

Sumitomo Drive Technologies

DRYWELL *OR NOT?*

WHEN SHOULD I USE IT?

CHESTER W. CHEN, PMP
SENIOR PRODUCT MANAGER

US.SUMITOMODRIVE.COM

Drywell or Not? When should I use it?

Chester W. Chen, PMP • Sumitomo Drive Technologies



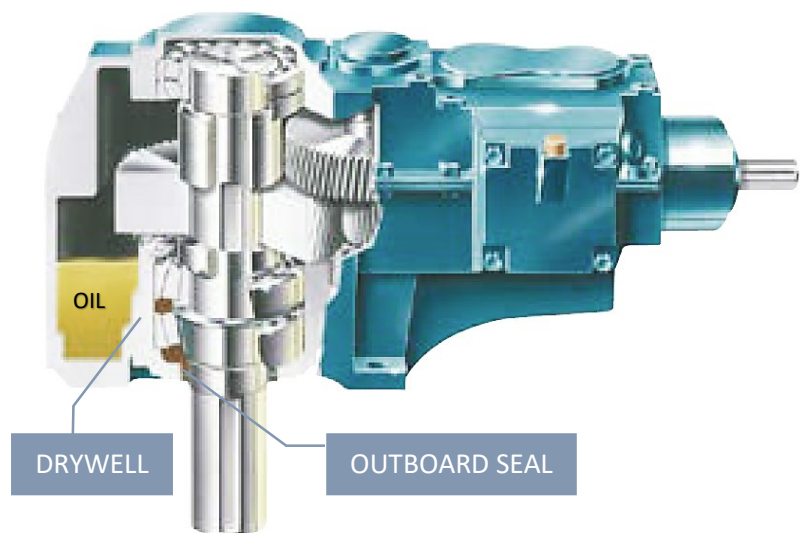
Drywell – a terminology that many of us in the power transmission business often encounter whenever a conversation would come up about the features and benefits of a particular gearbox or drive to be used in the industrial mixing or agitating equipment. Intuitively, we know that a drywell must be an important feature in the gearbox, but, do we know how the drywell works, when to use it, or if it is ideal for the application? After all, a mixer/agitator can be found in hundreds of applications across two dozen industries, such as the one shown here for the waste water treatment; can one drywell design satisfy all applications?

Here, we will explore the basic but important aspects of the drywell that will provide us with an insight to answer these typical questions.

PURPOSE

As the name suggests, “dry”-“well” is a well-like structure which shapes and functions like a dam, with the intention to keep the exterior and output area of the gearbox dry by preventing its gear lubricant (typically oil) from contacting or leaking through its outboard seal. In other words, the drywell averts a possible contamination scenario by reducing the likelihood of the gearbox oil coming into contact with the medium being mixed by the gearbox. Undoubtedly, the gear oil mixing with the processing medium is undesirable for most applications, and could be even more detrimental in the case of mixing ingredients for food, beverage, chemical, or pharmaceutical goods that are to be consumed.

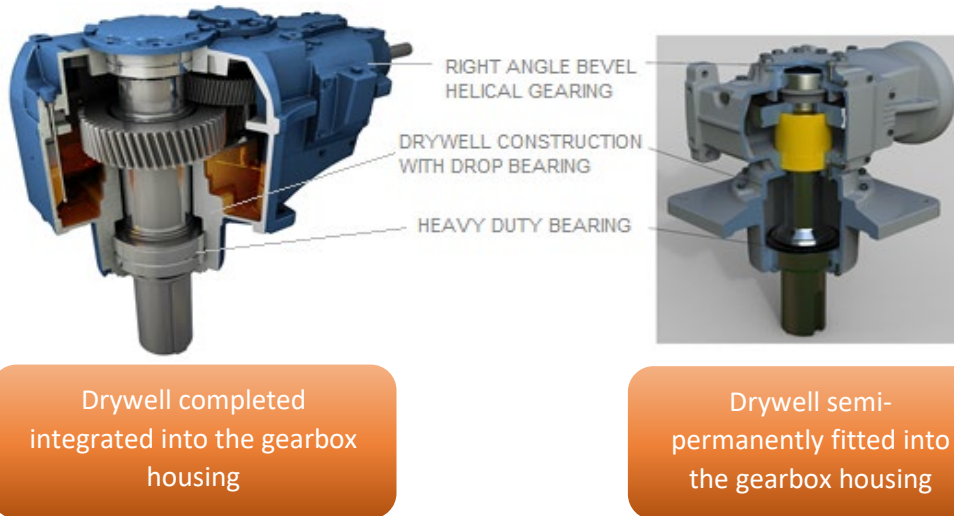
This cutaway image shown here is a *Hansen® P4* right-angled mixer drive with the drywell integrated into its housing. This drywell is a stationary structure, which extends from the bottom of the housing all the way up to the gear. This design separates the oil from the outboard shaft, bearing(s), and seal(s), thereby, eliminating the potential for oil leaking down the shaft during the normal operation when unexpected forces are being subjected to the unit.



