MATERIALS FOR HEAVY INDUSTRIAL MAINTENANCE
HIGH STRENGTH ALLOY & CARBON STEELS

KROMITE® #3 HRHT (4140/4150 MOD), HIGH STRENGTH, PREHARD, ALLOY

Features
- Clean Steel Technology
- Electric Furnace Melt
- Vacuum Degassed
- Fine Grain Structure
- Heat Treated
- Machine Straightened
- Stress Relieved

Typ. Mechanical Properties*
- Hardness: 269/341 BHN
- Tensile: 156,000 PSI
- Yield: 123,500 PSI
- Elongation in 2": 17%
- Reduction of Area: 53%

Availability
- Rounds: 1/2" to 16"
- Squares: 1/2" to 6"
- Flats: 1/4" x 1" to 3" x 6"

Lengths
- 10/12 Ft R/L, 20/24 Ft R/L and Custom Cut-To-Lengths

Consider in place of: AISI 1018, 1020, 1045, 4130, 4140, 4150 and 4340 depending upon the requirement.

KROMITE® COLD DRAWN (4140 MOD), COLD FINISHED, ANNEALED ALLOY

Features
- Quench & Tempered
- High Strength
- Fine Grain Structure
- Fatigue Resistant
- Stress Relieved
- Free of Hard & Soft Spots

Typ. Mechanical Properties*
- Hardness: 180/235 BHN
- Tensile: 145,000 PSI
- Yield: 110,000 PSI
- Elongation in 2": 19%
- Reduction of Area: 50%

Availability*
- 3" OD x 1-1/2" ID to 6" OD x 3-1/2" ID
- Inquire On Other Sizes

Lengths
- Standard 18" Lengths
- Custom Cut-To-Lengths

*Supplied as a rough size (OD & ID)

KROMITE® #3 HOLLOW BAR (4140 MOD), HEAVY HOLLOW STOCK

Features
- Quench & Tempered
- High Strength
- Fine Grain Structure
- Fatigue Resistant
- Stress Relieved
- Free of Hard & Soft Spots

Typ. Mechanical Properties*
- Hardness: 269/341 BHN
- Tensile: 145,000 PSI
- Yield: 123,500 PSI
- Elongation in 2": 17%
- Reduction of Area: 53%

Availability* 3" OD x 1-1/2" ID to 6" OD x 3-1/2" ID

Lengths
- Standard 18" Lengths
- Custom Cut-To-Lengths

*Based on 1/2" test specimen

REDI-RAIL® CUSTOM HARDENED, PRECISION FINISHED, WEAR RAILS

Suited to handle many applications including: transfer rails, conveyor guide rails, machine ways, beef rails, heavy-duty tracks and various OEM parts. Its wear resistant properties far exceed that of "cold roll" steels even after further heat treatment is applied. Typical hardness range is "55/62" Rc; results based on decarb removal.

Availability
- Squares: 3/8" up to 4"
- Flats: 1/4" x 1" up to 2" x 6"

Beef & Pork Rail Stock
- 1/2" x 2-1/2", 1/2" x 3" and 5/8" x 3" (RD & SQ Hardened Edge)

Lengths
- 10/12 Ft R/L, 20/24 Ft R/L and Cut-To-Lengths

(meets specs of Kromite® CD60)

HIGH STRENGTH ALLOY & CARBON STEELS

(meets specs of Sheffield™ #10)
Our metals are manufactured utilizing clean steel technology and strict process controls to ensure the highest level of quality.

**MIRRALOY® TGP (4140/4150 MOD), TURNED GROUND & POLISHED, ALLOY SHAFT**

**Features**
- Clean Steel Technology
- Electric Furnace Melt
- Vacuum Degassed
- Fine Grain Structure
- Heat Treated
- Machine Straightened
- Stress Relieved

**Typ. Mechanical Properties**
- Hardness - 269/341 BHN
- Tensile - 156,000 PSI
- Yield - 123,500 PSI
- Elongation in 2" - 17%
- Reduction of Area - 53%

**Availability**
- Rounds - 1/4" up to 8"
- Metric Rounds - 4MM up to 100MM (Call For Other Sizes)

**Lengths**
- 10/12 Ft R/L, 20/24 Ft R/L and Custom Cut-To-Lengths

*(meets specs of Sheffield™ #20)*

**MIRRALOY® FM TGP (1144 MOD), FREE MACHINING, TGP SHAFT**

**Features**
- Clean Steel Technology
- Proprietary Chemistry
- Machine Straightened
- Fatigue Resistant
- Precision TGP Finish
- Free Machining

