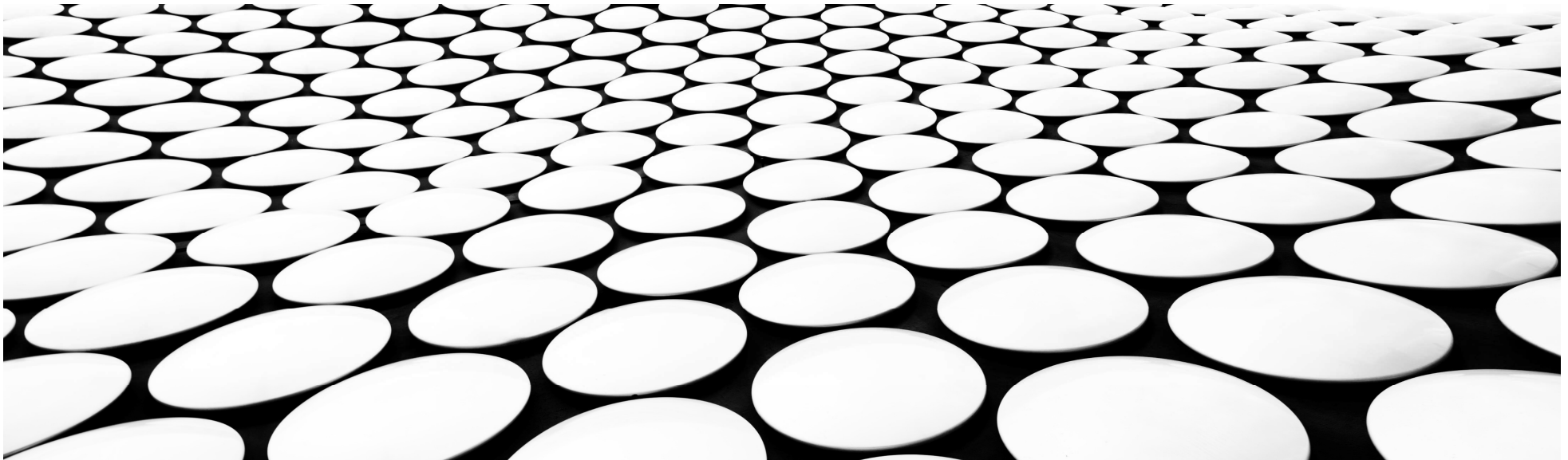
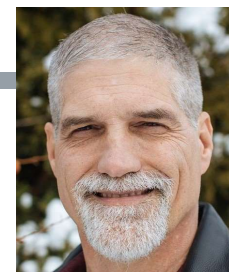
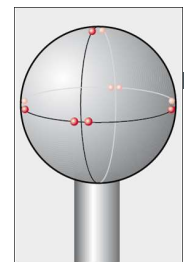


## CALYPSO DIAMETER MEASUREMENTS - I

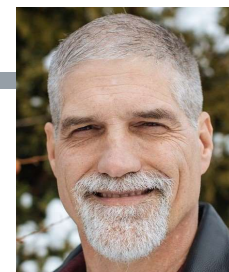
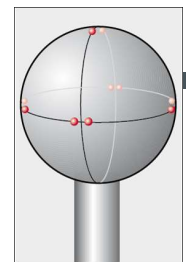
RICK SCHNEIDER





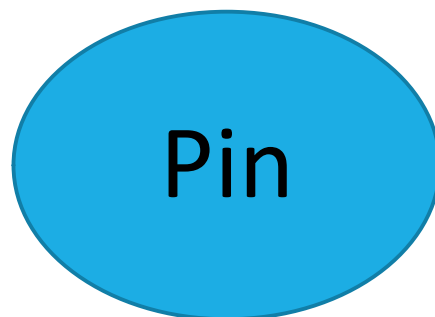
## **SHOULD YOU TRUST YOUR CALYPSO DIAMETER MEASUREMENTS?**

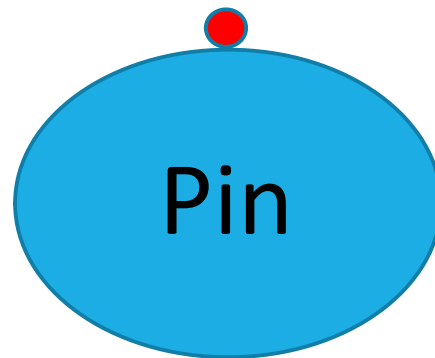
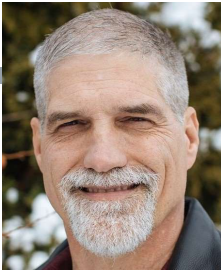
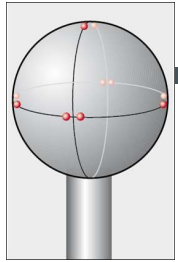
- CMM Measurements sometimes differ significantly from hard gaging.
- This can lead to miss-reported data.
- The goal of this presentation is to empower the CMM Programmer to achieve higher accuracy for all diameter measurements.

