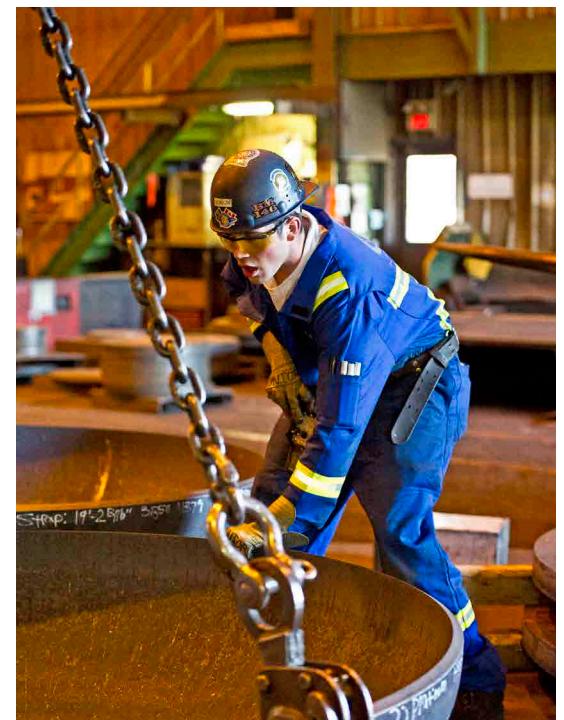




Pressure Vessel Components

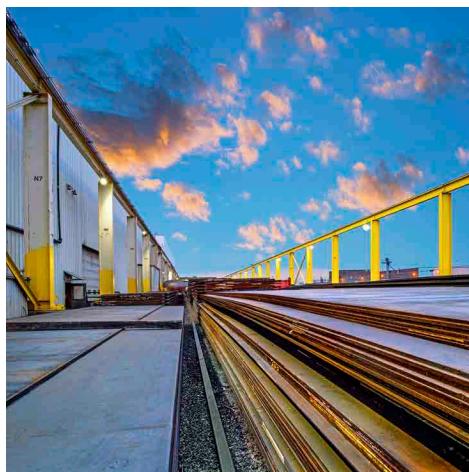




EDMONTON EXCHANGER - PRESSURE VESSEL COMPONENTS

Edmonton Exchanger was founded in 1975 and is over 1,000 employees strong. We are a multi-divisional company and feature a wide range of products and services for applications in industries that include oil and gas, petrochemical and power generation.

Our prefabrication Pressure Vessel Components division, specializes in the fabrication of large-scale pressure vessel components and features steel forming capacities that are some of the largest of their kind. It offers the most extensive one-stop pressure vessel head forming and shell rolling capabilities in North America, and one of the largest inventories of pressure vessel quality steel plate in the world.



OVERVIEW OF SERVICES

YOUR ONE-STOP HEAD FORMING AND SHELL ROLLING HEADQUARTERS

Whatever your pressure vessel component requirements are, Edmonton Exchanger has your solution. The fact is, our experienced professionals have the most extensive one-stop head forming and shell rolling capabilities in North America. So whatever your challenge, Edmonton Exchanger can tackle it.

ONE OF THE WORLD'S LARGEST SA 516-70 N STEEL PLATE INVENTORIES

Another advantage of working with us is our vast selection of steel plate. We have one of the largest inventories of SA 516-70 N steel plate in the world, so your pressure vessel job won't lose valuable time with a searching-for-materials phase added to it.

THE STEEL FORMING CAPACITIES TO HANDLE YOUR NEXT PROJECT

Does your project have some unique size challenges? No problem. We specialize in the manufacturing of large-scale pressure vessel components, and feature some of the largest steel forming capacities available.

HEAD FORMING TYPES FOR PRESSURE VESSELS AND TANKS

- Torispherical Flanged and Dished
- Flanged Only and Dished Only
- Semi-Elliptical 2:1
- Hemispherical

