



# DESIGNING THE OPTIMAL PAINT FINISHING OPERATION

WHY PRODUCTION REQUIREMENTS AND DESIRED FINISH QUALITY MATTER TO METAL FABRICATORS

For metal fabricators in the market for new finishing equipment, there are many factors to consider when deciding what type of paint booth is best for your business.

The paint booth you select should enable your business to fulfill its production requirements while also achieving the desired finish quality. You want to invest in equipment that not only will meet your business' needs in its current state but will be sufficient as your business grows and changes.

*"You should never install a piece of equipment that could potentially limit the growth of your business," said Royce Day, industrial territory manager for Global Finishing Solutions® (GFS). "The best capital equipment investments are the ones that result in the most efficient production, with the least amount of labor required."*

## PRODUCTION REQUIREMENTS

A business' production requirements – both today and in the future – help determine which equipment will deliver the most bang for your buck.

Since most manufacturers build specific products, their finishing equipment is typically designed to accommodate those

products. For instance, a manufacturer that paints small parts may not have the capacity to paint larger products. That is why equipment selection is so crucial.

Capital equipment investments are often likened to the purchase of a car – the more bells and whistles, the better the performance. There are several features on GFS paint booths that help maximize production:

- **Variable frequency drives (VFDs)** can be used to regulate airflow in your paint booth, while saving on energy costs. With a VFD, you can manually adjust the exhaust fan speed to compensate for filter loading.
- **Consta-Flow** is a variable-flow system that provides automatic compensation for filter loading. With Consta-Flow, the booth's exhaust fan speed is automatically adjusted by a VFD that responds to the changing conditions of the exhaust filters. The system monitors a differential pressure, adjusting the exhaust fan's RPMs to what is needed for the volume of exhaust air, based on how loaded (dirty) the filters are. The result is a paint booth with constant airflow, even while the filters load with paint, increasing filter life. This system is recommended for non-pressurized paint booths where the air exhausted from the booth and the building is replaced by an air make-up unit (AMU). This helps maintain a neutral building pressure as the exhaust filters load.

- **Intuitive control panels** feature a user-friendly interface, offering enhanced troubleshooting capabilities and allowing you to continually monitor all systems for safety and function. A reliable control panel often results in more reliable and consistent booth performance.



Unlike a car, manufacturing equipment cannot be easily traded in for a new model every couple of years. Your purchasing decision should be based on your business model. What is your current production? What do you anticipate your production to be five or 10 years down the road?

If you are painting a couple dozen 50-gallon drums a day, you may only need a small booth right now. But you cannot expect that same equipment to accommodate 200 50-gallon drums a day. You will not be able to accomplish this without upgrading your equipment and changing your processes.

## BUDGETING FOR CAPITAL EQUIPMENT

The more equipment you invest in, and the more elaborate the equipment is, the higher the upfront and operating costs, and the longer the payback period. Heating a booth with an AMU also makes the booth pricier initially and operationally.

*"The bigger the booth you have, the more airflow you have, which means bigger fans, more fans, bigger motors, more filtration and more structure required," Day said.*

On the flip side, a bigger booth presents more opportunity. You have the ability to fit larger products and more parts in the booth, and there is increased room for technicians to maneuver.

The type of equipment a manufacturer invests in is often dictated by a budget. Outgrowing equipment is common, particularly among startups. If you are constrained by your budget, your best bet is to buy slightly larger equipment without all the bells and whistles, that way when your business grows, you can increase production – and possibly add features to your paint booth – without needing new equipment.

*"It is all about productivity," Day said. "How much material do you have to move? And how fast do you have to move it?"*

## AVOIDING PRODUCTION BOTTLENECKS

Production bottlenecks in metal fabrication typically happen during the painting and drying cycles. Most problems arise in one of two ways:

1. Products are not being finished fast enough, so unfinished products get stacked up, waiting to be finished
2. There is not a dedicated space for the drying of products, forcing products to be dried in a booth, which slows production

*"A manufacturer may go a long time and never have a bottleneck because you have designed your workflow for a certain production level," Day said. "If you increase production or get production requests that you were not anticipating, you could have a bottleneck if you do not have the equipment to be able to accommodate that."*

Bottlenecks in the painting process can be avoided by efficiently designing the space in your shop. Like in an automotive body shop, in which vehicles pass through each stage of the repair process as quickly as possible and in the least amount of space, a metal fabricator should understand the impact of their shop layout on their production capabilities.



## LAYING OUT YOUR PROCESS

Your paint booth must be big enough to accommodate the largest part that you plan on finishing. When selecting the size for your booth, it is best to perform a dry run by staging parts in open space – place parts on carts, racks and hooks to determine exactly how big of a booth you need.

Having a dedicated space for products to dry is also essential to avoiding production bottlenecks. If wet products are left to dry on the shop floor, contamination will become a bigger problem. The best option for liquid and powder coating is an industrial oven.