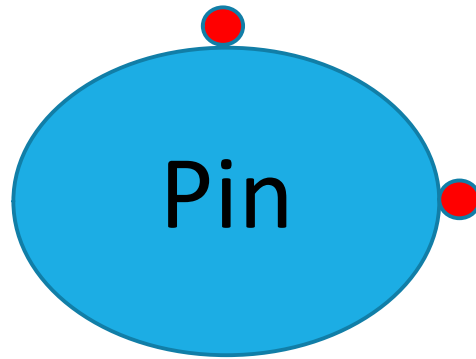
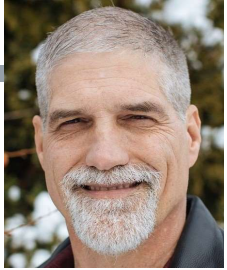
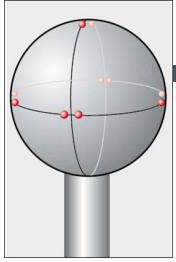


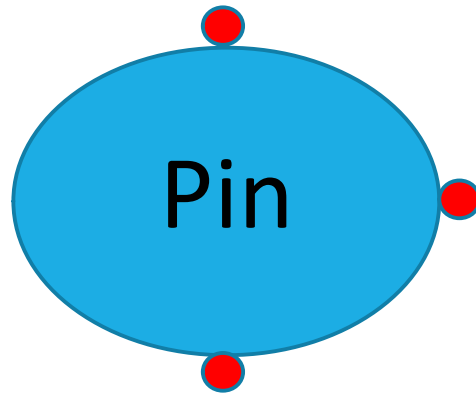
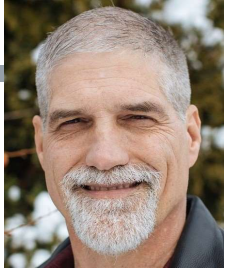
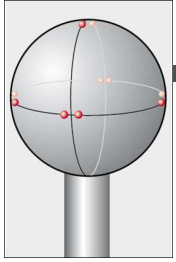
## WHY DOES CALYPSO STRUGGLE ON DIAMETER MEASUREMENTS?

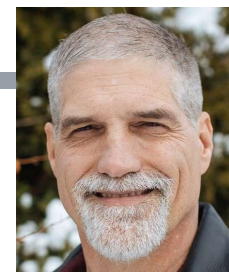
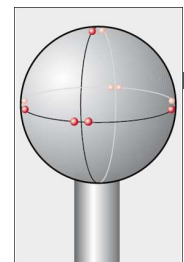
- What's really happening?





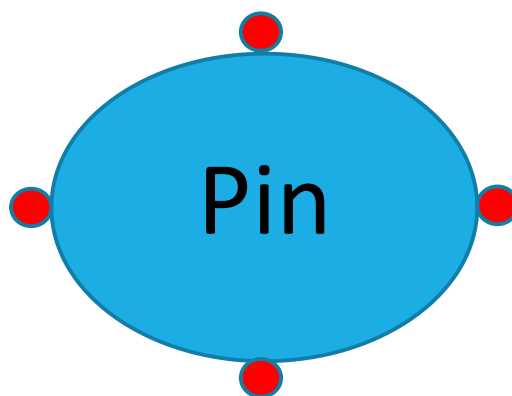


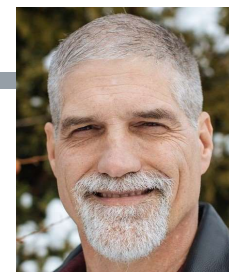
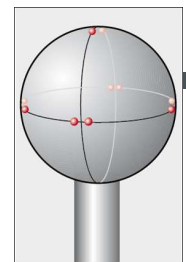