**Typ. Mechanical Properties**
- Hardness - 260 BHN
- Tensile - 133,000 PSI
- Yield - 110,00 PSI
- Elongation in 2" - 8% min.
- Machinability - Approx. 83%

**Availability**
- Rounds - 1/4" up to 4"

**Lengths**
- 10/12 Ft R/L
- 20/24 Ft R/L
- Custom Cut-To-Lengths

*(meets specs of Sheffield™ #20 FM)*

Up to 50% more strength than AISI 1018 carbon steel. This is a “near” bearing-fit, precision shaft.

**MIRRALOY® FM PRE-KEYED, FULL LENGTH, TGP, KEYED SHAFT**

**Features**
- Clean Steel Technology
- Proprietary Chemistry
- Machine Straightened
- Fatigue Resistant
- Precision TGP Finish
- Keyed Full Length

**Typ. Mechanical Properties**
- Hardness - 260 BHN
- Tensile - 133,000 PSI
- Yield - 110,00 PSI
- Elongation in 2" - 8% min.
- Machinability - Approx. 83%

**Availability**
- Rounds - 1/2" up to 2-15/16"
- Other Sizes & Metrics Available

**Lengths**
- 10/12 Ft R/L
- Custom Cut-To-Lengths

*(meets specs of Sheffield™ FM Redi-Key)*

**KROMITE® KEYSTOCK, COLD FINISH, DOUBLE DRAWN, CARBON STEEL**

**Features**
- Fine Grain Structure
- Sharp Square Corners
- Double Drawn Process
- Plus Tight Tolerances

**Availability**
- Fractional Squares - 1/8" up to 1-3/4"
- Metric Squares - 5MM up to 50MM

**Lengths**
- 12 Ft R/L

*(meets specs of Sheffield™ Keystock)*
**MIR50® STAINLESS**

**Features**
- High Strength
- Galling Resistant
- Corrosion Resistant
- Fatigue Resistant
- Double Stress Relieved
- Resists Shock
- PSQ Straightness
- Precision TGP Finish
- Machinable & Weldable
- Sour Service Approved

Typ. Mechanical Properties*
- Hardness: 258/294 BHN
- Tensile: 140,000 PSI
- Yield: 108,000 PSI
- Elongation in 2" - 26%
- Reduction of Area - 65%
- Charpy "V" Notch - 105 @ 70°F

**Agency Concurrence**
- NACE MR-01-75-97 rev
- AMS-5763 (chemistry)
- FDA and API-6A

**Availability**
- PSQ Rounds - 1/4" up 6"
- Rough Turned, Oversized - 3/4" up to 6-3/4"

*Mir50® replaces most other commercial grade stainless steels such as, 304L, 316L, 410, 416, 17-4PH, 15-5PH depending upon the specific maintenance application.

*Mir50® accepts additional hardness to Rockwell “C” 36/44. Contact office for details.

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**MIR50® BUSHING STOCK**

**Features**
- High Strength
- Galling Resistant
- Corrosion Resistant
- Fatigue Resistant
- Double Stress Relieved
- Low Memory
- Machinable
- Weldable
- Sour Service Approved

**Typ. Mechanical Properties**
- Hardness: 258/294 BHN
- Tensile: 140,000 PSI
- Yield: 108,000 PSI
- Elongation in 2" - 26%
- Reduction of Area - 65%
- Charpy "V" Notch - 105 @ 70°F

**Agency Concurrence**
- NACE MR-01-75-97 rev
- AMS-5763 (chemistry)
- FDA and API-6A

**Availability**
- 2-1/2" OD x 1" ID up to 6-1/2" OD x 3" ID
- Supplied rough machined with allowance for proper clean-up.
- Other sizes available, contact office for further details.

**Lengths**
- Custom Cut-To-Lengths

*Mir50® is well-known as the “4340 of the stainless world”. Offers excellent serviceability in the paper, marine, chemical and food processing industries.

