

1. Record Nr.	UNINA9910830495603321
Autore	Greulich Owen R.
Titolo	Fabrication of metallic pressure vessels / / Owen R. Greulich, Maan H. Jawad
Pubbl/distr/stampa	Hoboken, New Jersey : , : Wiley : , : ASME Press, , [2022] ©2022
ISBN	1-5231-5511-6 1-119-67488-3 1-119-67487-5 1-119-67490-5
Descrizione fisica	1 online resource (333 pages)
Collana	Wiley-ASME Press series
Disciplina	681.76041
Soggetti	Pressure vessels - Design and construction
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Preface -- Acknowledgments -- Chapter 1 Introduction -- 1.1 Introduction -- 1.2 Fabrication Sequence -- 1.3 Cost Considerations -- 1.3.1 Types of costs -- 1.3.2 Design choices -- 1.3.3 Shipping -- 1.3.4 General approach to cost control -- 1.4 Fabrication of Nonnuclear Versus Nuclear Pressure Vessels -- 1.5 Units and Abbreviations -- 1.6 Summary -- Chapter 2 Materials of Construction -- 2.1 Introduction -- 2.2 Ferrous Alloys -- 2.2.1 Carbon steels (Mild steels) -- 2.2.2 Low alloy steels (Cr-Mo steels) -- 2.2.3 High alloy steels (stainless steels) -- 2.2.4 Cost of ferrous alloys -- 2.3 Nonferrous Alloys -- 2.3.1 Aluminum alloys -- 2.3.2 Copper alloys -- 2.3.3 Nickel alloys -- 2.3.4 Titanium alloys -- 2.3.5 Zirconium alloys -- 2.3.6 Tantalum alloys -- 2.3.7 Price of nonferrous alloys -- 2.4 Density of Some Ferrous and Nonferrous Alloys -- 2.5 Nonmetallic Vessels -- 2.6 Forms and Documentation -- 2.7 Miscellaneous Materials -- 2.7.1 Cast iron -- 2.7.2 Gaskets -- 2.7.2.1 Gasket types -- 2.7.2.2 Gasket containment -- References -- Chapter 3 Layout -- 3.1 Introduction -- 3.2 Applications -- 3.3 Tools and Their Use -- 3.4 Layout Basics -- 3.4.1 Projection -- 3.4.2 Triangulation -- 3.5 Material Thickness and

