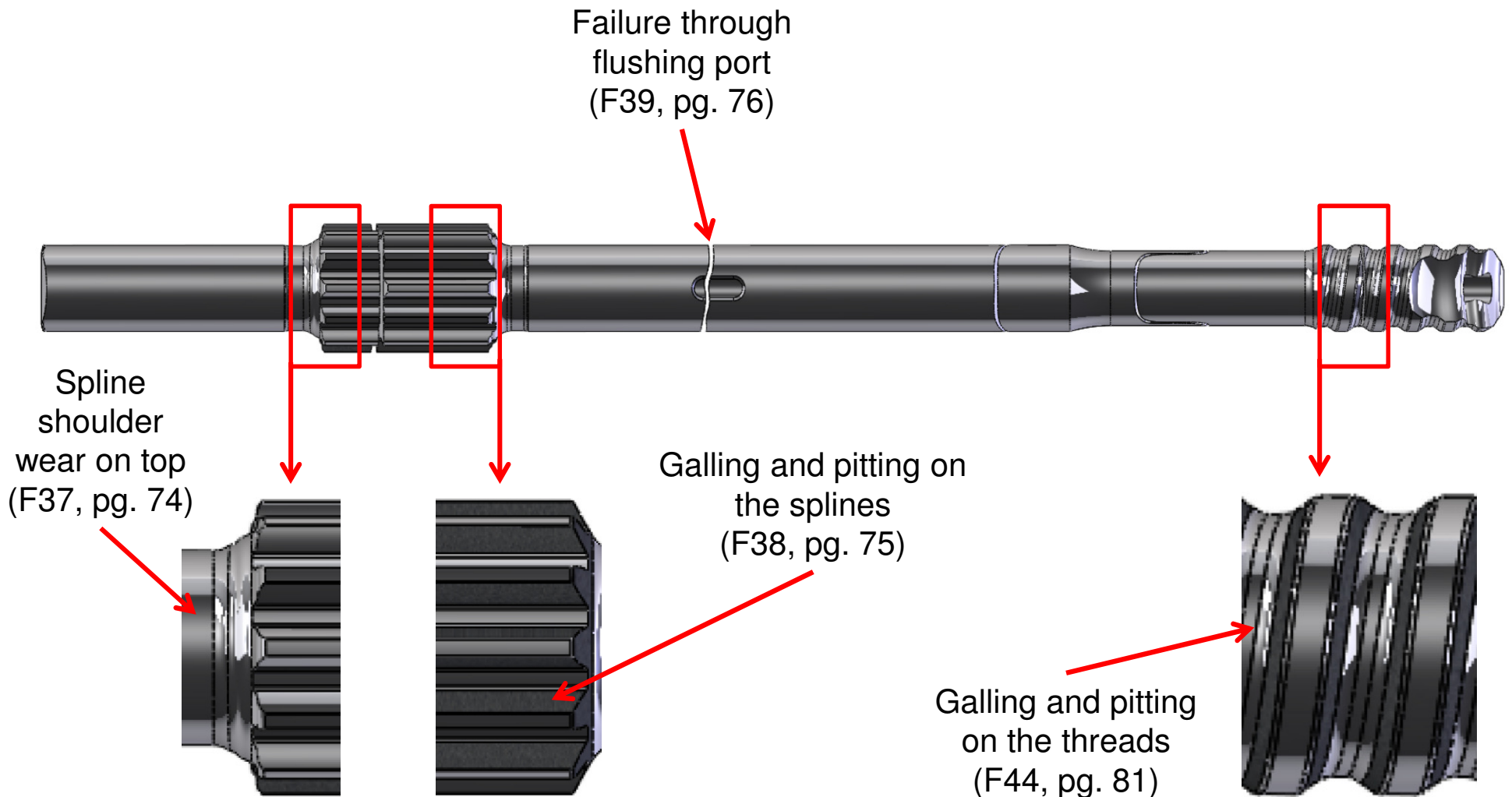




# Shank Adapters

## Common Problems & Failures

Diagram 2 of 2





# Shank Adapters

Problem:  
Dented, chipped, or damaged striking end

Cause of problem:

- Misalignment from a worn out bushing or a damaged piston

Action required:

- Replace worn out components in rock drill, including but not limited to bushings and pistons



