CHOOSING THE RIGHT HANDWHEEL

EVERYTHING YOU NEED TO KNOW ABOUT HANDWHEEL SELECTION AND FUNCTION.

THE HANDWHEEL

We all know the wheel changed history. While most of us picture the invention of the wheel on a primitive cart, the wheel used in manufacturing that adjusts and runs machinery is just as relevant and history making.

The Industrial Revolution was driven just as much by the manually turned handwheel as the wheels of planes, trains, and automobiles.

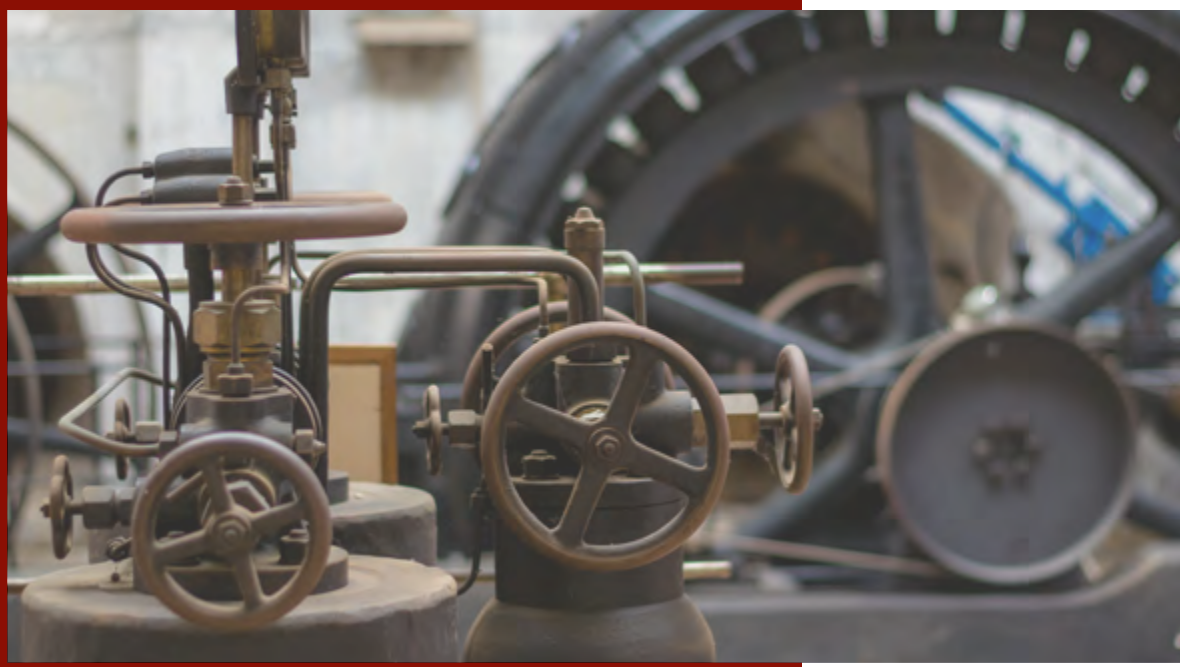
There are a couple of key considerations you will want to think about when purchasing handwheels. We have carefully outlined the vital factors in handwheel selection in this guide and hope you find it helpful.

QUESTIONS TO ASK YOURSELF

1. Do you need a handwheel that will accommodate different attachment mounting methods such as keyways, custom borings on set screws?

2. Are you looking for a light duty handwheel for a machine such as a lathe or CNC machine?

3. Do you need a heavy duty handwheel for valves or steering control?



THE FUNCTION

Handwheels typically perform one of two operational tasks. They enable movement and precise adjustment to machinery or carefully open and close a valve. Because they perform various functions in many different applications, handwheels come in a wide variety of types and sizes.

Some handwheels are gently moved by fingers making fine adjustments to everything from medical to measuring devices. Other handwheels are used to turn valves controlling the flow of oil and gas. These handwheels are quite large and require the ability to transmit a lot of force to the wheel to turn it.