## SHOULD YOU TRUST YOUR CALYPSO DIAMETER MEASUREMENTS?

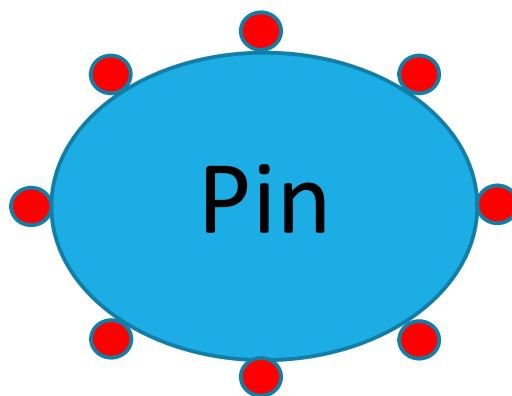
- Whether you probe four points

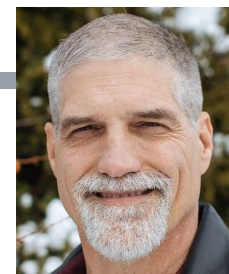
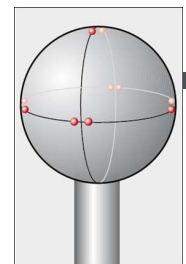




## SHOULD YOU TRUST YOUR CALYPSO DIAMETER MEASUREMENTS?

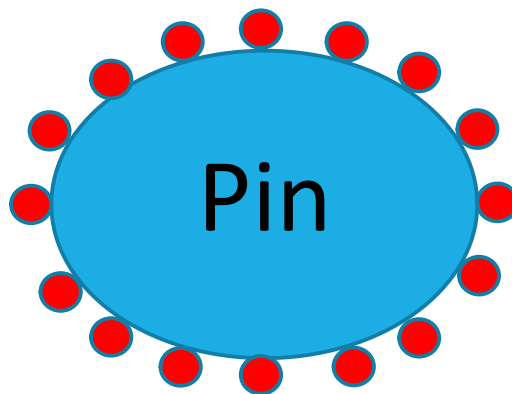
- .....eight points

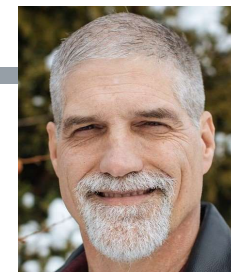
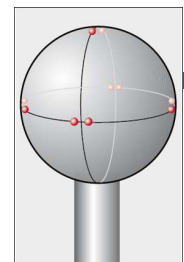




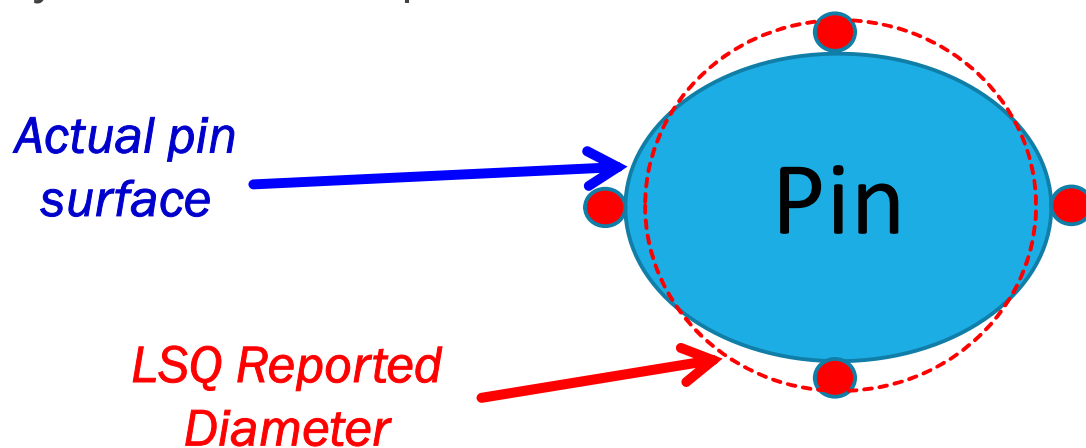
## SHOULD YOU TRUST YOUR CALYPSO DIAMETER MEASUREMENTS?

- .....16 points or many more.

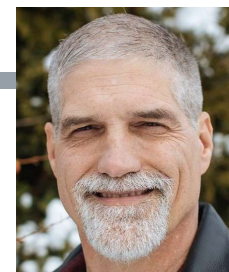
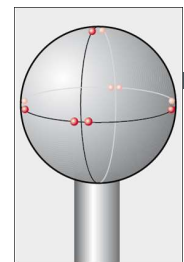




- Calypso uses an algorithm to evaluate all measurement data.
- The default algorithm is LSQ (least squares or average).
- No matter how many points you take the average will not accurately characterize any deviation from perfect form.