Bending Allowance -- 3.6 Angles and Channels -- 3.7 Marking  
Conventions -- 3.8 Future of Plate Layout -- Reference -- Chapter 4  
Material Forming -- 4.1 Introduction -- 4.1.1 Bending versus three-dimensional forming -- 4.1.2 Other issues -- 4.1.3 Plastic Theory -- 4.1.4 Forming limits -- 4.1.5 Grain direction -- 4.1.6 Cold versus hot forming -- 4.1.7 Spring back -- 4.2 Brake Forming (Angles, Bump-Forming) -- 4.2.1 Types of dies -- 4.2.2 Brake work forming limits -- 4.2.3 Crimping -- 4.2.4 Bending of pipes and tubes -- 4.2.5 Brake forming loads -- 4.3 Roll Forming (Shells, Reinforcing Pads, Pipe/Tube).  
4.3.1 Pyramid rolls -- 4.3.2 Pinch rolls -- 4.3.3 Two-roll systems -- 4.3.4 Rolling radius variability compensation -- 4.3.5 Heads and caps -- 4.3.6 Hot forming -- 4.4 Tolerances -- 4.4.1 Brake forming tolerances -- 4.4.2 Roll forming tolerances -- 4.4.3 Press forming tolerances -- 4.4.4 Flanging tolerances -- Reference -- Chapter 5  
Fabrication -- 5.1 Introduction -- 5.2 Layout -- 5.3 Weld Preparation -- 5.3.1 Hand and automatic grinders -- 5.3.2 Nibblers -- 5.3.3 Flame cutting -- 5.3.4 Boring mills -- 5.3.5 Lathes -- 5.3.6 Routers -- 5.3.7 Other cutter arrangements -- 5.4 Forming -- 5.5 Vessel Fit Up and Assembly -- 5.5.1 The fitter -- 5.5.2 Fit up tools -- 5.5.3 Persuasion and other fit up techniques -- 5.5.4 Fixturing -- 5.5.5 Welding fit up -- 5.5.6 Weld shrinkage -- 5.5.7 Order of assembly -- 5.6 Welding -- 5.6.1 Welding position -- 5.6.2 Welding residual stresses -- 5.6.3 Welding positioners, turning rolls, column and boom weld manipulators -- 5.7 Correction of Distortion -- 5.8 Heat Treatment -- 5.8.1 Welding preheat -- 5.8.2 Interpass temperature -- 5.8.3 Post weld heat treatment -- 5.9 Post-fabrication Machining -- 5.10 Field Fabrication - Special Issues -- 5.10.1 Exposure to the elements -- 5.10.2 Staging area -- 5.10.3 Tool and equipment availability -- 5.10.4 Staffing -- 5.10.5 Material handling -- 5.10.6 Energy sources -- 5.10.7 PWHT -- 5.10.8 Layout -- 5.10.9 Fit up -- 5.10.10 Welding -- 5.11 Machining -- 5.12 Cold Springing -- Chapter 6 Cutting and Machining -- 6.1 Introduction -- 6.2 Common Cutting Operations for Pressure Vessels -- 6.3 Cutting Processes -- 6.3.1 Plate cutting -- 6.3.2 Pipe, bar, and structural shape cutting -- 6.4 Common Machining Functions and Processes -- 6.5 Common Machining Functions for Pressure Vessels -- 6.5.1 Weld preparation -- 6.5.2 Machining of flanges -- 6.5.3 Tubesheets -- 6.5.4 Heat exchanger channels.  
6.5.5 Heat exchanger baffles -- 6.6 Setup Issues -- 6.7 Material Removal Rates -- 6.7.1 Feed -- 6.7.2 Speed -- 6.7.3 Depth of cut -- 6.8 Milling -- 6.9 Turning and Boring -- 6.10 Machining Centers -- 6.11 Drilling -- 6.12 Tapping -- 6.13 Water Jet Cutting -- 6.14 Laser Machining -- 6.15 Reaming -- 6.16 Electrical Discharge Machining, Plunge and Wire -- 6.17 Electrochemical Machining -- 6.18 Electron Beam Machining -- 6.19 Photochemical Machining -- 6.20 Ultrasonic Machining -- 6.21 Planing and Shaping -- 6.22 Broaching -- 6.23 3D Printing -- 6.24 Summary -- Reference -- Chapter 7 Welding -- 7.1 Introduction -- 7.2 Weld Details and Symbols -- 7.2.1 Single fillet welds -- 7.2.2 Double fillet welds -- 7.2.3 Intermittent fillet welds -- 7.2.4 Single-bevel butt welds -- 7.2.5 Double-bevel butt welds -- 7.2.6 J-groove or double J-groove welds -- 7.2.7 Backing strips -- 7.2.8 Consumables -- 7.2.9 Tube-to-tubesheet welds -- 7.2.10 Weld symbols -- 7.3 Weld Processes -- 7.3.1 Diffusion welding (DFW) -- 7.3.2 Electron beam welding (EBW) -- 7.3.3 Electrogas welding (EGW) -- 7.3.4 Electroslag welding (ESW) -- 7.3.5 Flux-cored arc welding (FCAW) -- 7.3.6 Flash welding -- 7.3.7 Friction stir welding (FSW) -- 7.3.8 Gas metal-arc welding (GMAW) -- 7.3.9 Gas tungsten-arc welding (GTAW) -- 7.3.10 Laser beam welding (LBW) -- 7.3.11 Orbital