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**CENCOR™ STAINLESS**

**Features**
- Corrosion Resistant
- Precision TGP Finish
- Tight Tolerances
- Scaling Resistant
- Machinable

Typ. Mechanical Properties*
- Hardness: 186 BHN
- Tensile: 82,000 PSI
- Yield: 33,000 PSI
- Elongation in 2" - 35%
- Reduction of Area - 45%

**Service Temperature**
- 1400°F (max limit)

**Availability**
- Rounds - 1/8" to 4-1/2"
- Metric Rounds - 4MM to 50MM

**Lengths**
- 10/13 Ft R/L
- Custom Cut-To-Lengths

(meets specs of Sheffield™ Stainless)
ASC2250® LDX HIGH STRENGTH, LEAN DUPLEX, BEARING-FIT STAINLESS SHAFT

Features
Stress Corrosion Cracking (SCC) Resistance
Excellent Pitting Resistance (PRE26)
Corrosion Fatigue Resistance
Improved Strength Over 304L & 316L Stainless
Service Temperature Up To 800°F
Machinable and Weldable
Bearing-Fit, TGP Finish

Agency Concurrence
National Sanitation Foundation approval for drinking water applications (NSF Section 61).
USDA approval for dairy processing applications (3-A Format for Sanitary and Practice Standards).

Typ. Mechanical Properties*
Hardness - 290BHN max
Tensile - 94,000 PSI min
Yield - 65,000 PSI min
Elongation in 2" - 30%
Reduction of Area - 45%
*Based on 1/2" test specimen

Availability
Bearing-Fit TGP Rounds - 1/2" to 6"
Rough Turned, Oversize Rounds - 5/8" to 6"
Metric Bearing-Fit Rounds - 20MM to 90MM

Service Temperature
Up to 800°F

Lengths
10/13 Ft R/L, 20/26 Ft R/L and Custom Cut-To-_lengths

ASC2250® LDX (2101 Duplex) is a lean duplex stainless steel that exhibits equal parts Austenite and Ferrite. It combines high chromium, nitrogen and molybdenum to enhance the corrosion resistance and toughness of the steel.

ASC2250® LDX HIGH STRENGTH, LEAN DUPLEX STAINLESS PLATE

Features
Stress Corrosion Cracking (SCC) Resistance
Excellent Pitting Resistance (PRE26)
Corrosion Fatigue Resistance
Superior Mechanical Properties
Improved Strength Over 304L & 316L Stainless
Machinable and Weldable
"Non-Bright" Surface Finish

Agency Concurrence
National Sanitation Foundation approval for drinking water applications (NSF Section 61).
USDA approval for dairy processing applications (3-A Format for Sanitary and Practice Standards).

Typ. Mechanical Properties*
Hardness - 290BHN max
Tensile - 94,000 PSI min
Yield - 65,000 PSI min
Elongation in 2" - 30%
Reduction of Area - 45%
*Based on 1/2" test specimen

Service Temperature
Up to 800°F

Availability
Plates - 14 Gage up to 3/8" Thick
Sheet Sizes
48" x 120"

AQUA-KEY® HIGH STRENGTH, CORROSION RESISTANT STAINLESS KEYS TOCK

A unique stainless steel product designed to provide a high level of reliability for general maintenance applications in marine service and other corrosive environments.

Availability
Squares and Rectangles
(Contact Office For Details)
**RHINO-TUF® EZ**  AR400 ABRASION RESISTANT, “THRU-HARDENED” WEAR PLATE

**Features**
- Clean Steel Technology
- Vacuum Degassed
- Abrasion Resistant
- Ease of Machining
- Weldable & Formable
- Low Carbon Equivalency

**Typ. Mechanical Properties**
- Hardness - 400/440BHN
- Tensile - 180,000 PSI
- Yield - 140,000 PSI
- Elongation in 2" - 15%
- Reduction of Area - 60%
- Grain Type - Tempered Martensite
- Carbon Equivalency (CE) - 47

**Availability**
- Plates - 1/8” up to 4”

**Sheet Sizes**
- 48” x 96”, 48” x 144”, 48” x 288”, 96” x 144”, and 96” x 288”
- Custom Cut Shapes
- Options Available

*Rhino-Tuf® EZ* can replace most other commercial grade wear products including but not limited to: HSLA, T-1, A36, AR360, AR400 and A514. Plasma, laser and water jet cutting services available.