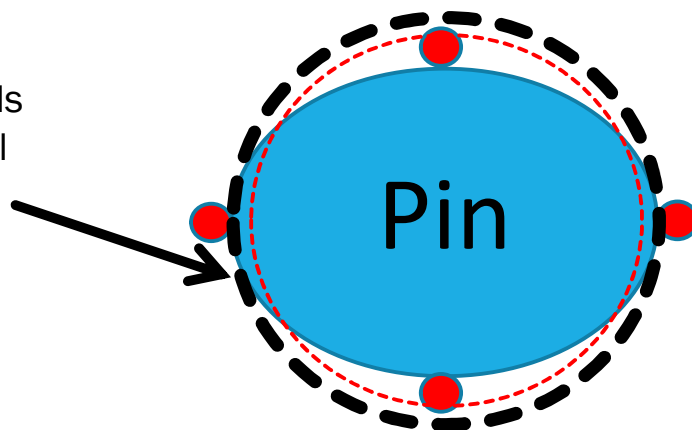


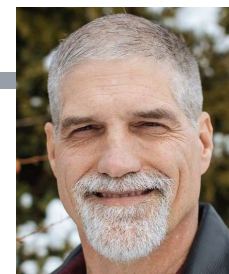
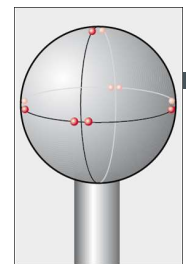
.....from perfect form.



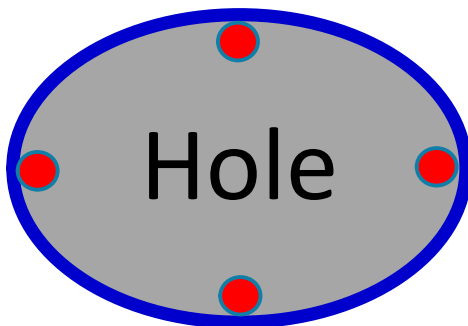
- The LSQ algorithm can never accurately report an out of round diameter's functional size.

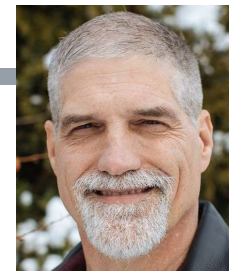
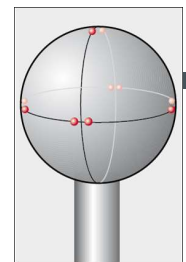
Functional Diameter Equals  
the smallest Ring that will  
slide over the pin.



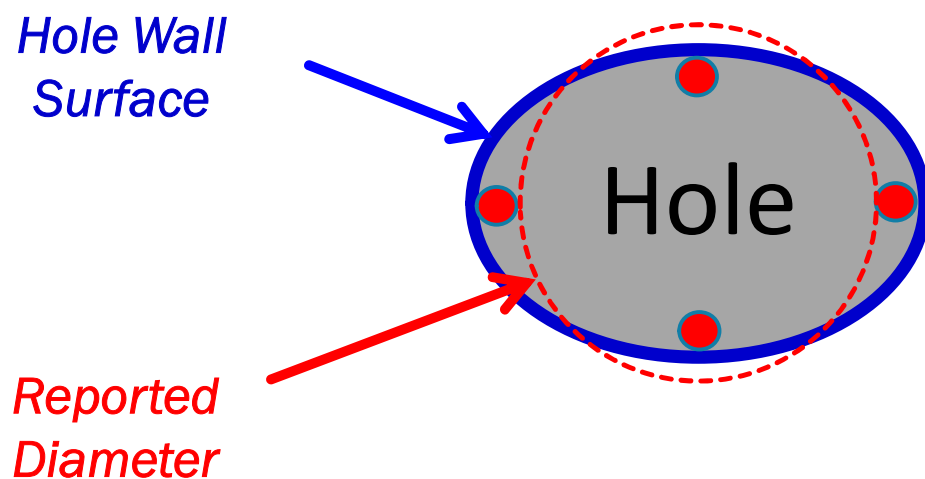


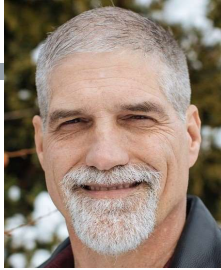
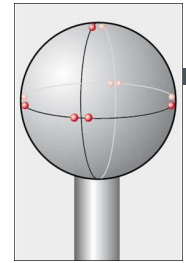
- The inverse result occurs on an inside diameter.