**F34**  
(see pg. 69)



# Shank Adapters

## Failure: Across the splines

### Cause of failure:

- Inadequate or improper lubrication
- Excessive back hammering
- Getting rod stuck in unconsolidated rock
- Using a worn out chuck coupling
- Excessive rotational torque
- Inadequate feed pressure
- Drilling with dull bits

### Action required:

- Use the proper type and quantity of lubrication, checking often
- Only employ percussion when bit is engaged in rock
- Use Retrac bits when drilling in difficult rock conditions
- Replace worn out chuck coupling
- Adjust drilling parameters to the rock conditions
- Sharpen dull carbides on bit, following proper carbide sharpening procedures



**F35**

(see pg. 69)



# Shank Adapters

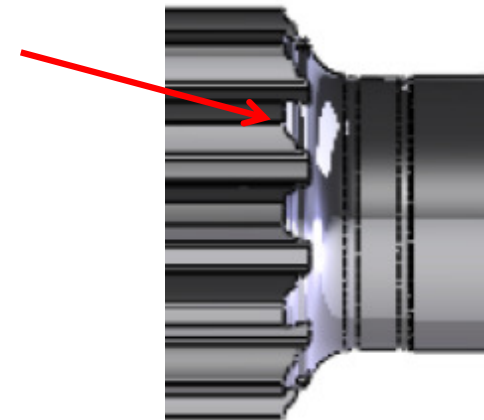
## Problem: Spline shoulder wear on bottom

### Cause of problem:

- Excessive rotation when retracting the drill string
- Drill rod stuck in unconsolidated rock

### Action required:

- Adjust rotational speed to the rock conditions
- Use Retrac bits when drilling in difficult conditions



**F36**

(see pg. 69)



# Shank Adapters

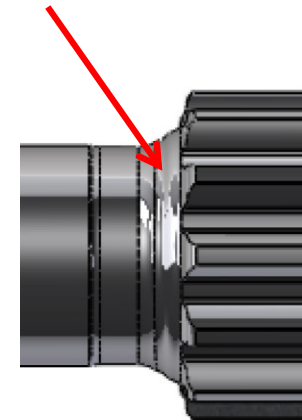
Problem:  
Spline shoulder wear on top

Cause of problem:

- Low feed pressure
- Worn out rotation bushing
- Non-functioning damping piston

Action required:

- Adjust feed pressure to rock conditions
- Replace worn out rotation bushings
- Repair or replace damping piston



**F37**

(see pg. 70)





# Shank Adapters

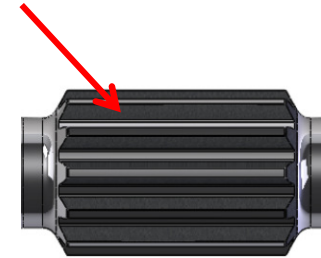
## Problem: Galling and pitting on the splines

### Cause of problem:

- Inadequate or improper lubrication
- Excessive rotational torque in unconsolidated rock
- Over heated hydraulic oil
- Excessive back hammering
- Getting rod stuck in unconsolidated rock

### Action required:

- Use the proper type and quantity of lubrication, checking often
- Adjust drilling parameters to rock conditions.
- Cooling units may be added to the hydraulic system in cases of over heating
- Use Retrac bits when drilling in difficult conditions



**F38**

(see pg. 70)



# Shank Adapters

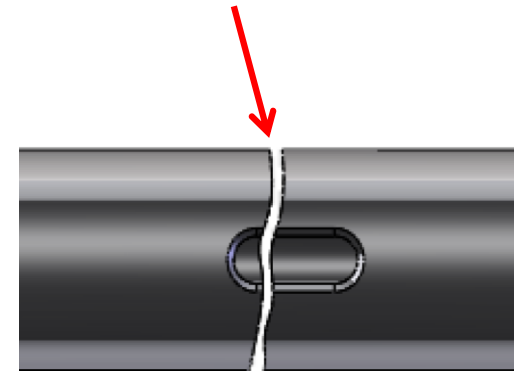
## Failure: Through flushing port

### Cause of failure:

- Corrosion from flushing agent
- Dirty flushing water
- Steel fatigue

### Action required:

- Replace or maintain flushing agent
- Clean flushing water of solids
- Replace broken, damaged, or worn out drill components



**F39**

(see pg. 70)