STEEL PLATE ROLLING

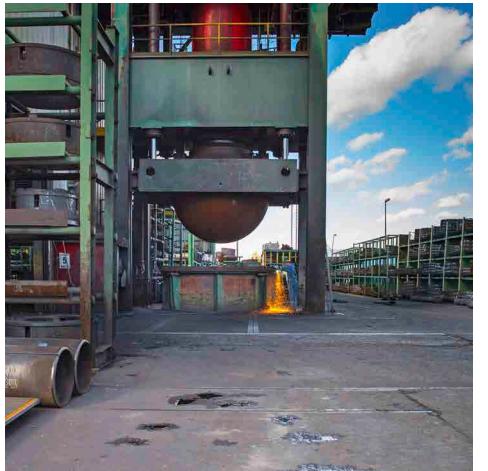
- Shells for Pressure Vessels and Tanks
- Eccentric and Concentric Cones
- Rolled Rings for machining applications
- Rolled Repads
- Custom Rolling

PROFILE CUTTING FOR MOST PATTERNS AND SHAPES

Available for almost any pattern or shape imaginable from plate up to 15'-0" x 10'-0" in size (4,572 mm x 3,048 mm).

STEEL PLATE FORMING CAPABILITIES

Pressure Vessel Heads: up to 8" in thickness and up to 28'-6" in diameter
Pressure Vessel Shells: up to 12" in thickness and up to 144" in width



HEAD FORMING (HOT PUSHED)

HOT PRESSED HEADS FORMED WITH CUSTOM-DESIGNED PRESSES

We can make almost any size and thickness of head you require. We created two custom-designed head-forming presses to handle your project needs: A 1,200 ton head press, and a 3,000 ton head press. We can hot press heads up to 192" (4,877 mm) I.D. and up to 8" (203.20 mm) thick, so whatever the challenge, we say bring it on!

SEMI-ELLIPTICAL HEADS

Semi-Elliptical Heads: from 8 $\frac{5}{8}$ " (219 mm) O.D. to 192" (4,877 mm) I.D.

ASME CODE FLANGED AND DISHED HEADS

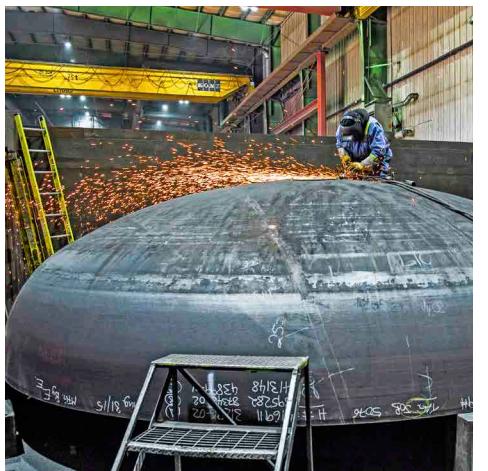
ASME Code Flanged and Dished Heads: from 48" (1,219 mm) I.D. to 96" (2,438 mm) I.D.

HEMISpherical HEADS

Hemispherical Heads: from 8 $\frac{5}{8}$ " (219 mm) O.D. to 144" (3,658 mm) I.D.

DISHED ONLY HEADS

Dished Only Heads: from 10" (254 mm) O.D. to 120" (3,048 mm) O.D.

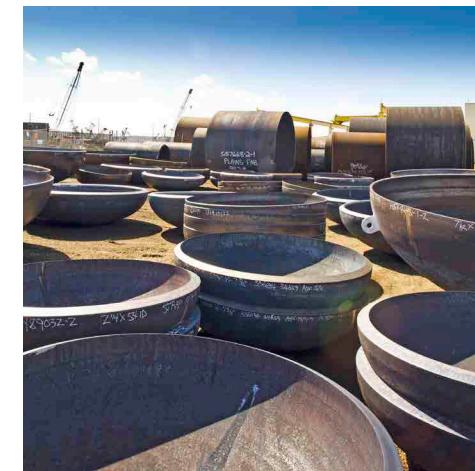


HEAD TEMPERATURES

Typically, carbon steel heads are hot formed at normalizing temperature range. Stainless steel heads are hot formed at annealing temperature range. Chromium molybdenum steel heads are hot formed and tempered as specified by MTR. Clad heads are formed at temperatures suitable to the material. Various forming temperature requirements and additional heat treatments can be accommodated upon request.

HEAD FORMING FLEXIBILITY WITH MATERIALS

Heads can be formed from our own steel plate inventory, from special material we order in (such as clad plate), or from material that you supply.



HEAD FORMING (DISHED AND SPUN)

DISHED AND SPUN HEADS

Our dishing and spinning equipment enables us to cold form heads up to 1 $\frac{1}{4}$ " (31.75 mm) x 342" (8,687 mm) in diameter. Hot spinning allows us to manufacture heads up to 2 $\frac{1}{4}$ " (57.15 mm) thick.