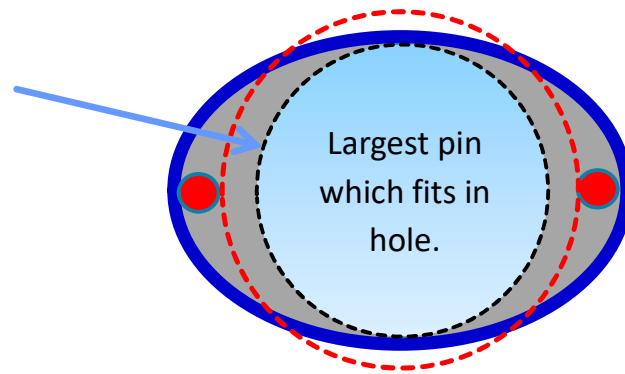
- The inverse result occurs on an inside diameter.

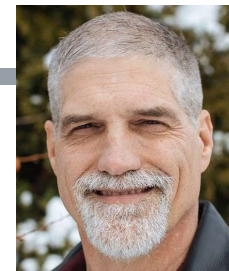
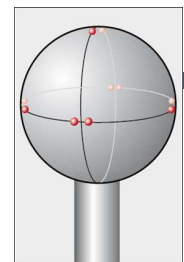




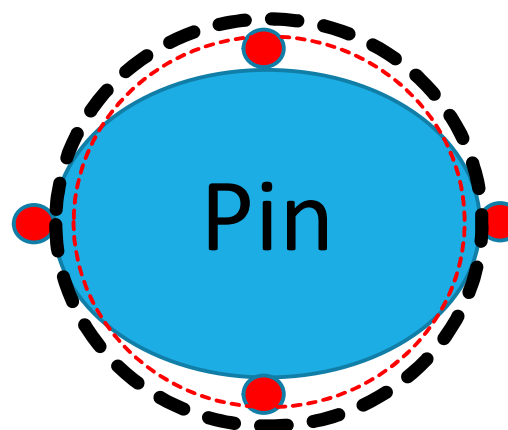
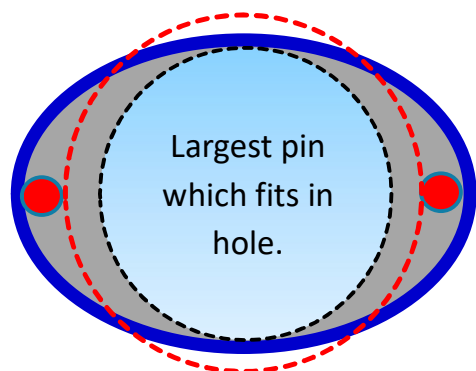
- The average size is no more useful on an inside diameter.

**Functional Diameter** - The Largest pin that will fit in the hole.

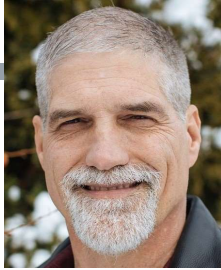
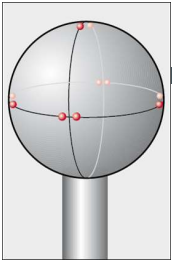




- *So, should you* trust your Calypso diameter measurements?



- The answer is of course yes. Calypso does a better job than you even realized, but you need to tell it what you want to know.

