Cold Planing/Milling Applications & Proper Technique

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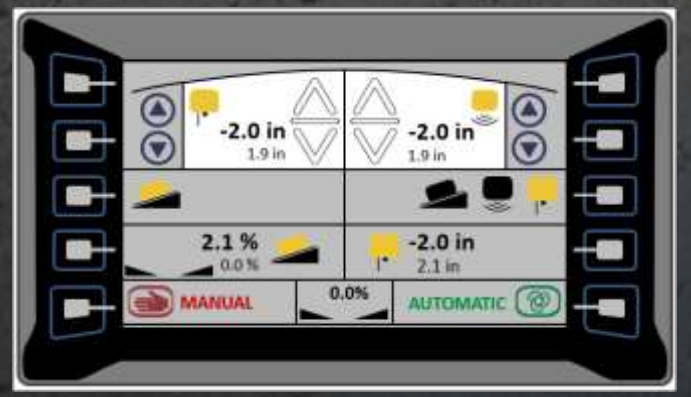
Overview

Factors that affect the finished product

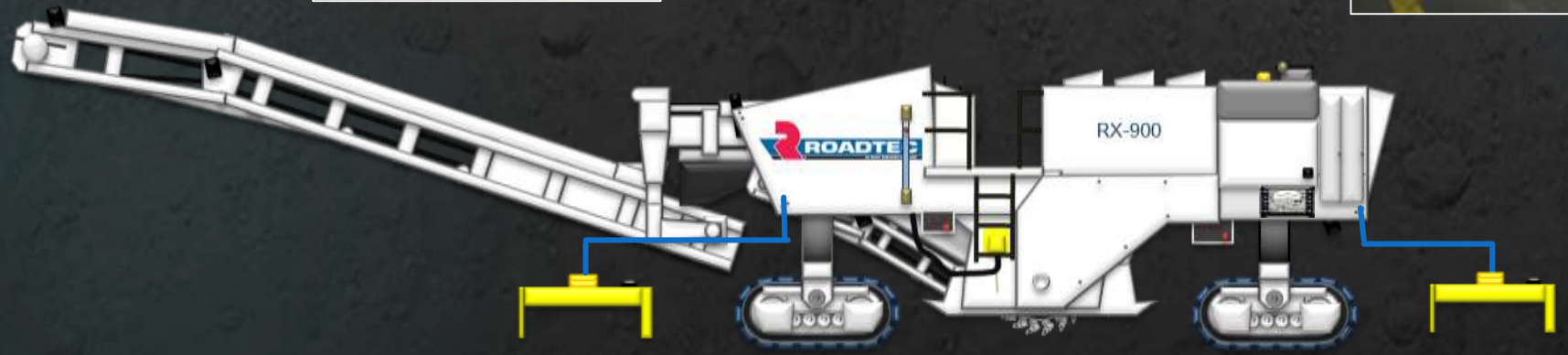
- Environment
- Operating Practices
- Machine Maintenance
- Machine Configuration

Scabbing and Rutting

Grade and Slope Controls



Averaging Systems



GPS Control Systems

Mill to Grade based on Position

Only as accurate as the data

Control Points

Ground Man

- Ground Man is responsible for keeping the surface clean and avoiding obstructions
- All utilities have to be marked
- Each pass must match grade properly
- Ensure each cut entry and exit is executed properly

Clean Surface Required

Grade control sensors (both wire rope and sonic) will react to changes in grade caused by piles of material.

Surfaces must be kept clean in front of the machine, and material piles must be removed every time the machine is picked up

Continuous Milling

Stops in the milling process cause the teeth to excessively cut the same spot, causing dips in the milled surface.