SEMI-ELLIPTICAL HEADS

Semi-Elliptical Heads: from 96" (2,438 mm) O.D. to 288" (6,096 mm) I.D.

ASME CODE FLANGED AND DISHED HEADS

ASME Code Flanged and Dished Heads: from 96" (2,438 mm) O.D. to 342" (8,687 mm) I.D.

FLANGED ONLY HEADS

Flanged Only Heads: from 72" (1,829 mm) O.D. to 168" (4,267 mm) I.D.

DISHED ONLY HEADS

Dished Only Heads: from 120" (3,048 mm) O.D. to 360" (9,144 mm) O.D.

UNTRIMMED HEADS, TRIMMED AND BEVELED HEADS

Edmonton Exchanger can supply heads either "untrimmed" or "trimmed and beveled" (single or double bevel) as per your requirements.

DELIVERED: AS-FORMED, PICKLED, SANDBLASTED

Carbon steel and chromium molybdenum steel heads are delivered in the as-formed condition. Stainless steel and clad heads are delivered in the pickled or sandblasted and passivated condition.



PRESSURE VESSEL PLATE ROLLING

MEET THE MONSTER: STEEL PLATE ROLLING UP TO 12" THICK

Have some monstrous plate rolling needs? Our beast can tame them! The Davi "Monster Rolls" machine can hot roll plate up to 12" thick. It's not only the largest steel plate rolling machine at Edmonton Exchanger, it is one of the largest of its kind in North America. This mighty monster is supported by a 100 ton overhead crane which spans the length of the shop.

FIVE SETS OF PLATE ROLLS = SHELLS, ROLLED RINGS, CONES, REPADS

With our selection of five sets of plate rolls, we can provide you with plate rolled into shells, rolled rings, cones (both eccentric and concentric), or repads. These components can be rolled from our own plate inventory or from material that you supply.

DIMENSIONAL ROLLING CAPACITIES

Minimum Diameter: 16" (406 mm) I.D.

Maximum Thickness: cold rolled 8" (203.20 mm), hot rolled 12" (304.80 mm)

Maximum Length: 144" (3,658 mm)

PRESSURE VESSEL SHELLS ROLLED TO ASME SPECIFICATIONS

Pressure vessel shells are rolled to ASME code specifications and rolled to match heads when ordered together.



STEEL PLATE ROLLING SIZE CHART

Thickness	Diameter	Length	Thickness	Diameter	Length
1/8"	x 18" O.D.	x 10'-0"	4 1/2"	x 30" I.D.	x 5'-0"
1/4"	x 18" O.D.	x 4'-0"	3/8" & up	x 43" I.D.	x 12'-0"
1"	x 20" O.D.	x 10'-0"	6 1/8"	x 48" I.D.	x 12'-0"
2"	x 20" O.D.	x 3'-0"	7"	x 60" I.D.	x 12'-0"
2 3/4"	x 24" O.D.	x 10'-0"	9"	x 72" I.D.	x 12'-0"
3"	x 24" O.D.	x 6'-0"	10"	x 84" I.D.	x 10'-0"
4"	x 30" I.D.	x 10'-0"	12"	x 90" I.D.	x 7'-0"

This chart illustrates variables for guideline purposes only. As diameters increase, lengths can increase up to 12'-0".



PRESSURE VESSEL PLATE ROLLING

SQUARE CUT, BEVELED CIRCUMFERENTIAL AND LONG SEAM SHELLS

We can supply you with square cut or beveled circumferential and long seam shells. Long seams can be provided tack welded or fully welded. We can also provide welded circumferential seams by welding together multiple courses.

CONCENTRIC CONES: ONE PIECE, ONE SEAM

Concentric cones can be rolled up to a thickness of 4" (101.60 mm) and a length of 10'-0" (3,048 mm). Diameters can be from 24" (610 mm) O.D. to 168" (4,267 mm) O.D. They are rolled in one piece with only one long seam when plate layout allows it. We can provide you with cones that are square cut or beveled with long seams tack welded or fully welded.

MILL TEST CERTIFICATES / FURNACE HEAT CHARTS

Components rolled from our plate inventory are accompanied with Mill Test Certificates. In the case of hot rolled items, Furnace Heat Charts can be provided upon request.