Small wheels are utilized for adjustment and require no more than finger force. These are typically made of durable plastic or lightweight metal like aluminum. Larger wheels are typically made of cast iron. Overkill is the name of the game in handwheels. The smallest wheel is far stronger than required and the largest wheels are made to the same intention.

When more force is required to over come adjustment resistance in any type of handwheel, a crank handle can be added to enable more force to be exerted.

What is the purpose or application the handwheel will be used for?

This will typically determine the area in which it will be attached and how much space is available to attach the handwheel. The diameter of the handwheel determines the amount of turning force. Diameter also affects how fine an adjustment can be made when applied to machining. To aid in turning, many handwheels have an added handle to gently ease the ergonomics of turning the wheel rapidly.

THE MATERIALS

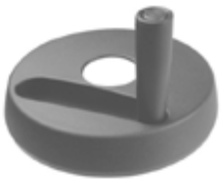
Handwheel materials are typically an easily cast material like iron or steel. Weight is not always a consideration, but when it is, wheels can be made of plastic and aluminum as well.

1 ALUMINUM

There are many benefits in using aluminum. Two of the main benefits is how lightweight it is (which gives the added benefit of inexpensive shipping). It has resistance to oxidation which makes it corrosion resistant. It is highly reflective with a good amount of thermal and electrical conductivity.

2 PLASTIC

Plastic is a great material because it is durable and resist solvents, grease, oil, and many other chemicals that are often found in an industrial setting.



3 DUROPLASTIC

Duroplastic is like super duty plastic. It has the same benefits as plastic but is reinforced with nylon or glass fiber to aid in it's strength.

4 STAINLESS STEEL

Stainless steel is a great material to work with in an industrial environment. It is corrosion resistant and does well with pressure because of its high tensile strength.

5 CAST IRON

Cast iron is a very strong and durable metal. It is resistant to deformation, relativity wear resistant, and cast easily. Although it is strong and durable cast iron is heavy.

STYLE & DESIGN

Handwheel design has evolved over the years from what they once were. Now they come in many options and features to fit virtually any application without needing a custom design.

THE STYLE

DISK OR SOLID HANDWHEELS

These are perfect if you are in a situation where you are trying to prevent axial access. Injuries can occur more often when a handwheel has a spoke design. The solid disk handwheels are best suited for smaller wheels because the bigger the wheel gets the heavier it will be.

SPOKE HANDWHEELS

Spoked handwheels are a great choice if you require access to the axial. The 2 and 3 spoke handwheels are very popular and often used in many different industries. The spokes often increase when the handwheel gets larger in size. The number of spokes, if not for a functionality purpose, is also purely for esthetics.

FLAT HANDWHEELS

These handwheels can be solid or have spokes. The outside diameter of the wheel's hub and the wheel are not offset so they are on the same plane.

DISHED HANDWHEELS

These are also solid or come with spokes. The outside diameter of the wheel's hub is offset to the outside diameter of the wheel giving if a dish appearance.

EMW+IR MONOSPOKE HANDWHEELS

The unique design of this handwheel is made to prevent fingers from slipping with a "U" shaped opening across from the handle that allows access to the axial.

THE HANDLE

NO-HANDLE

No-handle handwheels are much like a steering wheel. This makes it perfect for applications that require a steering motion or used to open and close and revolve.

MANUAL FOLD-A-WAY

On the manual fold-a-way models, to engage handle pull up and it will snap into a locked position. Handle will fold-a-way by pulling up on the handle and pushing it into the recessed cavity of the wheel.

AUTOMATIC FOLD-A-WAY

The revolving handle when pulled from its cavity, is locked into position by the operator pushing the handle axially towards the handwheel. When the axial pressure of the operator ceases, the handle disengages and will automatically fold-a-way into the recessed cavity. These are perfect for handwheels that are in an area where a handle sticking out would be a safety hazard.