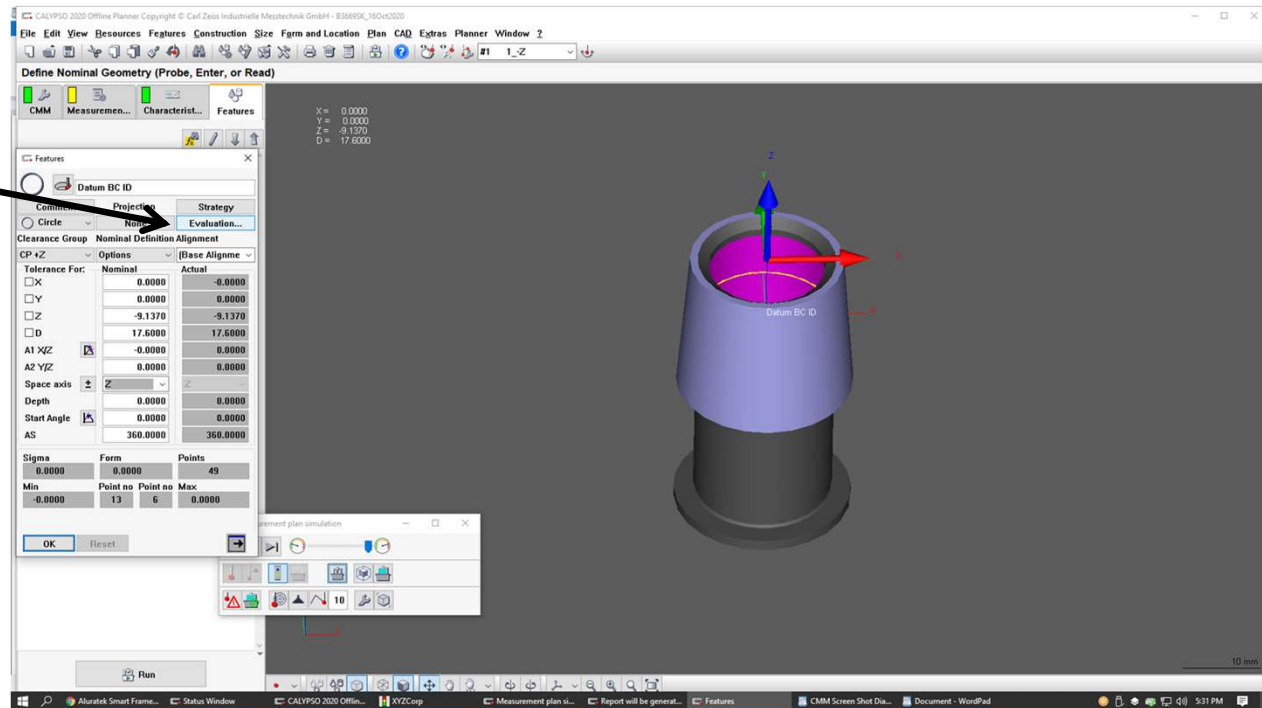


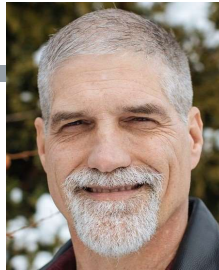
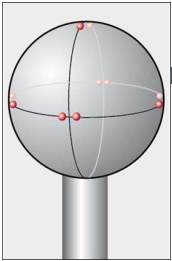
## SO HOW DO WE DO THAT?

Open the diameter feature.

Open “Evaluation”.

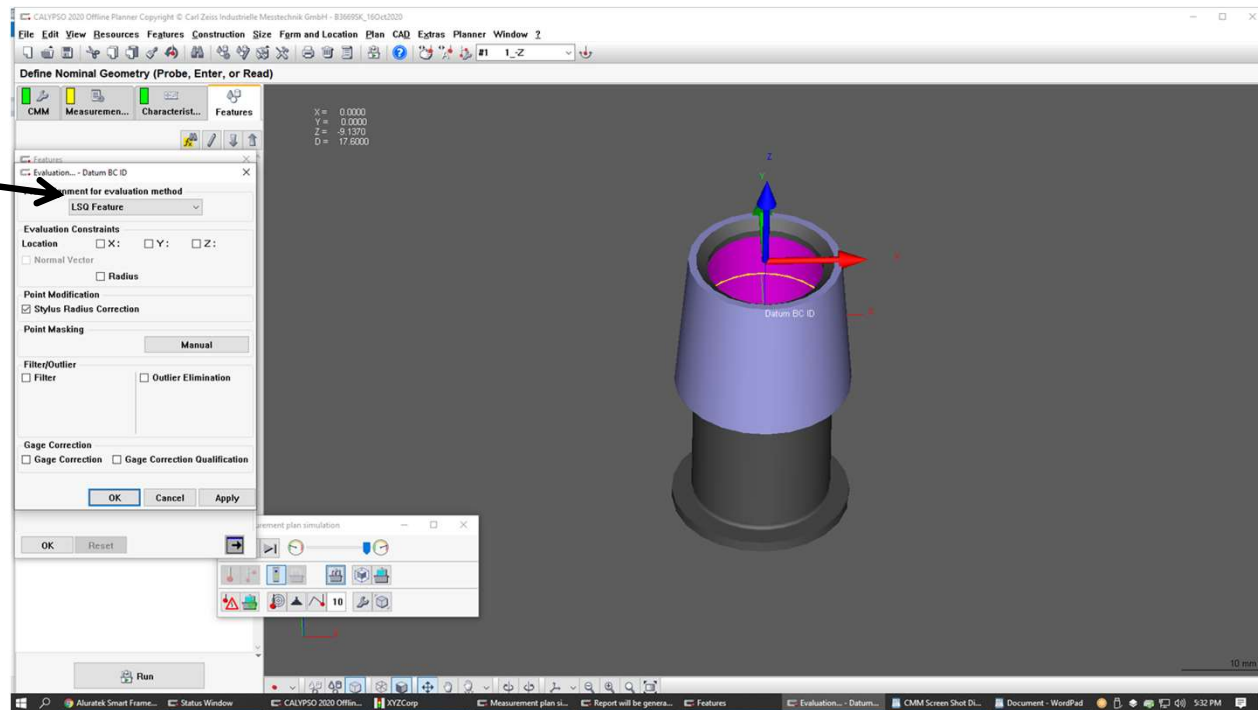
Various algorithms will appear.