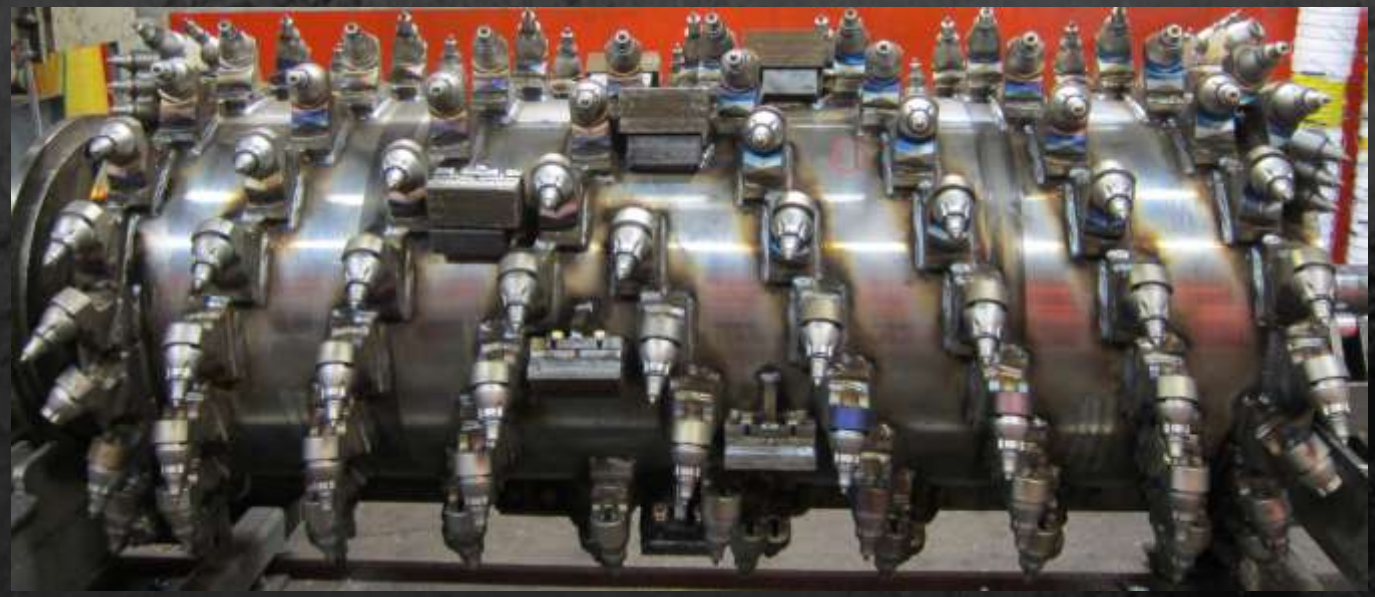
Difficult for the paving crew to correct these flaws.

Cutter Drums

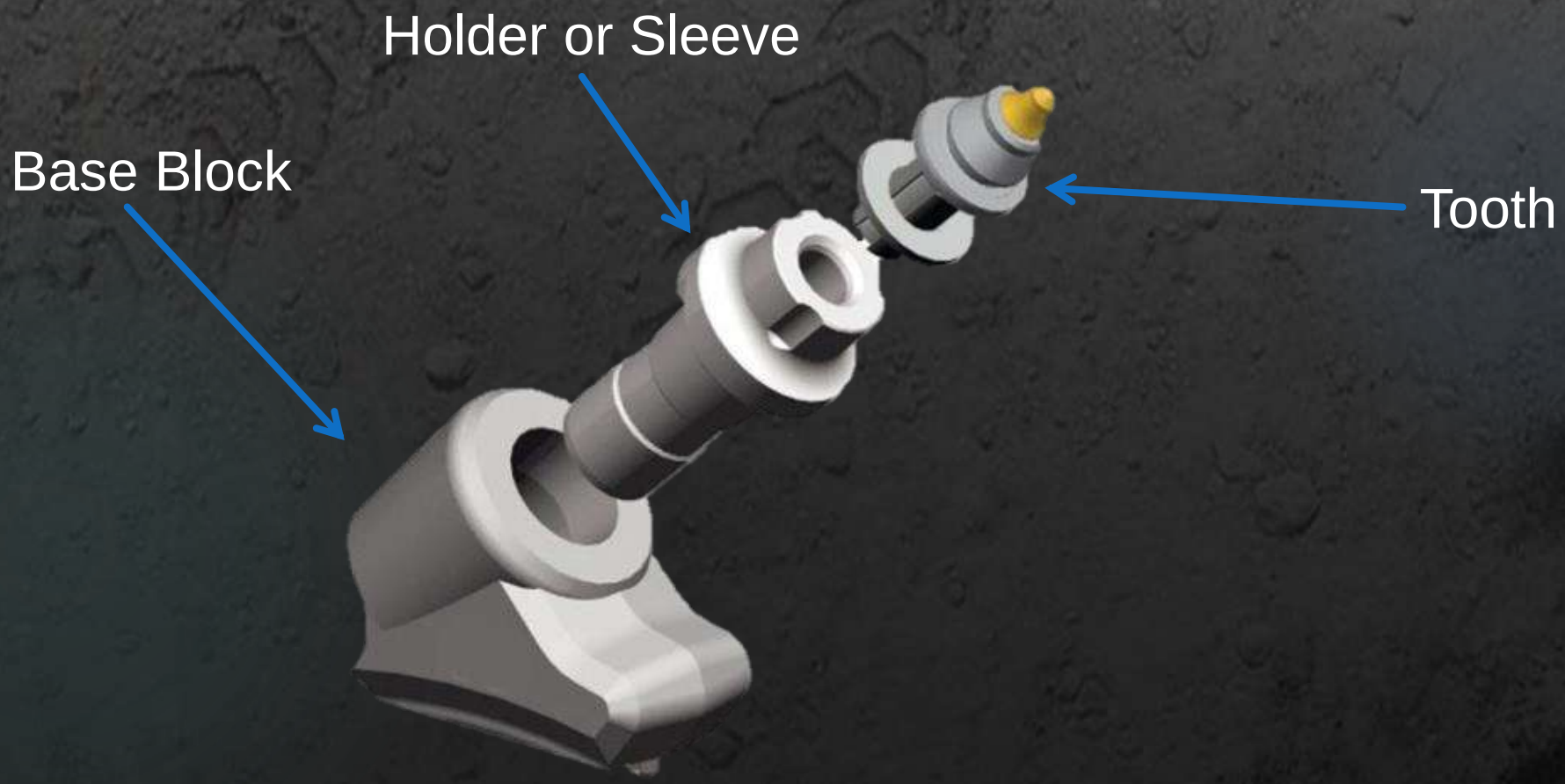
Triple Wrap, Offset flighting.

