

# Definition of Propeller Tunnels for PropExpert

## A HydroComp Technical Report Report 141

### Overview

PropExpert asks the user to define a *Vessel* data item called *Prop style*. The options for this are *Open*, *Ducted* or *In tunnel*. The purpose of this selection is to help PropExpert better define the hull-propulsor interaction coefficients known as wake fraction, thrust deduction and relative-rotative efficiency.

The existence of a propeller tunnel (some call this a propeller “pocket”) affects how the water flows into the propeller. The hull-propulsor coefficients must therefore reflect these flow changes when a tunnel is tightly wrapped around the propeller. On the other hand, if the tunnel is merely a slight indentation into the hull bottom, there may be little or no effect on the coefficients.

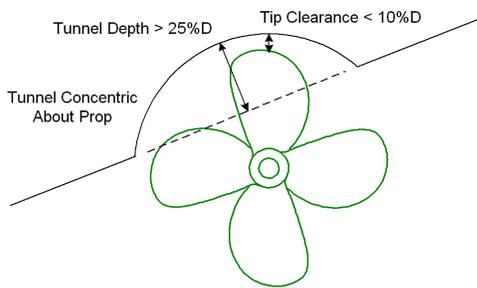
So, what constitutes a “propeller tunnel”, or just a “bottom hollow”?

### Selection criteria

We have undertaken to develop the following guidelines based on research into what propeller tunnel parameters will contribute a significant effect on the coefficients. The following two graphics should help you to choose if the propeller is legitimately *In tunnel*, or whether it is essentially an *Open* propeller.

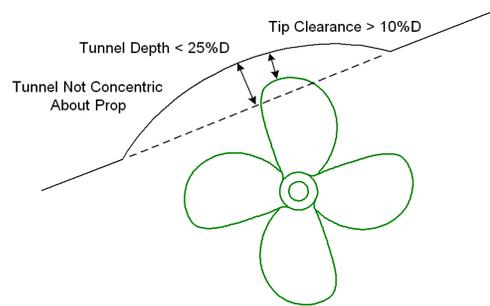
### Propeller tunnel “In tunnel” option

We recommend choosing the *In tunnel* option when the tunnel is a) deeper than 25% propeller diameter (D), b) has a tip clearance less than 10%D, **and** c) is of a concentric shape.



### Bottom hollow “Open” option

We recommend choosing the *Open* option when the tunnel is a) shallower than 25%D, b) has a tip clearance more than 10%D, **or** c) is not of a concentric shape.



### Distinctions

Of course, you may encounter shapes that are not clearly one or the other. In these cases, tip clearance is the most important parameter, followed by tunnel depth and shape. Think of it this way – does the propeller tip pass near the hull only for a brief moment (as is the case for an *Open* propeller), or is it close to the hull for a sizeable fraction of its rotation (when the propeller is truly *In tunnel*)?

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