

Time isn't all our

# DEFLECTION CALCULATOR

can save

You want strong, lightweight rolls that produce the least deflection.

It sounds simple enough. But accurately sizing rolls to deliver that kind of performance has been a complex, time-consuming process. Until now. Componex has developed an exclusive WINertia™ Deflection Calculator to make it fast, easy and precise.

Best of all, we're making this versatile tool available online to the entire industry. You can find the correct roll, compare different sizes, and also accurately size shafts—in a matter of seconds! Visit Componex online to try our Deflection Calculator for free. You don't have to be a customer. But once you see how well it works, you'll probably want to be.

See the reverse side of this page for more in-depth information about the Deflection Calculator.

For a fast, easy deflection analysis and price quote, go to

[www.componex.net](http://www.componex.net).

## Deflection Calculator

### WINERTIA IDLER APPLICATION ANALYSIS

Parameters (Customer to fill out section)

Section Design	3.1 x 2.0
Roll Face	70.00 in
Web Tension	2.00 lb/in
Web Width	62.00 in
Wrap Angle	90 deg
Web Speed	100 fpm
Nip Load	0 lb
Shaft Diameter	1.000 in
Shaft Length	72.00 in

### Allowable Roller Deflection<sup>1</sup>

Class A - precision or tipped	0.0956 in
Class B - most applications	0.0105 in
Class C - handle materials	0.0210 in
Class D - conveyors & ports	0.0420 in

<sup>1</sup> Recommendations published by David Housler, PhD.

### Roller Data

Sectional Area	2.664 in
Weight	18.2 lb
Area inertia $I_x$	2.439 in
Radius of gyration, $k_x$	1.353 in
Rotational inertia, $Wk^2$	33.32 lb
Resultant tension load	175.4 lb
Defl by gravity	0.0033 in
Defl by web	0.0316 in
Defl by nip	0.0000 in
Total Deflection - worst case	0.0349 in

### Shaft Data

Sectional Area	0.785 in
Weight	15.9 lb
Area inertia $I_x$	0.049 in
Defl by gravity	0.0524 in
Defl by idler force	0.0426 in
Total Deflection - worst case	0.0950 in

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**COMPONEX**  
Innovation end to end.



Darcy Perona, Sales Manager

# TECH NOTES

from Darcy

## WINertia™ DEFLECTION CALCULATOR

It's the formula for success

**It's our periodic way of sharing more in-depth information about products and solutions with you. As the leader in manufacturing strong, lightweight rolls, we want to respond to customer needs as well as industry issues. Please give me your feedback so that we can make Tech Notes a discussion of topics that interest you.**

As Sales Manager at Componex, my job is to show how WINertia™ idlers can enhance the performance of your machines. To do this, I typically discuss lower rotational inertia, roll deflection, idler weight, and many other characteristics of idlers. The WINertia™ Deflection Calculator was originally developed to help me offer you valuable engineering information at the click of a few buttons. We have now taken this tool and placed it online so you can access it yourself. Here are some tips on how to take advantage of its powerful benefits.

### How do I accurately size rolls?

With lines running faster and webs getting thinner there is a great need for lighter rolls that have less inertia. When changing from one roll design to the next, it is important to ensure that the new roll offers enough strength to handle your web without excessive deflection. Web load, wrap angles, and different web widths are critical factors in the formula for roll deflection. You can enter this information easily into the WINertia™ Deflection Calculator and quickly compare the actual deflection to the industry standards. Using a drop-down menu, you can easily compare several different sizes within seconds!

### How do I reduce roll deflection?

O.D. is king! The best means of gaining strength is to make the idler larger in diameter. Take a 3" roll with 1/4" wall thickness – it has an area moment of inertia of 2.06. Compare this to a 4" idler with 1/4" wall and an area moment of inertia value of 5.05. Keep in mind the relationship of I (I = area moment of inertia) to the weight of the roll. A 4" roll with 1/4 wall weighs 4.14 pounds per foot. WINertia™ 4 x 3 tubing weighs only .3 pounds per foot more, but its I = 7.5.

### How do I accurately size shafts?

One of the most commonly overlooked aspects of roll design is the strength of the shaft. An undersized shaft increases the risk of damaging bearings. Bearings can accommodate up to a .25-degree of misalignment between the shaft and the bearing. The Deflection Calculator will determine the shaft deflection and if there is more than .25 degrees of misalignment. A handy rule of thumb to use on WINertia™ idlers is: Roll Face Length x .0022 = Max Allowable Shaft Deflection.

### How do I reduce shaft deflection?

Again, O.D. rules. Four-, five-, and six-inch WINertia™ tubing can accommodate 1.0, 1.5 and 2.0" bearings. The first question to ask is, can I increase my shaft diameter? A 1.5" shaft is 5 times stronger than a 1.0" shaft.

With any given shaft length, as you increase the roll length, the roll deflection goes up and the shaft deflection goes down. The most suitable roll would be one that meets the deflection standards of both roll and shaft.

You can also utilize larger diameter shafts that are turned down to the bearing size on the ends. If you require a 1.0" shaft, Componex can construct a 1.5" tube shaft that would have 1.0" solid on each end. For those of you who are locked in to 1.0" bearings, it is an excellent way to strengthen the central shaft.



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