Tooling is offset so that cutter bits rotate properly

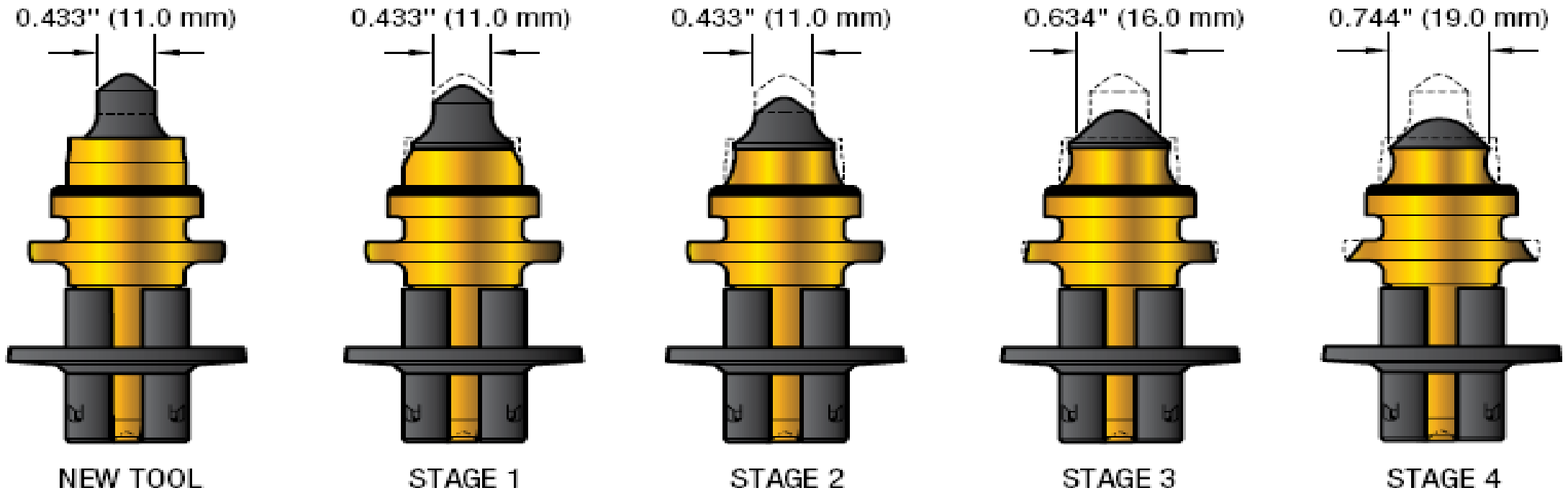
Standard spacing is 5/8”



