

Handbook on Steel Bars, Wires, Tubes, Pipes, S.S. Sheets Production with Ferrous Metal Casting & Processing

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Format: paperback

Code: NI260

Pages: 408

Price: Rs.1775US\$ 150

Publisher: NIIR PROJECT CONSULTANCY
SERVICES

Usually ships within 5 days

Ferrous materials have made a major contribution to the development of modern technology; they span a tremendous range of properties and applications. Reflecting the industrial practices, the information provided here offers easy access to reliable processes involved in the manufacturing of Steel products like Steel Bars, Wires, Tubes, Pipes, Sheets etc that proves to be the backbone of construction and automobile industries booming worldwide.

The work closes the gap in the treatment of steel and cast iron. Each chapter takes into account the gradual transitions between the two types of ferrous materials. It demonstrates that ferrous metal and steel are versatile and customizable materials which will continue to play a key role in the future and also covers the operations performed on ferrous metals for converting them into a commodity.

The book provides a full characterization of steel, including structure, chemical composition, classifications, physical properties, production practices of different steel products, processing of ferrous metals and so on. It will prove to be a layman's guide for the entrepreneurs who are willing to invest in the ventures related to Iron and Steel Industries, as it contains information related to processing of ferrous metals and production practices followed in Steel products manufacturing units. The text discusses the importance and objectives of processes and material used for the production of disposable products. Many examples have been provided to illustrate the concepts discussed.

The topics covered in the book are: Casting of Ferrous Metals, Heat Treatment of Ferrous Metals, Stamping Process of Ferrous Metals, Forming Process of Ferrous Metals, Machining Process of Ferrous Metals, Joining Process of Ferrous Metals, Production of Stainless Steel Wire, Production and Fabrication of Steel Bars, Steel Tube & Pipe, Stainless Steel Sheet and Different Grades of Stainless Steel.

1. CASTING OF FERROUS METALS

Casting Methods

Sand Casting

Shell-mold Casting

Expendable-Pattern Casting (Lost foam Process)

Plaster-Mold Casting

Ceramic Mold Casting

Investment Casting (Lost Wax Process)

Vacuum Casting

Permanent Mold Casting

Die Casting
Centrifugal Casting
Casting Design and Quality
Corners, Angles and Section Thickness
Drafts and Tapers
Shrinkage
Parting Line

2. HEAT TREATMENT OF FERROUS METALS

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Stages of Heat Treatment
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Soaking Stage
Cooling Stage
Heat Colors for Steel
Types of Heat Treatment
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Carburizing
Cyaniding
Nitriding
Flame Hardening
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Circular Band Progressive Method
Straight Line Progressive Method
Spiral Band Progressive Method
Circular Band Spinning Method
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Liquid Quenching
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Caustic Soda
Warning
Dry Quenching
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Progressive Die
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Fixed Stripper
Urethane Stripper
Spring Stripper
Stamping Terminology - Punch Operation
Perforating
Punch Stagger
Blanking
Piercing

Perforate and Shave
Piloting
Perforate and Extrude
Notching
Lancing
Coining
Embossing
Projection
Shear Angles
For More Information...

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Flat Rolling
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Ring Rolling
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Warm Extrusion
Equipment
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Indirect Extrusion
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Impression-die Drop Forging
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Induction Forging
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Hydraulic Drop-hammer
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Process
Bending Process
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Coining
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Folding
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Roll Bending
Elastomer Bending
Joggling
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Bend Deduction
K-factor
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Maintaining Quality
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Cutting Speeds
Setting Speed and Feed
Turning with Hand Feed
Turning with Power Feed
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Cylindrical Grinding

Creep-Feed Grinding
Centerless Grinding
A Schematic of ELID Grinding
Grinding Wheel
Lubrication
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Workpiece Materials
Workpiece Geometry
Effects on Workpiece Materials
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Subtractive Methods
Thread Cutting
Taps and Dies
Single-Point Threading
Thread Milling
Thrilling
Thread Grinding
Thread Lapping
Thread Casting and Molding
Additive Methods
Combinations of subtractive, additive, deformative, or transformative methods
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Uses
Characteristics
Care of Drilling Machines
Lubrication
Special Care
Types of Drilling Machines
Hand-Feed
Power-Feed
Safety Precautions
Drilling Machine Safety
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Special Drills
Sharpening Twist Drills
Precheck
Drill Point
Clearance Angle
Rake Angle
Drill Grinding Machines
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Double Wheel Swing Arm
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Counterbores
Combined Countersink and Center Drill
Reamers
Boring Tools
Field Expedient Cutters
Tap and Die Work

