

Text

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Sales/Customer Service/Order Entry

Clients interested in museum cabinets must first contact a Borroughs salesperson to discuss their storage shelving needs. Or, they can submit a request for quotation on the Borroughs web site. Based on the information given by the client, the salesperson then works with an engineer to determine the total cost of the project.

For just a general quote, the salesperson needs details such as: what items will be stored in the cabinet and what type of collection it is.

However, for extensive projects, the salesperson needs to know what the loading dock capacity is, the dimensions of the room, the location of heating and electrical outlets etc. It is also important to know the dimensions of building doors the cabinets will have to pass through, so we can ensure the cabinets will go around the corners, up and down staircases etc.

The customer service representative processes the order with the following information:

- A copy of the quote from the salesperson

- A copy of the customer purchase order

Typical lead time for a museum cabinet is 12 to 14 weeks

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Technical Support

For a project, (Multiple Cabinets) our Technical Support department completes elevation drawings using Computer Assisted Drawing (CAD) based on the specifications given to them from the salesperson or the architect. After the drawings are completed they are sent back to the customer for review. Common modifications include spacing and height changes.

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Component Design

The mechanical engineer gives the product engineer a product cost estimate based on what specifications the customer has requested. With height, width and depth dimensions, as well as internal component specifications the product engineer can take an existing cabinet, rename it and make the necessary changes and then run a set of prints.

For example, one museum needed storage for special boxes and wanted each cabinet to hold a certain number of boxes. If it is a complicated, unique project, a prototype can be built and sent to the customer for approval. Then the customer can indicate what components work well and what components need adjustment. In most cases a part is modified and it is sent to the client to replace the old component. However, at times, a new prototype is made.

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Design Modeling (CAD)

Design engineers receive an elevation drawing which gives the exterior dimensions such as cabinet height, width and depth as well as drawer dimensions. The design process centers on the dimension information. The designers see what works and what doesn't work and make the necessary changes. Once this process is complete and all the components fit properly, piece parts such as the door skin, or the top or side of the cabinet are drawn. Then the piece parts are welded together to make weldments. After that, an assembly drawing is completed with all the weldment and/or piece parts assembled together to form the finished product. Then, detailed drawings are made for piece parts, weldments and assemblies. Once all the piece parts are right, the last step is to make a DXF file for the flat pattern only.

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Machine Programming

The mechanical engineer takes the DXF file and uses it to make a machine program and a punching program to make the part as well as the routing (shop instructions). These instructions help determine how much material is needed and what quantity of pieces are needed for the cabinet and how long the manufacturing process will take.

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Purchasing

The responsibility of the purchasing department is to track quality and to ensure that suppliers are approved and evaluated. Borroughs identifies the need to purchase material based on industry standards, customer specifications and purchase orders, internal specifications, inventory levels and customer schedules.

A typical museum cabinet order would consist of the following: steel of various specifications, paint, packaging materials, sealant, and fasteners such as: screws, washers, hinges, locknuts and rivets.

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Steel Coils

Our steel coils are purchased in thicknesses of 0.030 inches to 0.134 inches and weigh up to 30,000 pounds. We use rolled steel because it is more manageable to handle and it is more efficient to transport than flat steel.

We use low carbon milled steel that is either hot or cold rolled. Hot rolls result in decreased processing time but strength is reduced. Inversely, cold rolls result in better strength but increase processing time. When strength to weight is a critical issue, Borroughs uses high strength – low alloy steel.

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Coil Steel Shearing

This machine takes the coil of steel and sends it through a leveler, which straightens and flattens the steel, then cuts it to the proper specifications.

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Sheet Steel Shearing

This is a squaring shear which takes the flattened steel and makes any additional cuts to achieve optimum size. After the steel is cut, it goes to one of three places:

- Brake forming

- Weld press

- Computer numeric control (CNC) Turret Press

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Turret Press

This machine takes a blank sheet of steel and the turret rotates the steel so it can punch out holes of different sizes and shapes. When all the holes are completed, a perimeter cut is made.

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Brake Forming/Hydraulic Brake Press

A brake press accurately bends material through exertion of force through a punch and a die. This is a hydraulic brake press. The benefit of a hydraulic press is that there is much better control. However, it is not as fast as the mechanical press.

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Brake Forming/Mechanical press

This is a mechanical press that is faster than a hydraulic press, but there is less control than with a hydraulic brake press.

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Cabinet Component Welding

This is a Rocker Arm Resistance Welder; it welds reinforcements into the sheets. By placing the reinforcing material only where it is needed, the desired rigidity is achieved and material costs are minimized.

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Welding Preparation

The cabinet is clamped into place so that it can be measured to verify that the overall cabinet size or dimensions are correct and the cabinet is square and plumb (straight up and down).

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Cabinet Welding

This is a pinch gun welding of a herbarium liner. This positions all the shelves in the right place to store your collection. It is welded together to eliminate any protrusions which could damage valuable contents.

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Finishing

During the welding process, sparks may land on the steel which causes bumps. The process to remove these bumps is called finishing. Finishing is done so that the cabinet has a clear, smooth paint finish. Any expulsions (bumps caused by welding) are removed by sanding the cabinet before it is painted.

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Phosphate Wash

The cabinets are washed to remove any oil or dust from the steel due to the shipping and manufacturing process. It also pre-treats the steel so it is less likely to rust. The iron phosphate coating resists moisture and gives the steel a rough surface finish so the paint adheres properly. If steel is not phosphate washed, the paint could come off in sheets.