Drum Tooling Components



Cutter Drum Maintenance



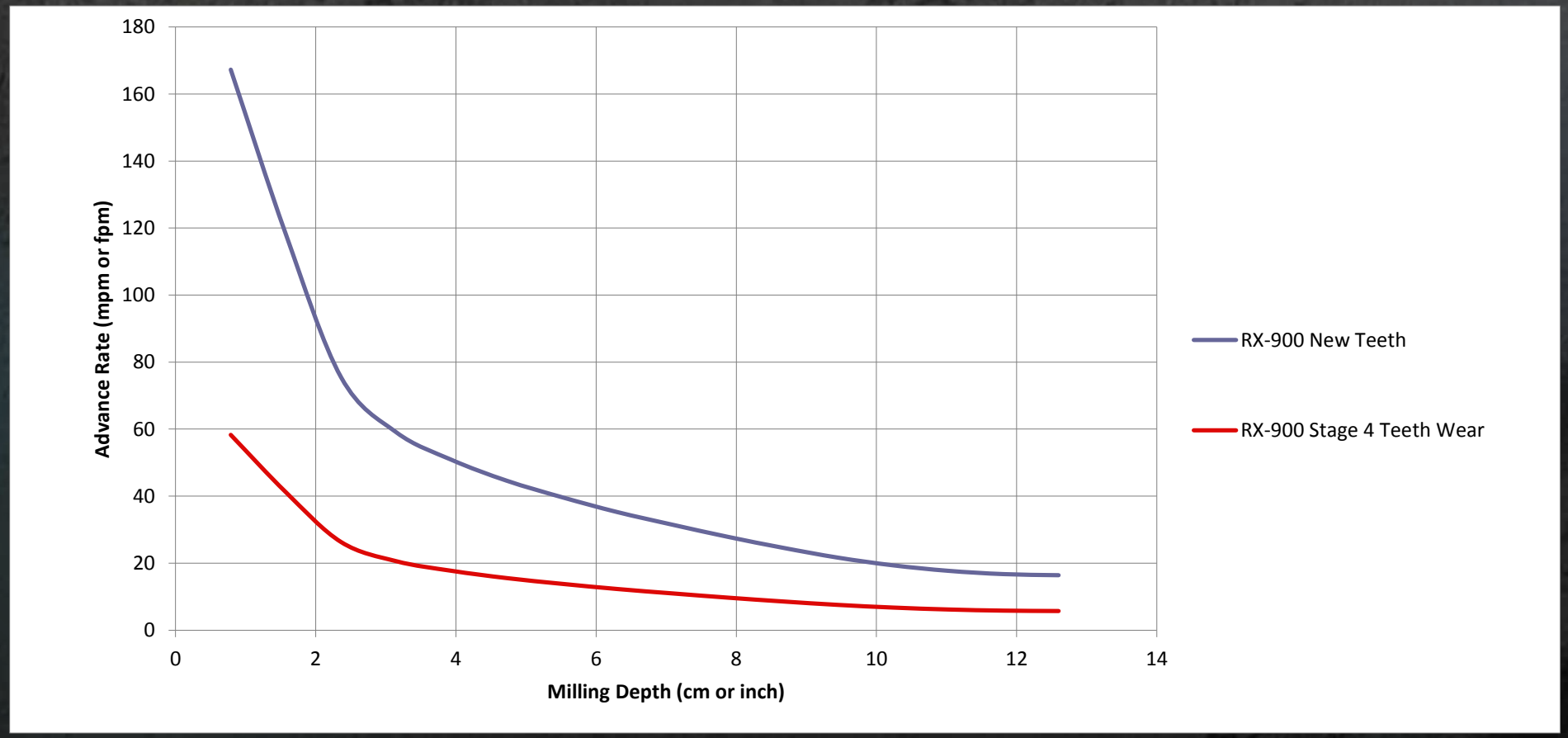
At Stage 3
Tool has lost 0.365 " [9.3 mm] of gage height

Cutter Drum Maintenance

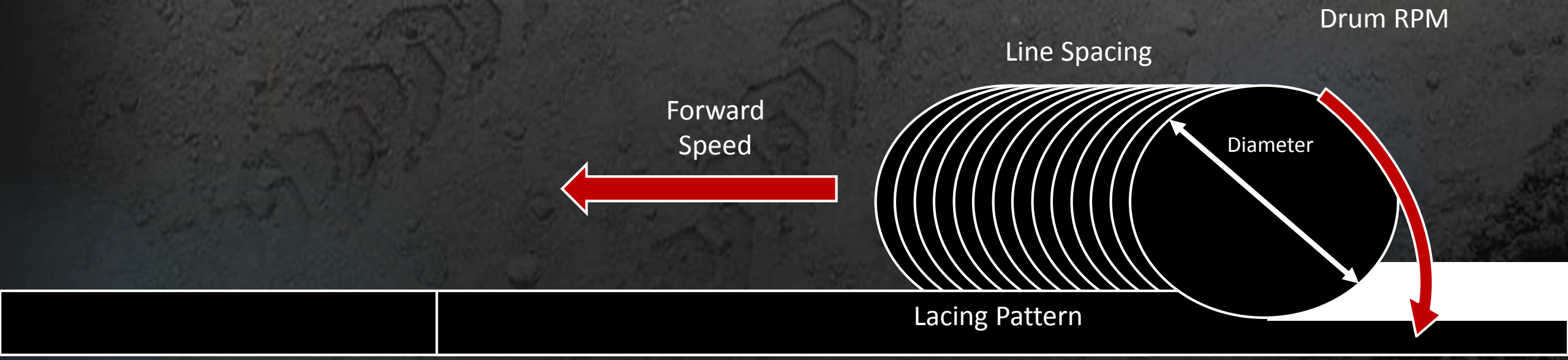
Advanced wear on holders will change how the tooth is seated in the drum.

This changes the surface pattern

Cutter Drum Maintenance



The Math of Milling



The 4 Main Factors Affecting Surface Texture

1. Line Spacing
2. Forward Speed
3. Drum RPM
4. Lacing Pattern

Advance Rate & Longitudinal Smoothness

As the machine reaches a certain ground speed, it begins to "out-run" the cut.

