How To Select The Right Pump Drive For An Application – Learning The Basics

It can be quite difficult to find the right pump drives for your particular needs. There are many types of different power take-offs (PTOs), and it may seem overwhelming to try to choose the right one that fits your needs.

That is where jbj Techniques come in. In this article, we'll take a look at multiple power take-offs and pump drives, and how you can select the right type of pump drive for your application.

Whether you're running an industrial plant, or simply looking for the right power take-offs for your heavy machinery, heavy plant, mobile applications, this guide is sure to help you select the right pump drive for your needs.

Six Basic Considerations For Selecting A Pump Drive

Let's begin with the basics. When engineering any new pumping or hydraulic system with pump drives and power take-offs, there are six basic things you must consider – before you begin creating blueprints, plans, and other project details. Here's a quick overview of each one.

1. The number and type of pumps required

- No two projects are the same. The type of pumps – and the number that you need – will vary in each and every engineering project.

This depends on the performance statistics and overall dimensions of the pumps, as well as the pipework through which the fluid will travel.

With both of these factors understood, it should be quite easy to establish a maximum centre distance, and choose units that will deliver enough power to reach their end destination. Failing to do so will result in sub-par performance. Pumps may be stressed past their operating limits, resulting in eventual product failure.

2. Maximum torque output requirements for each pump

– After you have done the basic maths to determine the type of pumps that you need, it's time to consider your maximum torque output requirements. You will need to make sure that this number is below the maximum value of each of your pumps, to ensure smooth and steady operation.

3. Maximum input torque

– This is where your prime mover (engine operating the power take-off or PTOS) comes into play. Depending on the power and size of your prime mover, you may need to select different pumps. If you have an extremely high-powered motor, you will need to make sure that you have selected a properly heavy-duty PTO.

And, in the same vein, you must consider whether or not a heavy-duty PTO is overkill if you are using a smaller motor, such as the motor on a truck or another piece of heavy machinery.

As a rule, maximum input torque should be at least 20% below the maximum rated value for any particular clutch and PTO. This ensures that the pump is not over-stressed, and will operate properly for its intended lifespan. Failing to do so can result in damage to both the pump and the prime mover.

4. Maximum input speed

– When designing a new pump system, maximum input speed should be examined to ensure that the chosen pump can accept the maximum input speed of the prime mover.

For example, a smaller engine may produce less torque at a higher RPM – and a suitably-sized pump must be chosen, to ensure that it can accept this high-RPM power.

And, in contrast, a larger industrial-sized prime mover may have a massive amount of torque and power, but few rotations per minute, which should also have an effect on the pump that you select.

Whatever pump you choose, you should also make sure that the pump directional rotation is opposite of the prime mover, to ensure compatibility.

5. Service factor

– Fluid pumps are often operating in high-stress, high-uptime environments, particularly in industrial processing plants and other such areas. This means that a service factor should be chosen which exceeds all requirements, to make sure that the drive remains intact and functional even in times of periodic overload.

As a rule, you should be looking for a service factor of at least 1.15 – this means that the pump can operate at 1.15x its intended design capacity for an extended period of time, without its overall lifespan being affected by doing so.

6. Cooling

– The ambient temperatures around the area of installation are quite important when it comes to selecting a cooling system for a pump. If the area is quite cold – for example, in a refrigerated environment – you may not need an additional cooling system, as

the ambient air will help cool the oil temperature of the pump.

Temperatures for a pump should not exceed 105 degrees Celsius when using synthetic oil, or 80 degrees Celsius when using mineral oil. Failure to adhere to these guidelines may result in lower capacity for work, as well as premature pump drive failure.

These are six of the most important factors that should be considered when selecting a pump drive, or any kind of PTO. Failure to abide by one or more of these factors can result in a shortened equipment lifespan, or even damage to a pump or prime mover.

For help choosing an appropriate PTO, this PTO guide helps you determine factors such as Speed Limits, Side-Load Limits, and Clutch Torque Limits.

Other Factors That Should Be Considered When Selecting Power Take-Offs Units (PTOs)

Beyond the six factors outlined above, there are some other considerations that should be taken into account when selecting a gearbox or a power take-off unit of any kind – not just a pump drive. When selecting a PTO, the following things should be kept in mind.

- **Type of prime mover**

  – A gearbox and PTO designed for use with diesel engines will not work as well with a hydraulic engine, for example. The type of prime mover and engine must be considered carefully when selecting a PTO. Make sure to choose the right

gearbox for a hydraulic, diesel, or petrol, or electric-powered engine.