NONDESTRUCTIVE EXAMINATION / INSPECTION FORMS

Fully welded shells and cones come complete with necessary nondestructive examination and the applicable inspection forms.



PRESSURE VESSEL PLATE

PLATELAND: OVER 30,000 METRIC TONS OF INVENTORY

You want steel plate selection? You've come to the right place. The quantity of steel plate inventory at Edmonton Exchanger is so immense (over 30,000 metric tons), it's commonly referred to as Plateland. All stocked steel plate complies with ASME code requirements and is accompanied by clearly legible Mill Test Certificates at time of shipment.

MASSIVE INVENTORY OF PRESSURE VESSEL PLATE

Welcome to one of the largest inventories of pressure vessel quality SA516-70 normalized in the world, ranging from $\frac{1}{4}$ " (6.35 mm) to 12" (304.8 mm) thick. SA 516-60, SA 537 CL1 and A572-50 (all normalized) are also available.

PLATE THAT MEETS THE MOST STRINGENT SPECIFICATIONS

Choose with confidence! Our extensive inventory includes plate that meets the most stringent specifications, including vacuum degassed, sulphide shape control, very low sulphur content and other extreme chemical restrictions. Testing to various specifications can be performed upon request (facing page).



PRESSURE VESSEL PLATE

TESTS PERFORMED UPON REQUEST:

- Ultrasonic Tests (for cracks and laminations)
- Magnetic Particle Examination
- Microstructure Analysis
- Chemical Product Analysis
- Corrosion Tests
- Hydrogen Induced Cracking
- Brinell Hardness
- Charpy V-Notch

CHROMIUM MOLYBDENUM STEEL

We offer a large inventory of chromium molybdenum steel (normalized and tempered) in the following grades:

- SA 387 Gr. 11 CL.2
- SA 387 Gr. 22 CL.2
- SA 387 Gr. 5 CL.2

Chromium molybdenum steel plate is available from $\frac{1}{4}$ " (6.35 mm) to 2" (50.80 mm) thick.



STAINLESS STEEL

We stock stainless steel in the following grades:

- SA 240-304
- SA 240-304L
- SA 240-316
- SA 240-316L

Plate ranges in thickness from $\frac{3}{16}$ " (4.76 mm) to 2 $\frac{1}{2}$ " (63.50 mm).



CNC DRILLED COMPONENTS

Edmonton Exchanger offers the following array of drilled components: tubesheets, baffles, flanges and other miscellaneous items. These are fabricated for in-house use in addition to our many other industry clients.

CNC TUBESHEET DRILLING

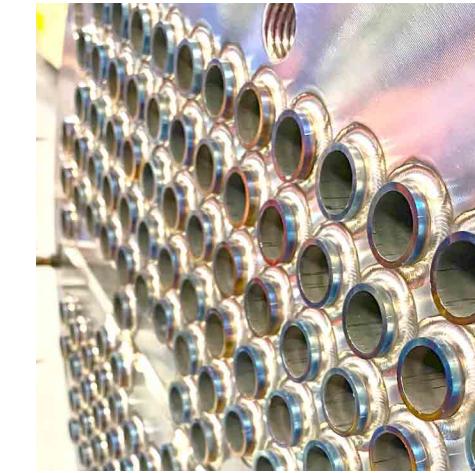
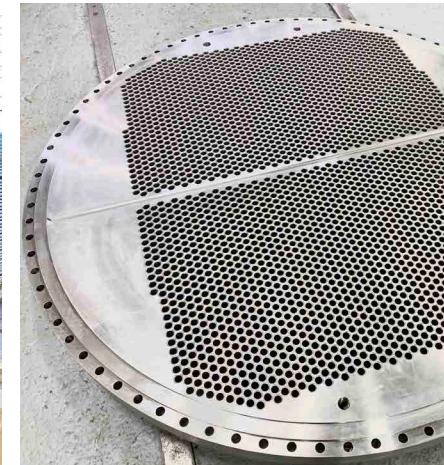
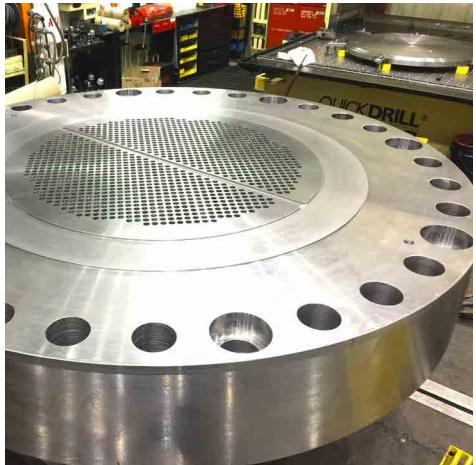
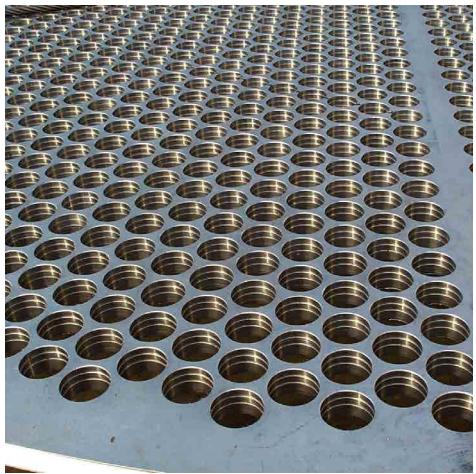
We have seven CNC machines of various sizes and capabilities available for tubesheet drilling applications.

