Welcome to the 2019 PMPA National Technical Conference
Why Not Swiss?

...........Because of the Limitations.........
Swiss Basics

- Originally Designed For Watch Winding Stems And Small Screws
- Styles Of Machine:
  - Gang
  - Turret
  - Gang/Turret
  - Tool Changer
- Sliding Headstock Concept
- Non-guide Bushing
Why Swiss?

- Length to Diameter Ratio
- Complete Part in 1 Operation
- Workholding
- Need for Speed
- Operator Attention
- Size/Shape Matters
- Accuracy
Swiss Advantages Over Traditional Turning

**Length to Diameter Ratio**

- Minimal Workpiece Deflection Due To Metal Removal At The Guide Bushing (Support)
- Starting Material Length Is Maximum Part Length
  - Controlling The Bar During Headstock Travel Is Key
  - Barfeeders Are Commonly Designed To Handle Bars That Are 6’, 12’, 20’ Long
- Headstock Travel Controls The Length Of Machining Before Re-chucking
  - Change In Features “Hide” Witness Marks
- Longer Parts Are Ejected Through The Subspindle
- Most Turning Is Done In 1 Pass
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Complete Part in 1 Operation

- Turning
- Milling
- Drilling
- Boring
- Tapping
- Reaming
- Burnishing
- Grooving
- Thread Rolling
- Thread Whirling
- Thread Milling
- Thread Cutting (Die Head)
- Gear Hobbing
- Laser Cutting/Etching/Welding
- Slotting
- Deburring
- Polygon Generation
- Broaching
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**Workholding Is KEY**

- Reliable And Repeatable Fixturing Is Important
  - Fallout At Secondary Operations Is Costly
- All But 1 “Side” Is Machined While Still Attached To The Original Fixture
  - Precisely Why The Aerospace Industry Use Swiss Style
- The Workholding Is The Collet In Your Main Spindle, Bar Material Quality Is Important
- Collet/Guide Bushing Can Be Standard Or Double Cone
- Your Op 20+ Is The Sub Spindle Which Is A Repeatable Method For Fixturing
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Manufacturing Feels The Need For Speed

- Sub Spindle Synchronization To Pick-off Within 3 Seconds
- Fast Rapids Moving Short Distances With Minimum Mass
- Main/Sub Spindle Rpms Common 12,000-15,000 With The Ability To Go From Zero To Max Rpm To Zero In Under 3 Seconds
- Changeover Times Are Decreasing Rapidly Due To:
  - Quick Change Toolholders
    - Turning Tool Cartridges
    - Pre Qualified Drills, End Mills, Boring Bars, Etc.
  - Machines That Hold More Tools (Also Allows For Many Standard Tools To Be Cut-ready)
    - Turret Style Machines
    - Toolchanger Style Machines
    - Offline Preset Tooling
- Chip To Chip On A Bar Change Is Usually Less Than 45 Seconds
- Simultaneous Tools In The Cut
- Consistent Market Growth
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Swiss Advantages Over Traditional Turning

Minimizing The Need For Operator Attention With Process Stability

- Straight, Round, Consistent Material Helps Create A Repeatable Process
- Monitor The Metal Removal Process
  - Vibration Monitoring
  - Servo Motor Load Monitoring
  - Tool Life Counters
- Monitor The Material Feeding Process
  - Barfeeder Vibration Monitoring
  - Remaining Remnant Length (Make Logic Decisions Based Upon Available Length)
- Create Redundant Tooling Conditions
- Use Predictive Analytics To Determine:
  - When The Barfeeder Will Need To Be Reloaded
  - When The Tooling Will Need To Be Changed Or Fail Prematurely
- Lights-out Operation
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Size/Shape Matters

- Faster, Smaller, Cheaper Is A Global Directive For Virtually Every Industry
  - Aerospace
  - Medical
  - Defense
  - Automotive
- Under 2” Diameter Capacity
- Automatic Barfeeders Capable Of Loading Material Down To 1/32” Diameter
- Automatic Barfeeders Capable Of Loading Shapes
  - Round
  - Rectangular
  - Keyhole
  - Flat Bar
  - All Thread
  - Tubing
  - Hex
  - Square
- Machine Footprint
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Accuracy
Swiss Advantages Over Traditional Turning

Accuracy - “Aim Small, Miss Small”

- The Material Is Pushed Past The Tool Allowing Independent Slide Movements To Create A Feature
- Weight Of Material And Spindle Are Borne Prior To The Guide Bushing
- Support At The Cut
- Get Cutting Fluid To The Cut
  - Small Cutting Area Allows Plumbing Direct Flow To The Cut
  - Through Tool Coolant On Most Tools
  - 1,000 And Up PSI Pressures
- Precision Spindles
Swiss Advantages Over Traditional Turning

- Machine Footprint
- Cutting Oil vs. Water Soluble
- Cost of Material
- Cost of Collets and Guide Bushings vs. Chucks
- Capable Manpower/Complexity
- Lot Sizes
- Capital Investment
Why Swiss?

Why Not...
Thank You!