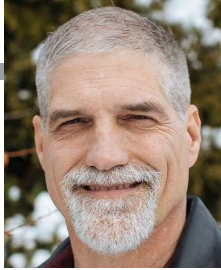
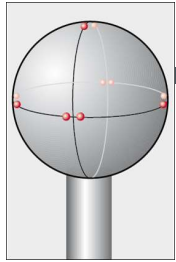




## SO HOW DO WE DO THAT?

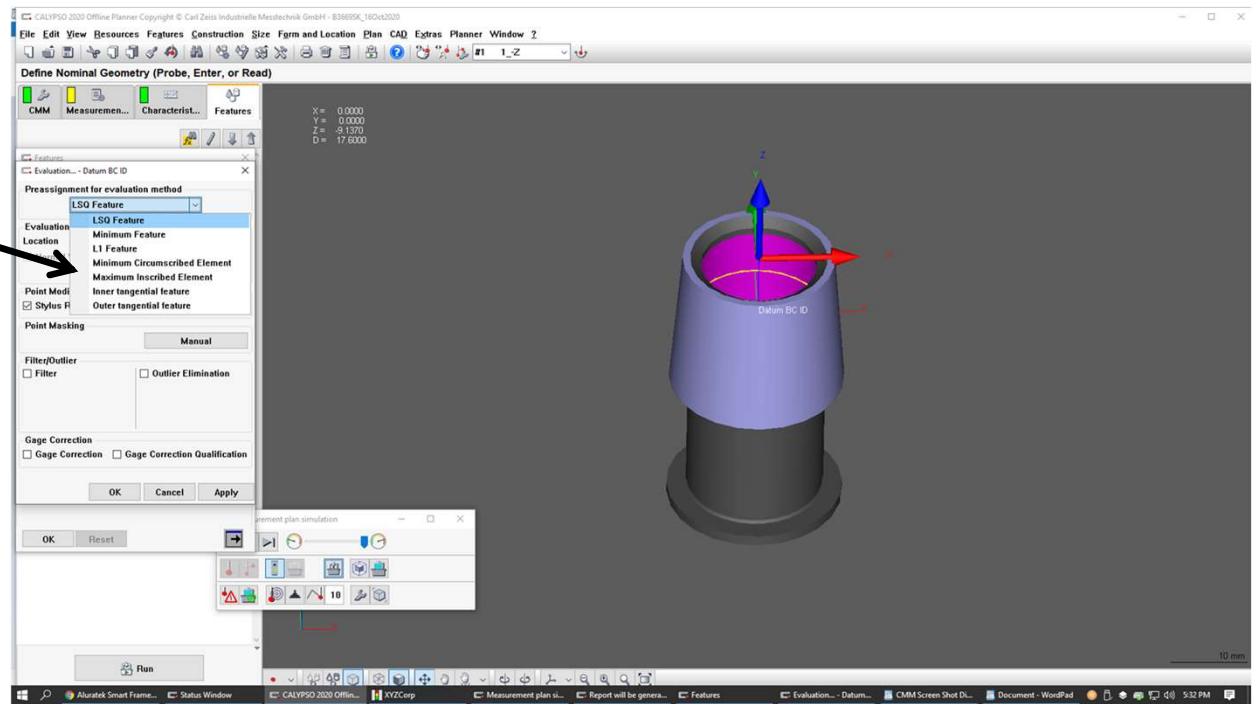
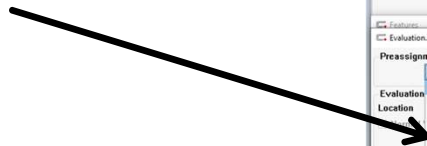
Notice the default setting is LSQ Feature (average).