QUICKDRILL 200 CNC

Our QuickDrill 200 CNC features drilling, ring grooving, milling along with boring services, it will also circular interpolate off center. With a drilling footprint of 200" (5,080 mm) x 120" (3,048 mm) x 30" (762 mm), it accommodates material up to 29" (736.60 mm) in height.

Currently the QuickDrill 200 CNC has a maximum drilling hole depth of 11.625" (295.28 mm) deep in one cycle, and a maximum drilling hole depth of 22" (558.80 mm) deep in two cycles (flip drilled).

Edmonton Exchanger has future plans to increase maximum drilling hole depth in one cycle to 23" (584.20 mm), eliminating the need for flip drilling.



CNC DRILLED COMPONENTS

QUICKDRILL 120 CNC

Edmonton Exchanger has (2) QuickDrill 120 CNC machines available that offer a wide range of drilling, ring grooving, milling and boring services, and will also circular interpolate off center. They boast a drilling footprint of 120" (3,048 mm) x 120" (3,048 mm) x 15" (381 mm), and can accommodate material up to 141" (3,581.40 mm) x 154" (3,911.60 mm) in size. They have a maximum drilling hole depth of 11.625" (295.28 mm) deep in one cycle.

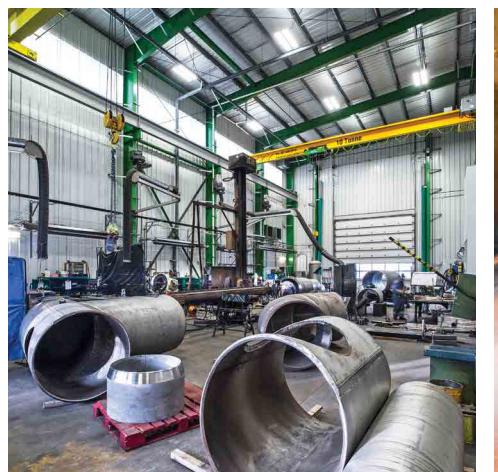
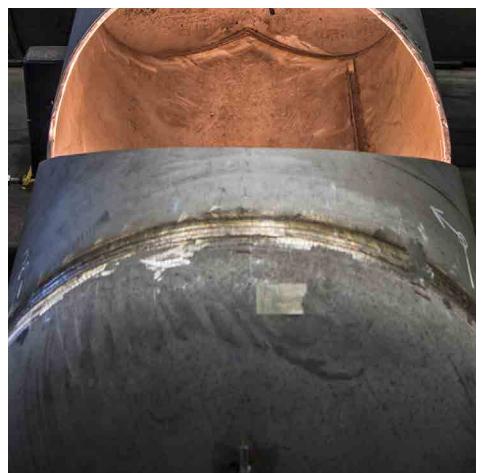
QUICKDRILL 96 CNC

Our QuickDrill 96 CNC machine features drilling, ring grooving, milling and boring services and will also circular interpolate off center. It offers a drilling footprint of 96" (2,438.40 mm) x 96" (2,438.40 mm) x 14.5" (368.30 mm), and a maximum drilling hole depth of 11.625" (295.28 mm) deep in one cycle.