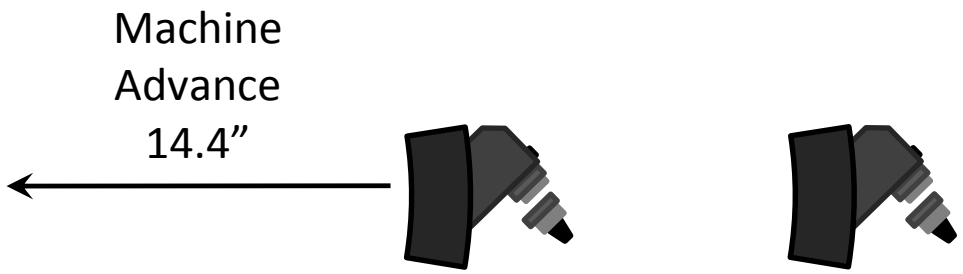
This creates the chevron pattern shown here

Drum rpm must increase, or machine speed must decrease to maintain a smooth surface

Advance = 30 fpm
Drum Dia = 46”
Drum RPM = 100

Machine
Advance
3.6”

Drum Dia = 46”
Drum RPM = 100
Advance=120 fpm



Production Tradeoff

30 fpm vs. 120 fpm

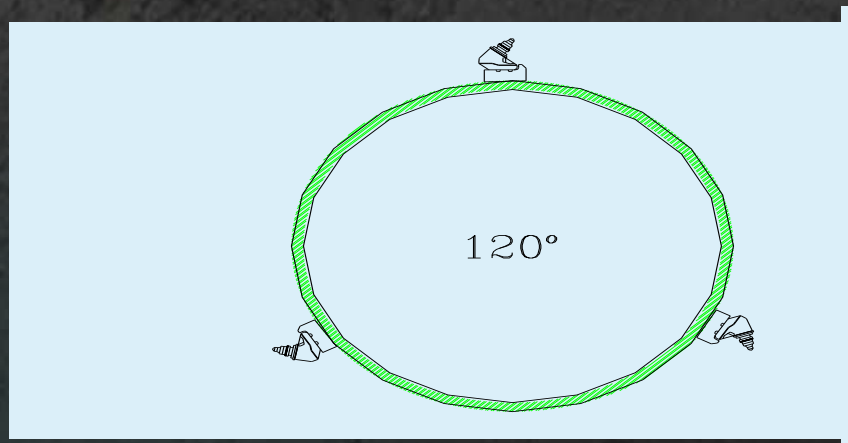
2.3 miles in a day vs. 9.1 miles in a day