DESIGN

Since the drywell resides inside of the gearbox as an internal object, the user would not be able to see or access it to troubleshoot if the leakage occurred, the gearbox designer bears the burden to ensure that the drywell must to be oil-tight and does not require maintenance – and this is our primary performance objective for a properly designed drywell. To further expand on the associated design criteria, based on *Sumitomo-Hansen's* decades of experience serving the mixer/agitator OEMs and end-users worldwide, the optimal drywell design would be:

- made from a one-piece solid metal or iron
- stationary or fixed and does not move during the gearbox operation
- is modular (instead of permanently cast or welded in) without changing the gearbox's footprint
- completely sealed or closed-off from the top rotating gear or shaft.



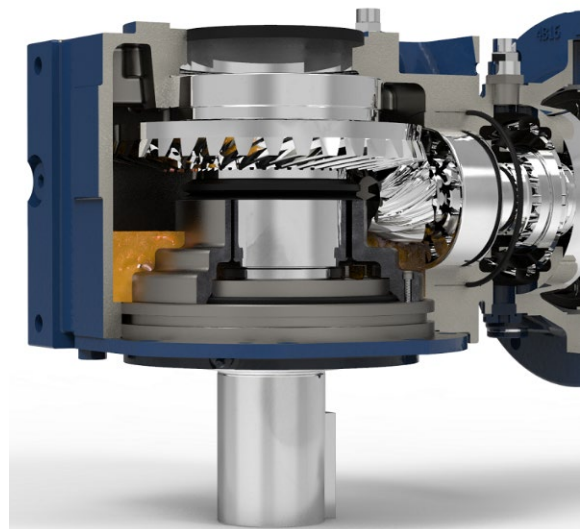
FLEXIBILITY

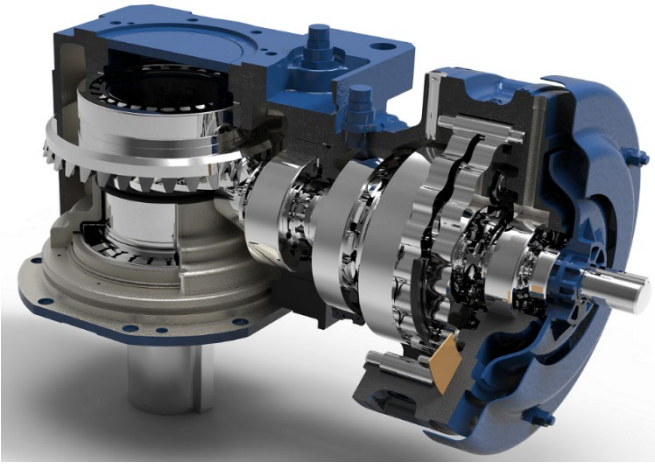
As previously mentioned, a drywell can be completely integrated into the housing, and this type of design is very strong since the drywell is a structure member of the housing and eliminates a potential oil leakage path at the bottom of the oil sump. However, such an integrated design generally comes at a higher manufacturing cost because the gearbox's housing would require a special casting pattern and special machining and/or welding operation (if the casing is made by steel). In short, the integrated drywell is extremely strong, but the gearbox becomes unique and costs more than its standard counterparts. Though, it is suitable for a dedicated group of customers it might not be an optimal solution for every customer across the industry. Which would require additional investment in castings for Drywell applications vs. all other non-Drywell applications

In order to be flexible and reduce the overall cost of the gearbox and yet still be able to provide customers with a robust drywell option, we looked deep into a modular design approach. This means, the customer can use the gearbox as is without the drywell if their mixing/agitating application does not require it, or opt to have the feature added into the gearbox should the drywell option be deemed necessary, all while not changing the dimensional envelope.

With the advancement in machining technology, specifically the capability to economically fabricate high quality components, coupled with superior sealing methodology readily available, many OEMs and end-users (approximately 60%) of the aerating/mixing /agitating applications have been operating satisfactorily without a drywell in their gearboxes. On the other hand, the remaining (40%) customers whose mixing mediums could be compromised by any contamination from a foreign substance, the drywell option would be preferred feature. Therefore, the new mixer/agitator drive solution should take into consideration the needs of both type of customers.

An example of a flexible drive with a modular drywell design is our *Sumitomo Cyclo® BEVEL BUDDYBOX (BBB)*, with images shown on the right. The BBB drywell is made from precision machined cast iron and can be added into the gearbox without affecting its mechanical or thermal performances. The drywell is bolted, torqued, and sealed against the bottom housing cover, converting the interior into a leak-free oil sump. To close-off the drywell and prevent oil splash ingress, a heavy-duty V-ring seal is installed onto the gearbox hub, that when the unit is static, seals off any oil access. When unit is in operation the V-ring rotates with the shaft acting as a dynamic slinger, pushing oil away from the Drywell chamber. The higher the rotational speed, the stronger the redirection effect.





In summary, we recommend to choose a gearbox with the drywell if it is required by the aerator/mixer/agitator end-user or the OEM, or if there is a concern with media contamination in the unlikely event that the gear oil leaks out of the gearbox and contacts the medium being processed or the surrounding environment in the processing plant.

The ideal drywell should be an option of a standard gearbox in order to be flexible to all users. Needless to say, it should be priced reasonably, prevents or eliminates potential oil leakage, and does not require any maintenance throughout

the life cycle of the mixer/agitator drive gearbox.

Sumitomo mixer/agitator drives are all equipped with proven drywell designs that are field tested and preferred worldwide. To get more information please visit: <https://us.sumitomodrive.com/en>