**RHINO-TUF® EZ**  AR400 ABRASION RESISTANT, “THRU-HARDENED” WEAR STRIPS

**Features**
- Clean Steel Technology
- Vacuum Degassed
- Abrasion Resistant
- Ease of Machining
- Weldable & Formable
- Low Carbon Equivalency

**Typ. Mechanical Properties**
- Hardness - 400/440BHN
- Tensile - 180,000 PSI
- Yield - 140,000 PSI
- Elongation in 2" - 15%
- Reduction of Area - 60%
- Grain Type - Tempered Martensite
- Carbon Equivalency (CE) - 47

**Availability**
- Strips - 1/8” up to 1” Thk
- Widths - 3/4 up to 4”
- and Custom Options

**Lengths**
- 10/12 Ft R/L, 20/24 Ft R/L
- and Custom Options

*Rhino-Tuf® EZ* wear strips are offered as hot roll bars (mill edged), oxy-cut, and/or high-definition plasma cut depending upon size and thickness configuration.

**ULTIMA™ 501**  AR500 (MOD), ABRASION RESISTANT, “THRU-HARDENED” WEAR PLATE

**Features**
- Clean Steel Technology
- Vacuum Degassed
- Electric Furnace Melt
- Abrasion Resistant
- Quench & Tempered
- Formable
- Inclusion Shape Control

**Typ. Mechanical Properties**
- Hardness - 475/535BHN
- Tensile - 255,000 PSI
- Yield - 200,000 PSI
- Elongation in 2" - 15%
- Reduction of Area - 41%
- Grain Type - Tempered Martensite
- Carbon Equivalency (CE) - 54

**Availability**
- Plates - 1/4” up to 3”

**Sheet Sizes**
- 48” x 96”, 48” x 144”, 48” x 288”, 96” x 144”, and 96” x 288”
- Custom Cut Shapes
- Options Available

*Rhino-Tuf® EZ* and *Ultima™ 501* are engineered to handle a wide range of maintenance applications including: crusher plates, truck bed liners, chain conveyors, hammers, bucket liners, fan blades, impact pads, coal chutes, wear screens, mixer components, inspection plates and chipper blades.

*Both Rhino-Tuf® EZ* and *Ultima™ 501* are intended for use in applications where a good balance of impact, toughness and abrasion resistance are required. Abrasion resistant steels are typically sold to hardness ranges and not fixed chemistries.

Note: Wear plate products are designed for liner applications; they are not intended for use as self-supporting structures or lifting devices. Proper precautions should be adhered to when working with and/or fabricating AR plate products.
ULTIMA™ 601 AR600 ABRASION RESISTANT, HARDENED I.D. WEAR PIPE

**Features**
- Excellent Hardness
- Superior Abrasion Resistance
- Adaptable To Various Configurations
- Up To 6X More Life Than Mild Steel

**Typ. Mechanical Properties**
- I.D. Hardness - 600BHN
- O.D. Hardness - 300BHN

**Availability**
- 3" SCH 40 up to 8" SCH 40
- 6" SCH 80 up to 14" SCH 80
- 10" XH up to 20" XH

**Typ. Mechanical Properties (Continued)**
- Custom T's, Y's, Laterals, Reducers, Flanges and Couplings Also Available

**Lengths**
- 10 Ft R/L
- 20 Ft R/L

The O.D. is still "wear plate hard" (360/400BHN).

Ultima™ 601 is designed to extend service life where abrasive materials (i.e. glass, coke, coal, wood chips, fly ash, sand, cement, rice and stone) can cause pre-mature wear. Simple welding precautions are required to protect high hardness at the joints. Inquire.

WORKWEAR™ 14 11-14% (HADFIELD) MANGANESE IMPACT STEEL

**Features**
- Excellent Hardness Results
- Hardens Under Load and Impact
- True Hadfield Grade

**Availability**
- Plates - 1/4" up to 3" Thick
- Rounds - 3/8" up to 7"
- Flats - 1/4" up to 2" Thick
- Squares - 3/4", 1", 1-1/2" and 2"
- Angle - 2" x 2" x 1/4"

**Typ. Mechanical Properties**
- Tensile - 130,000 PSI
- Yield - 85,000 PSI
- (As Delivered) Hardness - 250BHN
- (After Work Hardening In The Field) Achieved Hardness - 550BHN

**Typ. Mechanical Properties (Continued)**
- Contact our office for all sizes and various configurations.

Rhino-Klad™ CHROMIUM CARBIDE OVERLAY CLAD PLATE AND SHAPES

**Features**
- Excellent Abrasion Resistance
- High Impact Resistance
- Weldable

**Availability**
- Standard Nominal Thicknesses - 3/8" up to 1"
- Carbide Overlay Thickness - 1/8" up to 3/8" (Single & Double Pass Available)

**Typ. Mechanical Properties**
- Developed Hardness - Rc "60/62"
- Contact our office for all sizes and various configurations.