Double Hit Drums

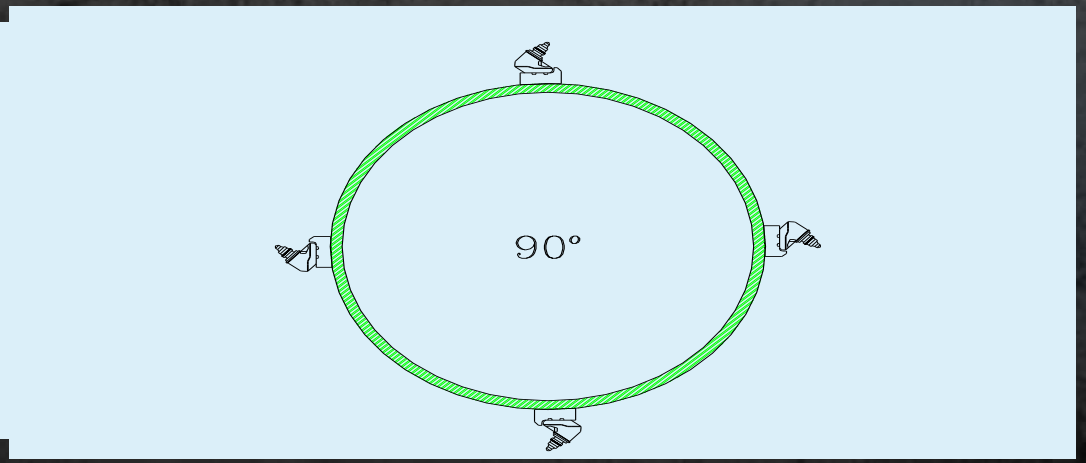
Above
Double hit Quad wrap drum

Standard triple wrap drum
Below

Drum Lacings
Scroll Start Comparisons

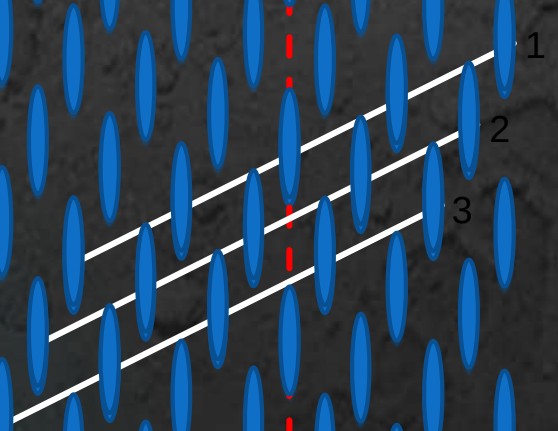


Triple Wrap

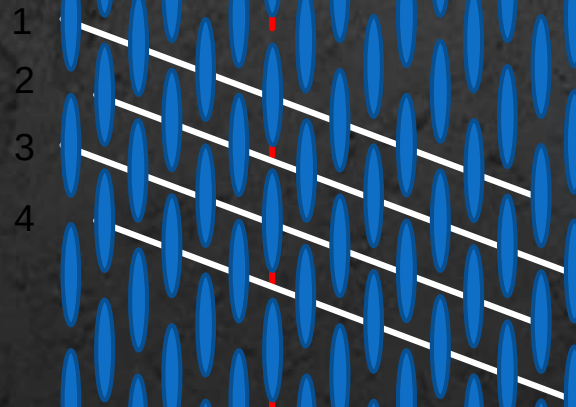


Double Hit Quad Wrap

Pattern Comparisons



Single Hit
Triple Wrap



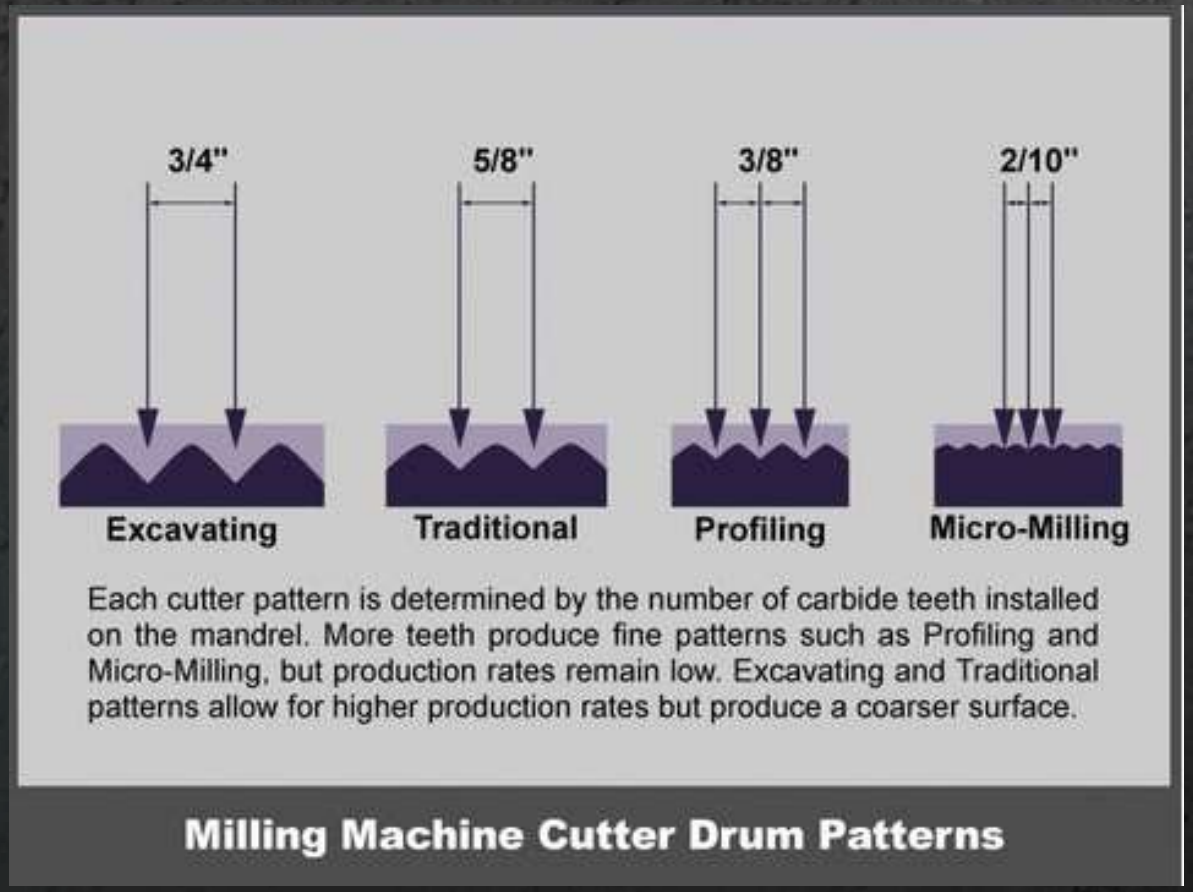
Double Hit
Quad Wrap

Pattern Comparison

5/8” Triple Wrap at 100 FPM

7/8” DHQW at 100 FPM