FINGER GRIPS

These handwheels can come with or without the added handle. The finger grips are grooved out sections on the perimeter of the wheel. Some are under the wheel and some are facing the hub. The finger grips add extra control to a revolving handle.

ADDED HANDLE FORCE

ADDING A CRANK HANDLE

Adding a crank handle increases the force you can exert but takes up additional room. The handle can protrude into the work area and present a danger.

Some handwheels come with cranks that can be folded away for safety. The crank handle added to the handwheel allows more force to be exerted and allows the wheel to be spun rapidly while under control.

ADDED HANDLE SAFETY

SAFETY POCKET

The fold-a-way handle leaves an unobstructed surface because of the safety pocket and rear finger grips gives the operator unique control.

SAFETY CLUTCH

The safety clutch allows the wheel to remain stationary while the shaft turns freely. A clutch is supplied when it is needed in the “pull” position. A slight “pull” on the wheel will engage serrations inside the clutch this inturn forms a positive engagement with the shaft.

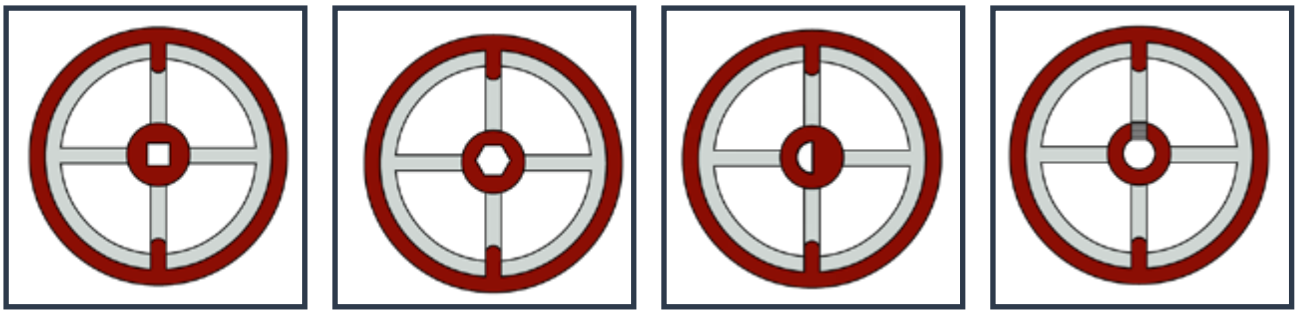
When the wheel is released automatically it returns to the stationary position relative to the shaft. The clutch can also be installed in reverse which will engage with a “pushing”. The “pushing” engagement should be used with caution because it can be engaged a lot easier then the “pull”.

WHEEL PREPARATION

The most important and variable consideration in handwheels!

The most important and variable consideration in handwheels is how the hub of the wheel is prepared and mated to the shaft of what it is driving. Hub styles include squares, hexes and half circles with set screws to retain them. Some are pressed into place on splines that are part of the shaft. Some are threaded to be screwed into place, and some are welded.

HUB STYLES



SQUARE **HEXES** **HALF CIRCLES** **SCREW SET**

Another consideration in handwheel selection is how the wheel is attached to the drive shaft which connects to the operating end of things. This issue is as old as the first wheel on a handcart 2,000 years ago and has been solved in a wide variety of ways. The part of the handwheel that attaches to the shaft is called the bore.

THE BORE

Handwheels Mounting and Retaining!

One of the most misunderstood parts of specing or buying industrial handwheels is the importance of understanding how to mount and retain them.

The hole in the center of the handwheel is called the bore. The bore is measured by its diameter, which is the distance from one side of the hole to the other. The basic bore type is simply a hole straight through the handwheel.

The easy part is measuring the shaft and cutting a hole just slightly larger in the center of the wheel, then sliding it into place. There are a wide variety in standard sizes.