Rhino-Klad™ provides excellent service in extreme abrasion and impact applications. The process provides a chromium carbide overlay metal that is fusion bonded to high quality plate. Cladding plate produces natural stress relief cracks which provide a certain amount of extended wear.
KROMITE® THREADED BAR
HEAT TREATED, ROLL THREADED ROD

Features
- Heat Treated
- High Strength - Alloy Material
- Rolled Threads vs Cut Threads
- Excellent Toughness
- Creep Resistant
- Consistent Grain Structure
- High Degree of Accuracy
- Precision Fit

Typ. Mechanical Properties
- Hardness - 321BHN
- Tensile - 155,000 PSI
- Yield - 135,000 PSI
- Grain Size - 7
- Elongation in 2" - 19%
- Reduction of Area - 53%
*Based on 1/2" test specimen

Availability
- National Fine - 1/4" (28) to 2" (12)
- National Coarse - 1/4" (20) to 2-1/2" (4-1/2)
- Eight Pitch - 1" (8) to 2-1/8" (8)
- Acme - 3/8" (12) to 2-1/2" (4)
- Metrics - 4MM (.7) to 39MM (4.0)

Kromite® Threaded Bar conforms to ASTM A193, Grade B7.

The secret to the strength of our threaded bar is in the rolling process. Thread rolling deforms the blank material as it is forced along the contour of the die. The worked material is strain hardened, resulting in a product stronger and harder with minimal risk of fatigue failure relative to cut threads.

Considered as a suitable upgrade where maintenance applications require improved strength and durability. Not intended for indexing or lead screws.

KROMITE® ECONO-FINISH
PRE-HARD, 28/34 RC, DECARB-FREE, PLATE

Features
- Heat Treated
- High Strength
- 4140/4142 (Mod.) Alloy
- Furnished 269/341BHN
- Decarb-Free
- Machinable

Surface Condition*
- Ground Top & Bottom (+.015"/.035" oversize)
- Edges Saw Cut (+1/8" oversize) With Stock
- Allowance For Clean-Up
*As Delivered (Pre-Machined Condition)

Availability
- Squares 3/4" to 6"
- Flats 1/4" to 6" thick and 1" to 32" wide
- Also available in the Annealed Condition

This pre-hardened, pre-machined product will dramatically reduce material preparation time and allow you to get finished parts in service quickly and to extend service life.

All of the decarb (from the heat treating process) has been removed. This “decarb-free” surface finish will accept maximum surface hardening for maximum wear resistance. The PLUS TOLERANCE is provided to minimize machining at your job site.

Consider this product for dies, molds, support tooling, and various fixtures. Please inquire with your “finished” dimensions.

OTHER TOOL & DIE STEELS
Molex® #7 (O-1) Oil Hardening Tool Steel
Molex® #8 (A-2) Air Hardening Die Steel
Molex® #13 (H-13) Hot Working Tool Steel
Krome Die™ (D-2) Air Hardening Die Steel
Lusco™ #7 (S-7) Shock Resistant Tool Steel

Precision Finish, Decarb-Free, Close Tolerance
Drill Rod & Flat Ground Stock Available (all grades)
MIRRO-KROME 60® (I.H.C.P.)
INDUCTION HARDENED, CHROME PLATED

Features
- Induction Hardened
- Chrome Plated
- Abrasion Resistance
- Corrosion Resistance
- Polished Finish
- Fatigue Resistance

Typ. Mechanical Properties*
- Surface Hardness - Rc “50” min
- Depth of Plating - .001”/side
- Yield - 100,000 PSI approx.
- Elongation in 2” - 10%
- Reduction of Area - 38%
- Finish - 12/15 RMS

Availability
- Rounds - 1/2” up to 6”
- Metrics - 12MM up to 80MM (other sizes may be available)