QUICKDRILL 60 CNC

We also have (3) QuickDrill 60 CNC machines that feature drilling and ring grooving capabilities. They offer a drilling footprint of 60" (1,524 mm) x 60" (1,524 mm) x 14.5" (368.30 mm), and a maximum drilling hole depth of 5" (127 mm) deep in one cycle.





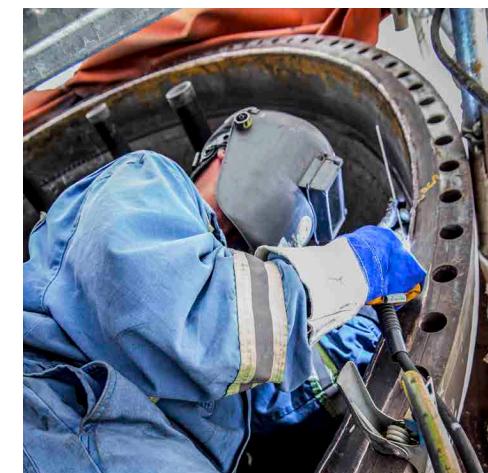
CUSTOM FABRICATION AND REPAIR

Edmonton Exchanger has extensive experience in the custom fabrication and repair of pressure related components. These include replacement vessels and exchangers on a "low volume" and urgent basis, often in support of our field operations.

In order to get a plant process back up and running, we can provide expedited fabrication and repair of large and small pressure related components such as pressure vessels, heat exchangers and other items on an "as needed" basis. We often receive requests to repair items such as heads and shell sections up to 20' diameter, as well as replacement of nozzles and internals.

Many times these requests include material upgrades to deal with specific process requirements and prevent accelerated corrosion. We have extensive experience with different grades of stainless steel and alloys.





FIELD SERVICES

PLANT MAINTENANCE SOLUTIONS SINCE 1975

With more than four decades of plant maintenance experience, Edmonton Exchanger provides on-site plant maintenance services for the petrochemical industry, refineries and fertilizer plants. Our services range from specialized field machining and controlled bolting, to complete turn-key plant and refinery shutdown projects.

FIELD OPERATIONS + SUPPORT SERVICES = POWERFUL SOLUTIONS

When you team with us, you get more than just superb field operations. You're also connected to a vast network of support services that range from project management to steel fabrication, pipe fabrication, machining and heat exchanger fabrication and repair services.

EXPERTISE, DEDICATION, PROFESSIONALISM

Another advantage of working with Edmonton Exchanger is our genuine commitment. While our specialized tools, heavy equipment and resource network all contribute to our ability to meet your project needs, it is ultimately the technical expertise, dedication and professionalism of our employees that make our projects successful.

- Turn-key Shutdown Projects
- General Shutdown Services
- Heavy Lift Execution
- On-site Heat Exchanger Services
- Crane and Equipment Rentals
- Piping Projects
- Controlled Bolting
- Flange Facing
- Cold Cutting
- Specialized Welding
- Project Management
- Estimating
- Safety Management
- Procurement
- Subcontract Coordination
- Custom Fabrication and Repair
- Pipe Fabrication
- Quality Control
- Engineering
- Steel Fabrication Plant Support
- Steel Plate Services
- Large-scale Machining
- Heat Exchanger Fabrication and Repair



PIPE SPOOL FABRICATION

Edmonton Exchanger's pipe fabrication facility specializes in petrochemical pipe spool fabrication. We can accommodate rush deadlines of turnaround pipe fabrication projects, and have alloy weld consumables in stock in order to process rush work.

This facility has over 1,000 ABSA certified weld procedures available, and has welders that are qualified to handle rare materials such as chrome, monel, duplex, stainless and titanium. Our weld processes ensure quality and efficiency to meet your needs. TIG /stick for small bore, STT / flux core for medium bore and Q. 2 sub arc stations for heavy / large bore pipe.