# Shank Adapters

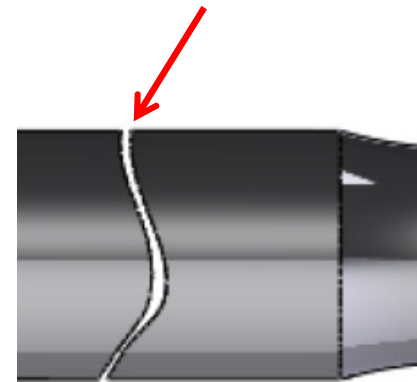
Failure:  
At front bushing bearing surface

Cause of failure:

- Worn out front bushing causing misalignment
- Poor lubrication

Action required:

- Replace worn out front bushings
- Use the proper type and quantity of lubrication, checking often



**F40**

(see pg. 69)



# Shank Adapters

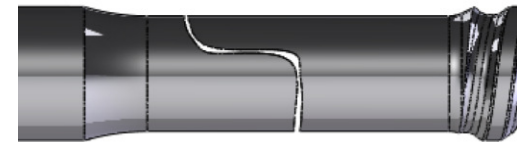
## Failure: Behind the threads

### Cause of failure:

- Drilling with a misaligned boom
- Worn out front bushing causing misalignment
- Excessive feed

### Action required:

- Align the boom prior to drilling
- Replace worn out front bushings
- Adjust feed pressure to rock conditions



**F41**

(see pg. 69)



# Shank Adapters

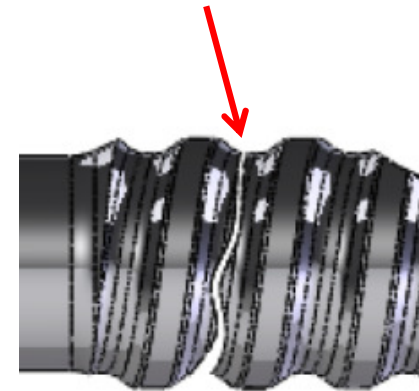
## Failure: Across the threads

### Cause of failure:

- Poor drilling conditions
- Hole deviation
- Bending from excessive feed pressure
- Using percussion while stuck in the drill hole
- Drilling with loose thread joints
- Misaligned threads
- Using a worn coupling or drill rod
- Drilling with dull bits
- Inadequate thread lubrication

### Action required:

- Adjust drilling parameters to the rock conditions
- Use alignment tools and adjust drilling practices to achieve a straighter hole; use bits with drop center face design and/or retrac body
- Do not activate percussion when the drill string is stuck
- Make sure thread joints are tight before starting percussion
- Make sure joints are aligned before threading together
- Use quality products when mating components
- Replace worn out couplings or drill rods
- Sharpen dull carbides, following proper carbide sharpening procedures
- Use the proper type and quantity of lubrication, checking often



**F42**

(see pg. 69)



# Shank Adapters

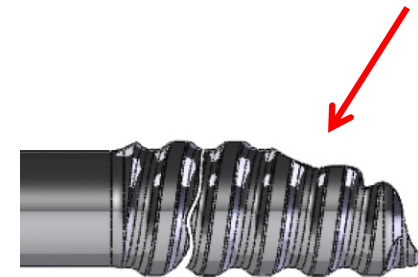
## Failure: Damaged thread end

### Cause of failure:

- Adapter smashed into coupling
- Loose machine cradle
- Boom misaligned
- Adapter not coupled properly to drill rod
- Broken drill rod
- End of drill rod is not square

### Action required:

- Make sure feed mechanism is aligned properly
- Align the boom prior to drilling
- Do not use worn out couplings; make sure joints are aligned before threading together
- Use new couplings with new shank adapters
- Replace worn out, damaged, or broken drill rods
- Regularly inspect condition of drill rod ends



**F43**

(see pg. 69)



# Shank Adapters

## Problem: Pitting and/or galling on the threads

### Cause of problem:

- Un-balanced feed pressure and percussion rate
- Drilling with loose thread joints
- Improper feed to rotation when threading joints together
- Inadequate or improper lubrication

### Action required:

- Monitor joint temperatures; adjust percussion and feed pressures
- Make sure thread quality is good and use new couplings with new shank adapters; make sure thread joints are tight before starting percussion
- Adjust feed and rotation to thread specifications
- Use the proper type and quantity of lubrication, adding often



**F44**

(see pg. 70)





# Failure Summary Index

Part 1 of 2

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Drill bits - top hammer & DTH - button carbide	Crack in bit body originating from bottom of carbide socket	11
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