- **Inertia of the machine to be driven**

– A high-inertia machine will typically put more stress on a gearbox, due to the heavy torque loads and weight applied to the unit during each rotation. The heavier the pump or other machine is, the more robust the gearbox will have to be. Special bearings and housing designs may be required to accommodate these high loads on the input shaft. This guide is a helpful resource for analysing inertia, engine type, horsepower, and more.

- **Peak torque requirements**

– Care should be taken not to undersize or oversize a gearbox. Using power take-offs that are too large – or small – for a particular task will result in higher strain and efficiency losses.

- **Number of clutch engagements/hour and duration of each engagement**

– More durable units are required for use in applications such as heavy-duty pumping, milling, and other activities which require fast, repeated clutch engagement every hour.

- **Splitter requirements**

– In some cases, a single power take-off may not be the right choice for a particular application, and multiple power take-offs can be used to provide maximum efficiency, and minimise equipment redundancy.

Splitter gearboxes, or multiple power take-offs, allow for a single prime mover to drive multiple pumps or other pieces of equipment. They can even be designed to accept inputs from multiple prime movers, and output it through a single

gearbox. When selecting either a single pump drive or a multiple power take-off, each of these factors must be considered.

Failing to choose the right unit will lead to poor performance, and an inefficient design, so ensure that you do your due diligence, and refer to all available resources, such as this selection guide from jbj Techniques.

By doing so, you can ensure that you choose the right unit for your particular needs.

Single Pump Drives Or Splitters? Understanding The Pros And Cons Of Each

Wondering if a single pump drive or a splitter gearbox (multiple power take-off) is right for your needs? It can be quite difficult to select the right pump drive for your needs. Here is a quick overview of the pros and cons of both single gearboxes and splitters.

Multiple power take-offs

Pro

- **Versatile and flexible**

– While splitter gearboxes are usually used to provide power from one prime mover to multiple drive units, they can also be used to unite the power provided by two different engines, and drive it into a single pump or another machine.

- **Allow multiple pumps or other devices to be driven with one prime mover**

– Splitter gearboxes allow for multiple types of pump to be driven by a prime mover with a high enough capacity. This includes traditional pumps, vane pumps, screw pumps, and more. Of course, their usefulness is not only limited to pumps – they can drive a variety of other devices as well.

- **Reduce planning complexity and prime mover requirements**

– By using a single engine and a multiple power take-off, the mechanical operations of a given product can be simplified dramatically.

Con

- **Typically more expensive**

– As you may expect, it's more expensive to purchase a three or four-way power take-off than it is to purchase a single PTO gearbox.

- **More mechanically complex**

– Though only a single motor is required to drive multiple pumps, the PTO itself is more mechanically complex, and great care must be taken to choose the proper unit.

- **Harder to install**

– Splitter gearboxes are quite delicate, and require extra care and attention when they're being installed.

Single pump drives

Pro

- **Simplified design**

– A single pump drive has a more simple design, as it is not designed to output power to more than one device. In some cases, this can also mean superior performance when driving a single pump, though this depends on the particulars of the application.

- **Comparatively inexpensive**

– Lower mechanical complexity means a lower overall cost of the unit, which can be a benefit in lower-budget projects.

- **Can be more reliable in high-uptime environments**

– Because it accepts power from only one prime mover, and powers only a single pump, single pump drives are often used in areas where consistent performance and uptime are mission-critical.

Con

- **Can’t be used to unite multiple prime movers**

– This is one of the biggest drawbacks of a single pump drive. Being able to use one pump drive to accept power from multiple motors is very useful when designing and implementing projects.

- **Not ideal for parallel pumping**

– Parallel pumping is gaining acceptance in the world of hydraulics and plant design. It allows for less stress on each individual pump, and faster delivery of fluids via smaller pipes. Compared to multiple power take-offs, single pump drives are not ideal for parallel pumping.

Both single and multiple power take-offs have their own ideal applications – and it's up to you to decide which one may be right for your product, due to their unique advantages and disadvantages. However, jbj Techniques have the expertise to assist you and are happy to help!

Use This Guide To Choose The Right Pump Drives For Your Application!

jbj Techniques Limited has available for you a tremendous variety of single and multiple power take-offs and gearboxes – each of which can be used as a pump drive for many different tasks.

Whether you need a single pump drive for use in a mobile truck, or you're designing a new piping and liquid flow system for an industrial manufacturing plant, you can find the right jbj product for your needs.

So take another look at this guide now, and think about how you can choose the proper pump drives for your next project. Don't forget, you are not alone, jbj Techniques are here to help!

If you have more questions about selecting the drive unit that's right for you, you can always contact jbj Techniques by sending an email to info@jbj.co.uk, or contact them by telephone at +44 (0)1737 767493.