*“As long as those parts are drying in the booth, you are not going to be painting in it,” Day said. “You have to get those parts moved out of the booth to dry to keep production running smoothly.”*

## FINISH QUALITY REQUIREMENTS

One of the biggest mistakes a metal fabricator can make in selecting equipment is purchasing equipment that does not meet the finish quality requirements demanded by the market. When a paint job fails to meet the market standard, the consequence is often a lot of wasted time on rework, which results in additional labor, impacts a business’ bottom line and negatively affects the customer’s experience.

Different products have different finish quality requirements. Therefore, different equipment may be needed to produce the smooth, shiny finish on the fender of a Harley-Davidson motorcycle compared to the coarse finish on a gun safe.

The three classes of finishes in industrial manufacturing:

**Class A:** Top-of-the-line coating (appearance is important)

**Class B:** Covering with a decent appearance

**Class C:** Only a protective covering (appearance does not matter)



*For some tractors, for example, a Class B paint job is all that is needed. “They get good coverage, and they look good from a distance,” Day said. “They might have some blemishes in the paint, but that is the market standard.”*

## OPEN FACE VS. ENCLOSED PAINT BOOTHS

The choice between an open face and enclosed paint booth typically depends on the finish quality requirements for the products being sprayed. An open face booth consumes less floor space and is more cost-effective but lets in more contaminants, whereas an enclosed booth takes up more floor space and is more expensive but produces a better quality finish.

It is nearly impossible to keep contaminants out of open face booths, especially wider booths. The booth’s exhaust fan pulls unfiltered air into the booth, and even if pre-finishing operations – milling, assembling, prepping and sanding – are kept away from the booth, dust and dirt seemingly always end up in paint jobs.



*“Whatever is in the ambient air is going to come in contact with that product when you are painting it,” Day said. “When you enclose a paint booth by putting filtered doors on it, you take that quality up a notch. When you pressurize your paint booth, you take it up another notch because you are double filtering the air that goes into the booth, as well as climate controlling that area. Plus, with AMUs capable of having cure cycles, that helps metal fabricators avoid bottlenecks when running high production with the booth occupied.”*

## SELECTING YOUR AIRFLOW STYLE

The style of airflow in your paint booth can have a significant impact on the quality of the paint finish.

**CROSSDRAFT PAINT BOOTHS** are the most popular airflow option among metal fabricators because they work for a large number of applications and are the most affordable, with smaller fans, fewer fans, smaller AMUs and fewer filters. However, the potential for cross-contamination is highest in crossdraft booths, and controlling overspray is difficult, especially in longer booths, such as open face booths.

If multiple parts are arranged in the booth, as one is sprayed, the air – along with paint overspray – may be pulled across other products, affecting the quality of the paint job. Similar problems exist when trying to paint long objects in crossdraft booths.



*"If you are painting something 40 feet long in a crossdraft booth and you are looking for a Class A paint job, you are going to have to do a lot of buffing when you pull the product out of the booth," Day said. "You are going to have a good covering, but you are going to have imperfections in the paint job because of the flow of the air in the booth. For optimal results, you want to be spraying in a pressurized booth that has an AMU."*

**SIDE DOWNDRAFT AIRFLOW** is consistent from each end of the paint booth because of a filtered ceiling and exhaust plenums that run along both sides of the booth. The air flows downward, over the product and toward floor-level plenums, keeping overspray away from the product being painted.

With **DOWNDRAFT PAINT BOOTHS**, there is uniform airflow through a full-length, filtered ceiling and exhaust pit. Unlike in crossdraft booths, overspray is not dragging across the product being painted or other parts in the booth. Gravity carries overspray into the exhaust pit, making downdraft airflow the overall best airflow style for controlling overspray and contamination.

The drawback to side downdraft and downdraft paint booths is their heftier price tag. Side downdraft booths feature as many as four fans, and there is added expense for the side ductwork. Pit installation can cost as much as \$10,000 in downdraft booths, and pit grating is another large expense, in addition to a plenum and a full ceiling of intake filters.

Ultimately, you want to get the most out of the airflow in your paint booth. If you have space limitations and budget restrictions, a crossdraft booth may be the only fit for your business, but you can reduce rework by adding an AMU and having the booth pressurized and climate controlled. Likewise, if you cannot dig an exhaust pit in your building, a side downdraft booth is your best choice over a downdraft booth; if you have plenty of floor space, you can shoot for a targeted airflow rate so that the highest amount of paint possible adheres to the product.

*"You have to weigh the benefits of a side downdraft or downdraft paint booth versus a crossdraft booth and determine whether the increase in finish quality justifies the additional cost," Day said.*

Production requirements and finish quality requirements are the two most important considerations when determining what type of industrial finishing equipment is best for your business. GFS has custom designed industrial finishing equipment for a number of applications, across a range of industries.

To learn how the right piece of equipment can improve your operation and to get in contact with a distributor in your area, please visit [globalfinishing.com](http://globalfinishing.com).