It is not quite that simple though, the handwheel must also be locked to the shaft in order for it to be actually able to turn the shaft. There are a number of ways to do this depending on how the handwheel is going to be used.

The bores are designed in a lot of ways and all for good reason. Wheels have to be removed and installed to service machines. Most of them have to exert force in both directions equally. Here are just a few of the designs:

- Hexagonal bore with set screw
- Tapered shaft with locking bolt
- Threaded shaft with locking bolt
- Splined shaft
- Press fit shaft
- Keyway fit shaft
- Half square shaft with set screw

HANDWHEEL KEYWAYS

Handwheels Keyways are not a Bore!

A keyway is one of the oldest methods of locking a handwheel to a shaft. A square cutout is made going into the shaft and a matching cutout is made going out into the handwheel. These matching cutouts are known as the keyway. They typically come in standard sizes. A small piece of steel that fits tightly into the keyway locks the handwheel to the shaft.

The handwheel slides on to the shaft, the cutouts are lined up, and then the "key" is pushed into place. Typically the key requires some force to push into place. This gives equal turning force in both directions, limited by the strength of the key itself. The key and handwheel are meant to absorb the wear and preserve the shaft being driven. Keys are easy to replace.

Bored Hole

Bored Hole With Keyway

Bored Hole With Setscrew Hole Over Keyway

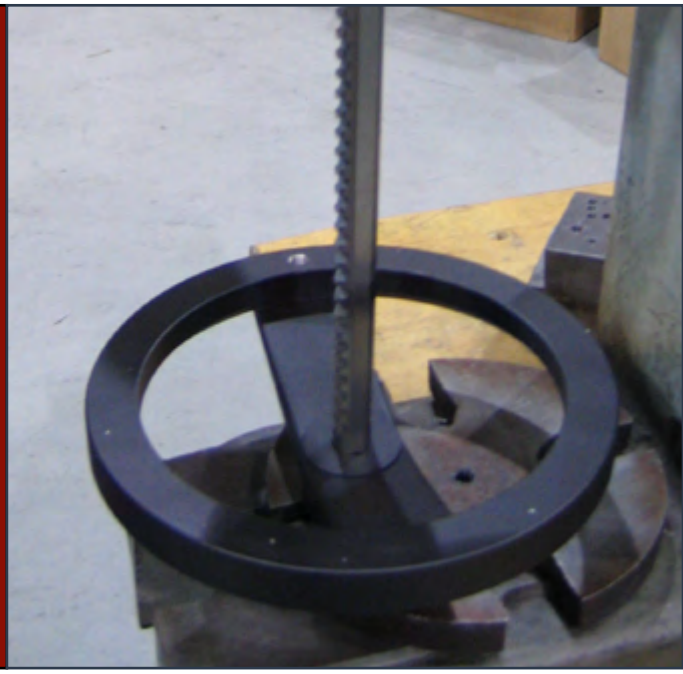
Bored Hole With Setscrew Hole

Bored Hole With 2 Setscrew Holes at 90°

BROACHING

Cutting keyways into handwheels is done in large volume production with a process called broaching. That is why there are "standard sizes" for shafts, keyways, and handwheels.

Custom keyways and keyway style handwheel replacements in small numbers are done either with a process called wire EDM, or sometimes by a laser or waterjet.Keyways have very sharp corners and that can be a manufacturing challenge for low volume applications which do not justify a custom broaching tool.



HANDWHEEL ACCESSORIES

BEARINGS

Bearings can be added for smoother motion and control between the shaft and the handwheel.

Bearings help to stabilize the shaft and provide the operator with added control and stability.

INDICATORS

Handwheels can also be equipped with indicators. Mechanical indicators (counter) are shaft driven measuring devices. Each indicator incorporates a geared number wheel set.

These devices regulate and position variable-speed drives, distance between rollers, gate widths, valves, and other equipment controlled by rotary or screw motion.

Numbers change along the reading line as the actuating shaft on which the instrument is mounted rotates clockwise or counterclockwise.

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