Lengths
- 10/12 Ft and 20/24 Ft R/L, Custom Cut-To-Lengths

*Based on 1/2” dia. specimen

MIRRALOY® HCP (C.P.O.)
HARD CHROME PLATED SHAFT

Features
- Chrome Plated
- Abrasion Resistance
- Corrosion Resistance
- Polished Finish

Typ. Mechanical Properties*
- Chrome Hardness - Rc “58/60”
- Depth of Plating - .001”/side
- Yield - 100,000 PSI approx.
- Elongation in 2” - 10%
- Reduction of Area - 38%
- Finish - 12/15 RMS

Availability
- Rounds - 1/2” up to 4”
- Metrics - 10MM up to 70MM (other sizes may be available)

Lengths
- 10/12 Ft and 20/24 Ft R/L, Custom Cut-To-Lengths

*Based on 1/2” dia. specimen

Both Mirro-Krome 60® and Mirraloy® HCP are engineered for use in a host of pneumatic and hydraulic piston rods, as well as, other applications such as dowel and guide pins commonly seen in the agricultural and construction industries. Proper consideration should be given for material choice dependent upon specific requirements and/or in-house machining capabilities.

MIRRO-MAX 60® INDUCTION HARDENED, BEARING-FIT, LINEAR SHAFT

Features
- Hardened Case
- Wear Resistant
- Machine Straightened
- Precision Finish
- Bearing-Fit Tolerances
- Chamfered Ends

Availability
- Rounds - 1/4” up to 4”
- Metrics - 8MM up to 50MM

Lengths
- Custom Lengths

*Based on 1/2” dia. specimen

Mirro-Max 60® is ideal for bearing, linear shafting, linear guides, shaft supports and hardened roller applications with tight diameter and straightness tolerances. Combines elevated hardness with tight diameter and straightness tolerances for optimum fit. This product is not chrome plated.
METRIC SIZED METALS

ALLOY

Heat Treated, TGP (4140/50 mod.) Shafting - MIRRALOY® TGP
Available Sizes
4MM - 100MM Rounds

Cold Finished, Annealed (4140 mod.) Bar Stock - KROMITE® CD
Available Sizes*
20MM - 50MM Squares
*Inquire on Metric Flats

STAINLESS STEEL

Precision Fit, TGP (316L) Shafting - CENCOR™
Available Sizes
5MM - 40MM Rounds

Bearing-Fit, TGP Lean Duplex Shafting - ASC2250® LDX
Available Sizes
20MM - 90MM Rounds

THREADED ROD

Heat Treated, Roll Threaded (B7) - KROMITE® THREADED BAR
Available Sizes
4MM (.7) - 39MM (4.00)

KEYSTOCK

Cold Finished, Double Drawn Keystock - KROMITE® KEYSTOCK
Available Sizes
5MM - 50MM Squares

CHROME ROD

Induction Hardened, Chrome Plated - MIRRO-KROME 60®
Available Sizes
12MM - 80MM Rounds

Hard Chrome Plated Shafting - MIRRALOY® HCP
Available Sizes
10MM - 70MM Rounds

LINEAR SHAFT

Induction Hardened, Bearing-Fit, Linear - MIRRO-MAX 60®
Available Sizes
6MM - 50MM Rounds

Please contact our offices with all other sizes, grades and configurations of metric materials that may not be shown. We shall make every effort to accommodate your requirements.
For 80 years, Associated Steel Corporation has been providing fabrication service and technical assistance. Our experienced team routinely handles the most difficult maintenance problems through our Special Service Division (SSD). Associated Steel Corporation is capable of providing a complete O.E.M. replacement product that is ready for immediate installation to minimize downtime and increase productivity. Our capabilities include the latest version of AUTOCAD and Blue Print services. We will gladly review your sketches or prints. Quotes from worn or new parts may be an option (restrictions apply).

FABRICATION PROCESSES

- Plasma Cutting
- Saw Cutting
- Counter-Boring
- Counter-Boring
- Polishing
- Chamfering
- Counter-Sinking
- Facing-To-Length
- Turning-On-Centers
- Shape Cutting
- Flame Hardening
- Straightening
- Heat Treating
- Tapping
- Planing
- Forming
- Welding
- Grinding
- Milling
- Broaching
- Saw Cutting
- Chamfering
- Counter-Sinking
- Shape Cutting
- Flame Hardening
- Straightening
- Heat Treating
- Tapping
- Planing
- Forming
- Welding
- Grinding
- Milling
- Broaching

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