Line Spacing and Texture

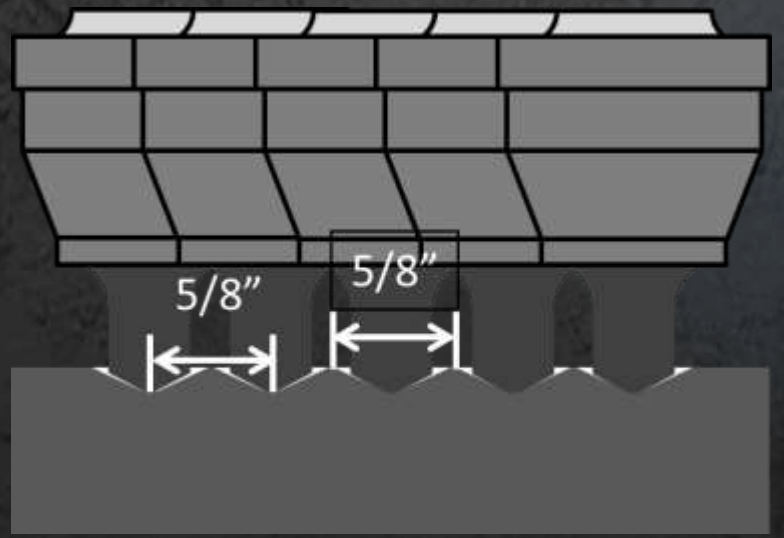


Milling Machine Cutter Drum Patterns

Line Spacing

Standard drums are configured with 3 scrolls of teeth on each side (Triple Wrap)

In one revolution of the drum, each tooth should strike the surface once in lines spaced 5/8” apart



5/8” Spacing at 30 fpm

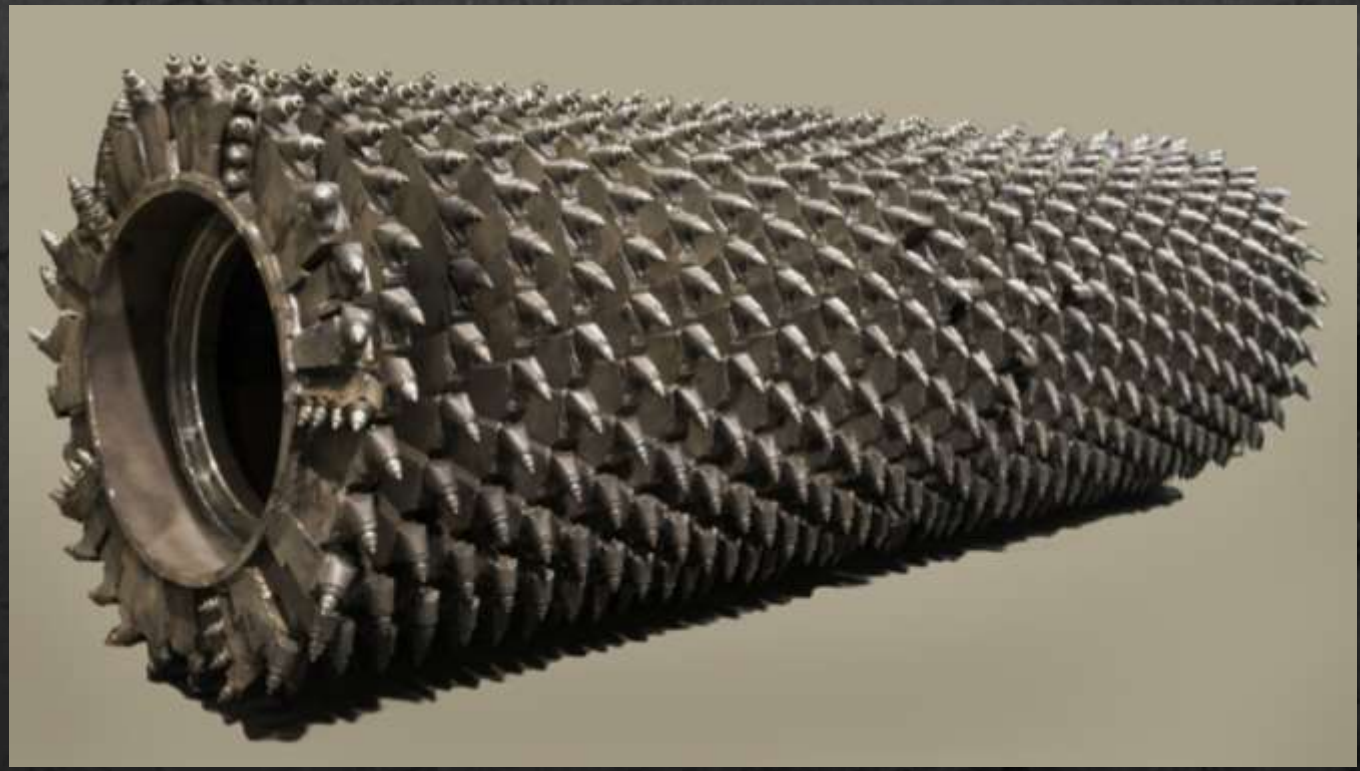
Micro-Mill Drums

Laced with 4 scrolls of teeth

0.2" Spacing

Must be built with weld-on tooling

Cut depths < 2"