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Geared Drill Chucks
Drill Sockets and Drill Sleeves
Drill Drifts
Work Holding and Drilling Devices
Machine Table Vises
Step Blocks
Clamps
V-Blocks
Angle Plates
T-Slot Bolts
Jigs
Drilling Support Device
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Laying Out Work
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Aligning and Starting Holes
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Drilling a Pilot Hole
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Countersink Alignment
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Counterboring
Spot Facing
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Tapping Large Holes
Tapping Small Holes
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Machine Reamer

Reaming Operations

Boring

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Flush Rivet

Friction-Lock Rivet

Self-Pierce Rivets

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Installing rivets on M3 tank hull

Detail of a 1941 riveted ship hull, with the rivets clearly visible

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Solid & Semi Tubular Rivets

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Details of Welding Processes

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Flame Characteristics

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Flux cored arc welding (FCAW)

Gas shielded arc Welding

MIG and TIG

MIG welding (gas metal arc welding)

Pulsed MIG welding

Hot Wire MIG

Plasma MIG

TIG welding

Pulsed TIG Welding

Hot Wire TIG

Spot TIG

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Electric Resistance Welding

Electro-Slag Welding (ESW)

Induction Pressure Welding

Energy Method

Electron Beam Welding (EBW)

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Plasma Welding

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Electrode Coating

Classification of Electrodes

Selection of Electrodes

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General

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Various types of groove welds

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Welding Symbols

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Billet Production

Production of Spring Wire

Conclusion

Wire Drawing

Process

Mechanical Properties

8. PRODUCTION OF STEEL BARS

Hot Rolled Bars

Cold Twisted Deformed Bars

Tmt Bars

Mild Steel Bars (as per IS: 432, part-I -1982)

Deformed Steel Bars (as per IS: 1786-1985)

Various Grades of Mild Steel Bars

Physical Requirement

Steel Bars for RCC Work

General Precautions for Steel Bars in Reinforcement

Weight of Different Steel Bars

Stainless Steel Bar-Round

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Bar Grade Datasheets

Bright Mild Steel Bar

Types of Cold Finished Bars

Grade Datasheets

Stainless and Engineering Steel Bar and Wire Product Specifications

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Stainless Steel Hollow Bar

Stainless Steel Wire

Welding wire

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Carbon and Alloy Steel Hollow Bar

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Annealing

Skin Pass

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Continuous Mandrel Rolling Process
Push Bench Process
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Assel Rolling Process
Diescher Rolling Process
Downstream Tube Cold Forming
Cold Drawing
Cold Pilgering
Welded Tube and Pipe
Pressure Welding Processes
Fretz-Moon Process
Electric Resistance Welding
DC Processes
Low-Frequency Process
High-Frequency Processes
High-Frequency Induction Welding Process
High-Frequency Conduction Welding Process
Fusion Welding Processes
Submerged-Arc Welding Process
Gas-Shielded Arc Welding Processes
The Production of Longitudinally Welded Pipe (U-ing/O-ing process)
Spiral Pipe Production
Spiral Pipe Production in Integrated Forming and SAW Welding Lines
Spiral Pipe Production with Separate Forming and SAW Welding Lines

10. MANUFACTURING OF STAINLESS STEEL SHEET

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Heat Treatment
Descaling
Cutting
Finishing
Manufacturing at the Fabricator or End User
Bending Process of Steel Sheet
The Air Bending Process
Recommended Inside Bend Radius
Flange Dimensions
Channels
Distortion Near Bends
Flat Layouts
Theoretical Sheet Metal Thickness Gauges

11. GRADES OF STAINLESS STEEL

A Brief Overview of Stainless Steel

Austenitic Grades

Straight Grades

“L” Grades

“H” Grades

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Type 316

Type 317

Type 317L

Type 317LM
Type 317LMN
Type 321, Type 347
Martensitic Grades
Type 410
Type 410S
Type 414
Type 416
Type 420
Type 431
Type 440
Ferritic Grades
Type 430
Type 405
Type 409
Type 434
Type 436
Type 442
Type 446
Duplex Grades
Precipitation Hardening Grades
Superalloy Grades

About NIIR

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Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new

business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

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Sat, 17 May 2025 08:24:57 +0000