welding -- 7.3.12 Oxyfuel gas welding (OFW) -- 7.3.13 Plasma-arc welding (PAW) -- 7.3.14 Resistance spot welding (RSW) -- 7.3.15 Resistance seam welding (RSEW) -- 7.3.16 Submerged-arc welding (SAW) -- 7.3.17 Shielded metal-arc welding (SMAW) -- 7.3.18 Stud welding -- 7.4 Weld Preheat and Interpass Temperature -- 7.5 Post Weld Heat Treating -- 7.6 Welding Procedures -- 7.7 Control of Residual Stress and Distortion -- 7.8 Material Handling to Facilitate Welding -- 7.9 Weld Repair -- 7.10 Brazing -- 7.10.1 Applications. 7.10.2 Filler metal -- 7.10.3 Heating -- 7.10.4 Flux -- 7.10.5 Brazing procedures -- Reference -- Chapter 8 Welding Procedures and Post Weld Heat Treatment -- 8.1 Introduction -- 8.2 Welding Procedures -- 8.3 Weld Preparation Special Requirements -- 8.4 Weld Joint Design and Process to Reduce Stress and Distortion -- 8.4.1 Reduced heat input -- 8.4.2 Lower temperature differential -- 8.4.3 Choice of weld process -- 8.4.4 Weld configuration and sequencing -- 8.5 Weld Preheat and Interpass Temperature -- 8.6 Welder Versus Welding Operator -- 8.6.1 Welders -- 8.6.2 Welding operators -- 8.6.3 Differences in qualifications -- 8.7 Weld Repair -- 8.7.1 Slag inclusion during welding -- 8.7.2 Surface indications after cooling of welds -- 8.7.3 Delayed hydrogen cracking after welding -- 8.7.4 Cracks occurring subsequent to PWHT -- 8.8 Post Weld Heat Treating -- 8.8.1 PWHT of carbon steels -- 8.8.2 PWHT of low alloy steels -- 8.8.3 Some general PWHT requirements for carbon steels and low alloy steels -- 8.8.4 PWHT of stainless steel -- 8.8.5 PWHT of nonferrous alloys -- 8.9 Cladding, Overlay, and Loose Liners -- 8.9.1 Cladding -- 8.9.2 Weld overlay -- 8.9.3 Loose liners -- 8.10 Brazing -- 8.10.1 Applications -- 8.10.2 Filler metal -- 8.10.3 Heating -- 8.10.4 Flux -- 8.10.5 Brazing procedures -- Reference -- Chapter 9 Fabrication of Pressure Equipment Having Unique Characteristics -- 9.1 Introduction -- 9.2 Heat Exchangers -- 9.2.1 U-tube heat exchangers -- 9.2.2 Fixed heat exchangers -- 9.2.3 Floating head heat exchangers -- 9.2.4 Attachment of tubes-to-tubesheets and tubes-to-headers -- 9.2.5 Expansion joints -- 9.2.6 Assembly of heat exchangers -- 9.3 Dimpled Jackets -- 9.4 Layered Vessels -- 9.4.1 Introduction -- 9.4.2 Fabrication of layered shells -- 9.5 Rectangular Vessels -- 9.6 Vessels with Refractory and Insulation -- 9.7 Vessel Supports -- 9.8 Summary. References -- Chapter 10 Surface Finishes -- 10.1 Introduction -- 10.2 Types of Surface Finishes -- 10.2.1 Surface characteristics, unfinished -- 10.2.2 Passivation -- 10.2.3 Applied coatings -- Reference -- Chapter 11 Handling and Transportation -- 11.1 Introduction -- 11.2 Handling of Vessels and Vessel Components Within the Fabrication Plant -- 11.3 Transportation of Standard Loads -- 11.4 Transportation of Heavy Vessels -- 11.4.1 Handling heavy vessels using specialty cranes -- 11.4.2 Shipping by truck -- 11.4.3 Shipping by rail -- 11.4.4 Shipping by barge or ship -- 11.4.5 Shipping by air -- 11.5 Summary -- Chapter 12 ASME Code Compliance and Quality Control System -- 12.1 Need for ASME Code Compliance -- 12.2 What the ASME Code Provides -- 12.3 Fabrication in Accordance with the ASME Code -- 12.4 ASME Code Stamping -- 12.4.1 Design calculations -- 12.4.2 Fabrication drawings -- 12.4.3 Material mill test reports -- 12.4.4 WPS for the vessel welds -- 12.4.5 Records of nondestructive (NDE) examination -- 12.4.6 Record of PWHT -- 12.4.7 Record of hydrotesting -- 12.4.8 Manufacturer's Data Report, U-1 Form -- 12.4.9 Manufacturer's Partial Data Report, U-2 form -- 12.4.10 Name plate -- 12.5 Authorized Inspector and Authorized Inspection Agency -- 12.6 Quality Control System for Fabrication -- 12.6.1 Organizational chart -- 12.6.2 Authority and responsibility -- 12.6.3 Quality control system -- 12.6.4 Design and drawing control -- 12.6.5 Material

control -- 12.6.6 Production control -- 12.6.7 Inspection -- 12.6.8  
Hydrostatic and pneumatic testing -- 12.6.9 Code stamping -- 12.6.10  
Discrepancies and nonconformances -- 12.6.11 Welding -- 12.6.12  
Nondestructive examination -- 12.6.13 Heat treatment control --  
12.6.14 Calibration of measuring and test equipment -- 12.6.15  
Records retention -- 12.6.16 Handling, storage, and shipping.  
12.7 Additional Stamps Required for Pressure Vessels.

**Sommario/riassunto**

"Much of the equipment used in the refining and processing industries is known as Process Equipment. Most pieces of process equipment are designed to perform specific, singular tasks. Process equipment can be used for tasks as varied as storage, controlling flow, and containing chemical reactions. Fabrication involves making products and components from raw or semi-finished materials by cutting, shaping and joining sections of metal together. Fabrication processes include cutting, folding, machining, shearing, stamping and welding"--