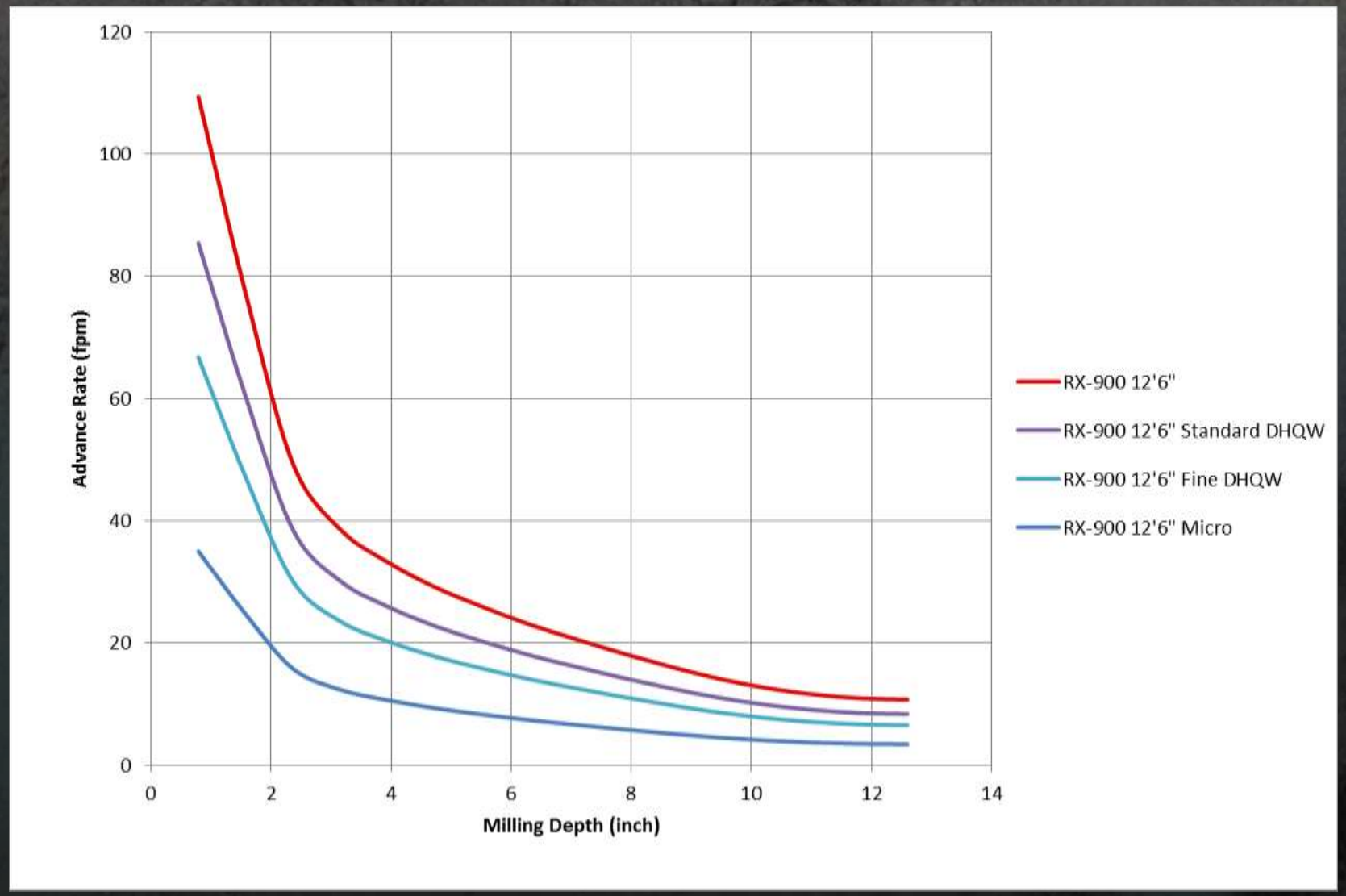
2/10” Micro-Mill Pattern

Production & Cost Comparison

12'6" (3.5 m) Full Lane Drum		
Line Spacing	# of Teeth	Cost of Teeth
5/8" (16 mm)	**268**	**$1340**
3/8" (9 mm)	**406**	**$2030**
0.2" (5 mm)	**770**	**$3850**

Nearly 3 times the teeth
Nearly 5 times the cost
No quick change holders

Production


120
100
80
60
40
20
0
Advance Rate (fpm)
0
2
4
6
8
10
12
14
Milling Depth (inch)
RX-900 12'6"
RX-900 12'6" Standard DHQW
RX-900 12'6" Fine DHQW
RX-900 12'6" Micro

Things we need to think about

Prior planning will help you do better work. Look at the job before you cut.

Know what your machine is capable of doing.

Make sure your machine is ready to cut. Keep up with the maintenance.

Am I cutting shoulder and will I have a good reference.

What is expected? smoothness or getting get in and get out…

Keep your job clean. Having a clean surface will help you start and make better transitions.