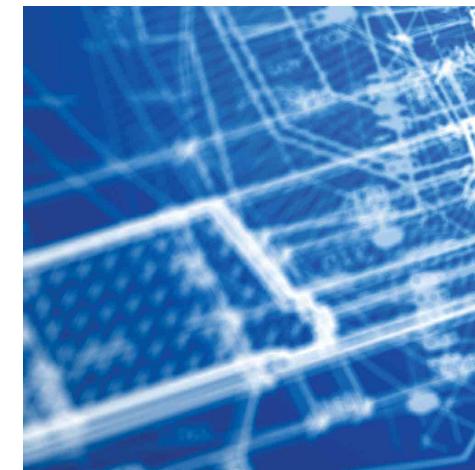
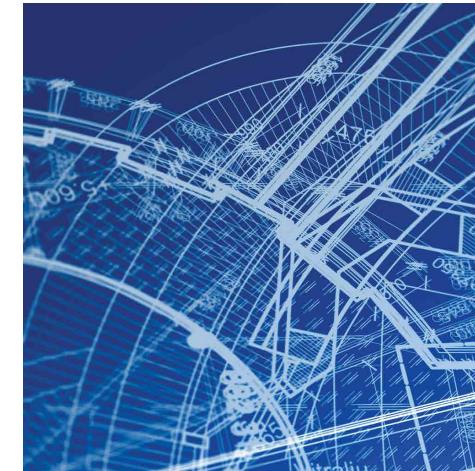
Our pipe fabrication facility has space to store materials coming in for new jobs as well as for completed work. Over 24,000 square feet in storage space is available in our warehouse and yard tent, and six acres of yard area is available for outdoor storage.

We have a 41,000 square foot fabrication facility with three bays, four overhead cranes and eleven welding bays with smoke hogs and jib cranes. There is heavy power distribution for additional welding / cutting and fabrication throughout the shop.



Our Vernon 5-axis head pipe cutter allows us to cut and bevel pipe up to 48". The Vernon is equipped with plasma for cutting alloys and oxy/acetylene for carbon steel. The Vernon accomplishes in minutes what used to take fitters hours or days to complete. Dummy legs, trunnions and re-pads are cut and beveled with ease, allowing perfect fit-ups.

We are a maintenance spool fabrication provider and deliver projects on tight deadlines. We recently completed over 100 separate turnaround piping jobs in time for a client's spring turnaround, supplying both the fabrication materials and field materials for all jobs. The materials for the jobs included low-temp carbon steel, chrome, monel and stainless. Over 20 different material / service classes with differing NDE requirements.



ENGINEERING SUPPORT

ENGINEERING EXPERTS ARE AT YOUR SERVICE

Do you require engineering support as well? Our high-tech engineering capabilities allow us to provide complete in-house engineering support to our field operations. Additional support is provided for such applications as Equipment Rigging Analyses, Vessel & Heat Exchanger Evaluations, Alterations to ASME Sec. VIII Div. 1&2 and Vessel & Heat Exchanger Re-rates.

BOLTED JOINT ANALYSIS

Gasket / stud / flange design checks to optimize design, and / or determine most suitable gasket and stud stress utilizing industry best practice.

FINITE ELEMENT STRESS ANALYSES

Finite Element Stress Analyses are available for such uses as SIF, and allowable load and stiffness determinations for vessel nozzles and fittings. Additional comparisons to traditional verification methods are also offered.

ADDITIONAL FIELD SUPPORT SERVICES AVAILABLE:

- Nondestructive Examination
- Weld Mapping
- Turnover Documents
- Bolt Torquing
- Field Machining
- Field Scanning



HEAT EXCHANGER SERVICES

HEAT EXCHANGER FABRICATION AND REPAIR

Specializing in heat exchanger fabrication and repair, Edmonton Exchanger's Heat Exchanger Services facility stocks a diverse inventory of materials and heat exchanger equipment that allows us to quickly adapt to your project's specialized requirements and specifications.

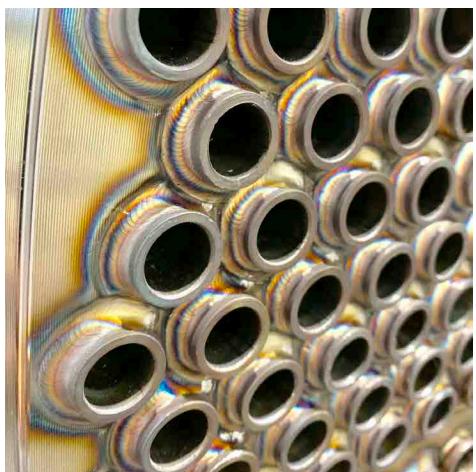
This facility fully supports our field operations for all heat exchanger services required, and upon customer request, will schedule shop time in preparation for field projects in order to ensure an expedited turnaround time for field maintenance work.