The same thing happens when primer isn't used under your house paint.

All Borroughs Shelving Components are phosphatized for better paint adhesion and lasting durability. Without phosphatizing, a nick or scratch in the finish will quickly result in rust "creepage". A phosphatized component will only rust where metal is exposed. The rust will not spread to the surrounding area.

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Powder Coating Batch Operation

Batch processing is used for cabinet configurations that have deep recesses and crevices that need to be painted. During batch processing, the cabinets are run through one at a time, but grouped where all the pieces have the same paint color.

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Powder Coating Application

This is an electrostatic application of a hybrid polyester epoxy powder which ensures an even application of a durable inert coating. The epoxy gives it scratch resistance and impact resistance, and the polyester gives it a consistent color and fade resistance.

Borroughs powder coated finishes are high quality, durable and inert. Our processes exceed current environmental standards and our paints contain no ingredients banned by the Environmental Protection Agency. Our finished surfaces will not emit any chemical compounds to the air, during product use, which could harm people or react with stored items.

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Door Paint Rack/Powder Coating Operation

These are racking doors on a continuous paint line. Since these cabinet parts are primarily flat, without many crevices, they can be painted at the same time as other parts of different sizes. This automated process allows for greater efficiency.

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Insulation Assembly

Some museum cabinets are insulated. This is simply pre-staging the cabinets for insulation assembly.

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Cubby Assembly

A cubby is a welded box with an opening at only one end; this end is where the three quarter inch micor board insulation is placed.

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Barrier Strip & Flexible Insulation Assembly

This is the bating between the cubbies. This insulation is similar to what is used inside your home. In the event of a fire, the insulation is designed to prevent the spreading of flames, between the cubbies.

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Channel and Frame Assembly

The horizontal and vertical channels cover the gaps between the cubbies and give it a finished appearance. Then the channels are riveted in place with 1/8 inch stainless steel rivets.

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Handle and Latch Detail

First the noise damper is placed on the museum cabinet. Then the throw bolt is installed and the handle is put into place. Next, if specified, the Filter Housing is installed. Finally, the seal is placed on the cabinet. In this case there is no metal strip between the two doors when they close. This particular cabinet has a seal attached to one of the doors and it seals when the door is closed over the existing closed door.

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Hinge Detail

This hinge allows for a 180 degree opening so that if the cabinet needs to be moved the door can be lifted off and reattached. It also facilitates loading and unloading of contents.

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Gasket Assembly

The gasket is made up of 100% silicone material. It is assembled into a hemmed gasket channel where there are no fasteners holding it in and no adhesives are used. It is completely inert so that your collection is not damaged or contaminated.

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Herbarium Unit Smoke Test

This is one of two tests which are conducted as a final component in the design process. Essentially, a smoke bomb is placed inside the cabinet and the doors are closed so that we can determine if there are any leaks. If leakage is indicated, our design is re-worked and re-tested, until there is no leakage of smoke.

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Water Test

A water test is also done as a final design component. Borroughs thoroughly tests our cabinet designs to ensure that water cannot enter into the cabinet and damage contents, in the event that the fire control sprinklers are activated.

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Paint Gloss Monitoring

Each time a new batch of paint powder is received from a powder supplier, the powder has already been tested for adhesion, color variation, millage, re-coatability, and over-bake resistance. The millage is the thickness of the paint on the fabricated metal part and the normal paint thickness is 1.0-3.0 mils. Paint thickness varies depending on the powder color covering a metal substrate. Over-bake resistance is tested by keeping the painted panel in an oven twice as long as recommended in order to see if any change in color, gloss, hardness, and adhesion takes place.

Borroughs internal Quality Assurance process ensures the consistency of total paint quality for every batch of powder received and verifies color variation, millage, gloss, and adhesion per each batch number supplied to us. Borroughs normal gloss consistency is 60 Gloss Units.

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Cabinet Up-ender

This machine takes a museum cabinet that is lying flat after shelf assembly and it rotates the cabinet into an upright position so it can be prepared for packing and shipping.

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Banding and Wrapping

The cabinet is strapped to a pallet with steel bands. Corner protectors and plastic wrap keep the cabinet clean and protect it during shipping or storage.

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Single Cabinet Pallet

A single cabinet packaged and ready to be shipped.

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Double Unit Palletization and Warehouse Storage

On the left, two cabinets are packaged together for efficient handling. On the right, the packaged cabinets are stored on racks at the warehouse to maximize floor space and to protect the cabinets, prior to shipment to the customer.

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Borroughs Museum Products

Borroughs offers a complete line of museum cabinets, both standard and custom units, designed specifically to store all types of collections, as well as other specialty storage products.

Museum Storage Products:

Art/Historical/Natural Storage Cabinets

Herbarium Cabinets

Entomology Cabinets

Art Racks/Painting Storage

Flat Files

Heavy-Duty Shelving

Open Shelf Filing Units

Archive/Record Storage Units

Bookcases and Library Shelving

Modular Drawer Systems

Mobile and Compacting Storage Systems

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Herbarium Cabinet

Pictured is our Model H60 Cabinet, includes 52 compartments, each measures 12-1/2" x 17-3/4" x 5-13/16". The unit features two independently opening doors and measures 84"h x 55"w x 19-12" d.

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Herbarium Cart

This is an example of a portable cart for herbarium storage.

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Custom Designs

This is an example of a unit custom designed to store film canisters.