HEAT EXCHANGER SERVICES: MANUFACTURE, REPAIR, REFURBISHMENT

Whatever shape or size your heat exchanger may be, we're the ones for the job. At Edmonton Exchanger, we manufacture, repair and refurbish any size and type of heat exchangers including:

- Shell and Tube Bundles
- Fin-fan Coolers
- Straight-tubed Heat Exchangers
- Hairpin Exchangers
- U-bundle Heat Exchangers

Edmonton Exchanger can also supply heat exchanger components in addition to supporting clients with their bundle fabrication.

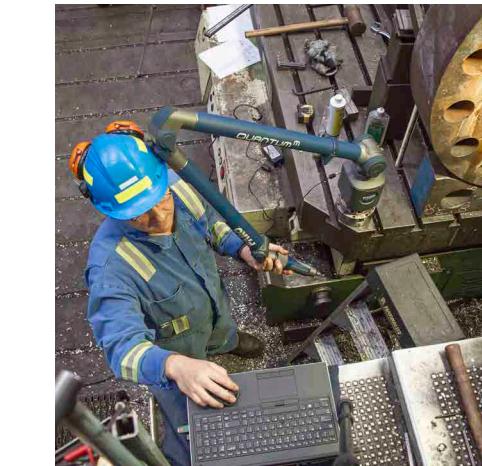


QUALITY CONTROL INSPECTION PRIOR TO SHIPMENT

Prior to shipment, all of our manufactured components undergo thorough Quality Control inspection to ensure conformance to ASME codes Sec. VIII Div. 1 and 2.

CERTIFICATE OF COMPLIANCE

All materials are supplied with a Certificate of Compliance showing material type, size, order numbers, heat numbers, minimum thicknesses and Mill Certification Specifications.



LARGE-SCALE MACHINING

Tackle your project with the right machining solution. Edmonton Exchanger's large-scale machining facility is located in close proximity to our main plant and offers a wide variety of machining services. It was specially designed to handle large diameter components and boasts equipment that is some of the largest of its kind.

General machining equipment consists of a lathe and a drill press. Three vertical boring mills of various sizes are available, as well as a large-scale horizontal boring mill.

VERTICAL BORING MILLS FOR TURNING, FACING, BORING

We make boring exciting! Three machines are available for turning, facing and boring. Our smallest boring mill handles material up to 68" diameter x 5'-0" high (1,727 mm x 1,524 mm).

A larger machine will handle material up to 13'-0" diameter x 10'-0" high (3,962 mm x 3,048 mm). Our largest vertical boring mill also has drilling and slotting capabilities. It can handle material up to 24'-0" diameter x 10'-0" high (7,315 mm x 3,048 mm), and a weight of 50 tons.

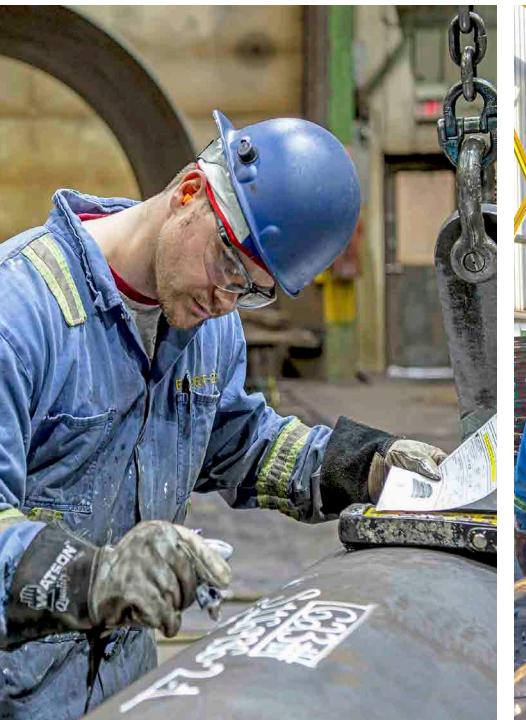
HORIZONTAL BORING MILL FOR FACING, SLOTTING, BORING, DRILLING AND TAPPING

The horizontal boring mill has a travel of 156" vertical and 360" horizontal (3,962 mm V x 9,144 mm H). Its applications include facing, slotting, boring, drilling and tapping.

To support our large-scale milling equipment, a 50-ton overhead crane spans the entire length of the machining facility and thus enables transport of large components throughout the shop.



**EDMONTON
EXCHANGER**



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