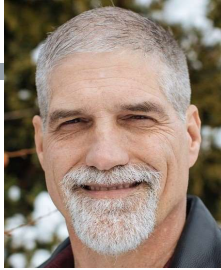
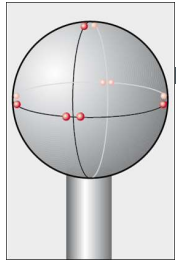




## SO HOW DO WE DO THAT?

Scroll down and select  
Maximum Inscribed Element

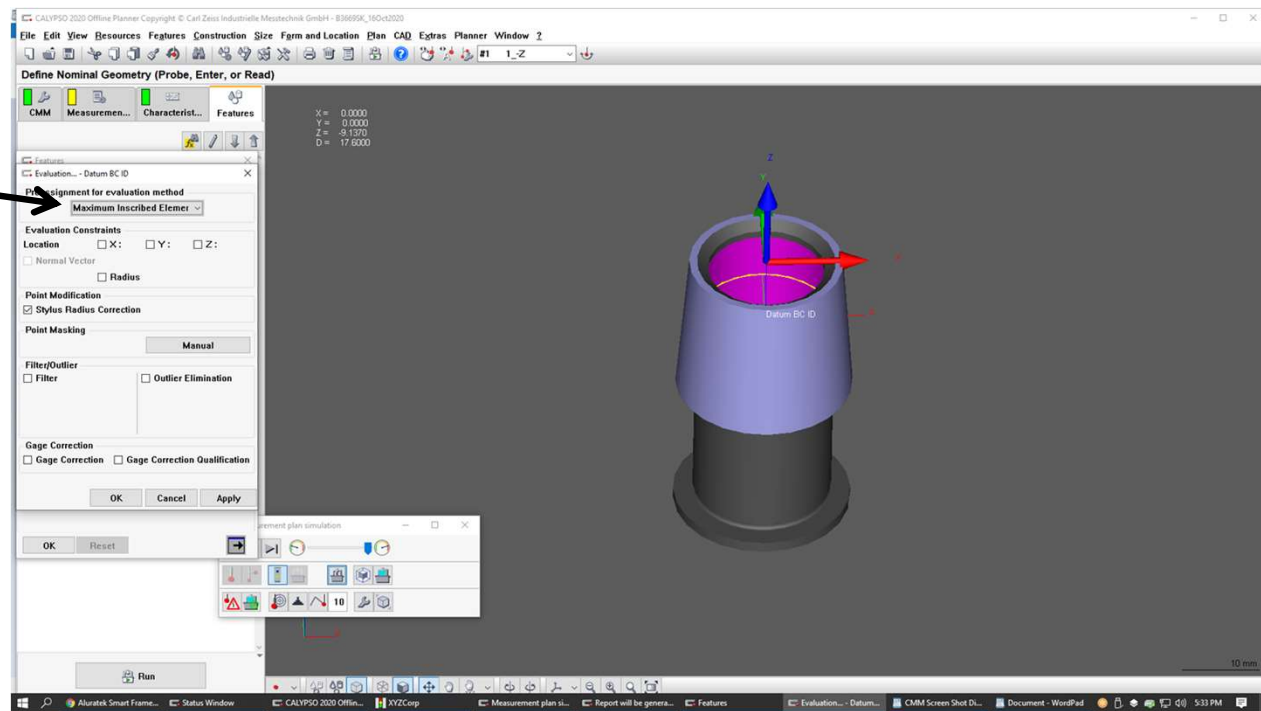


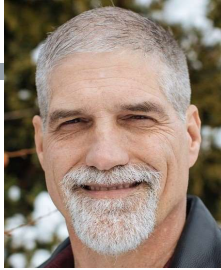
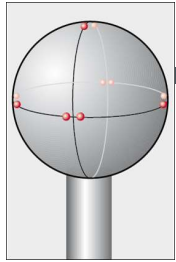


## SO HOW DO WE DO THAT?

Once selected this will display for an accurate evaluation of an Inside Diameter.

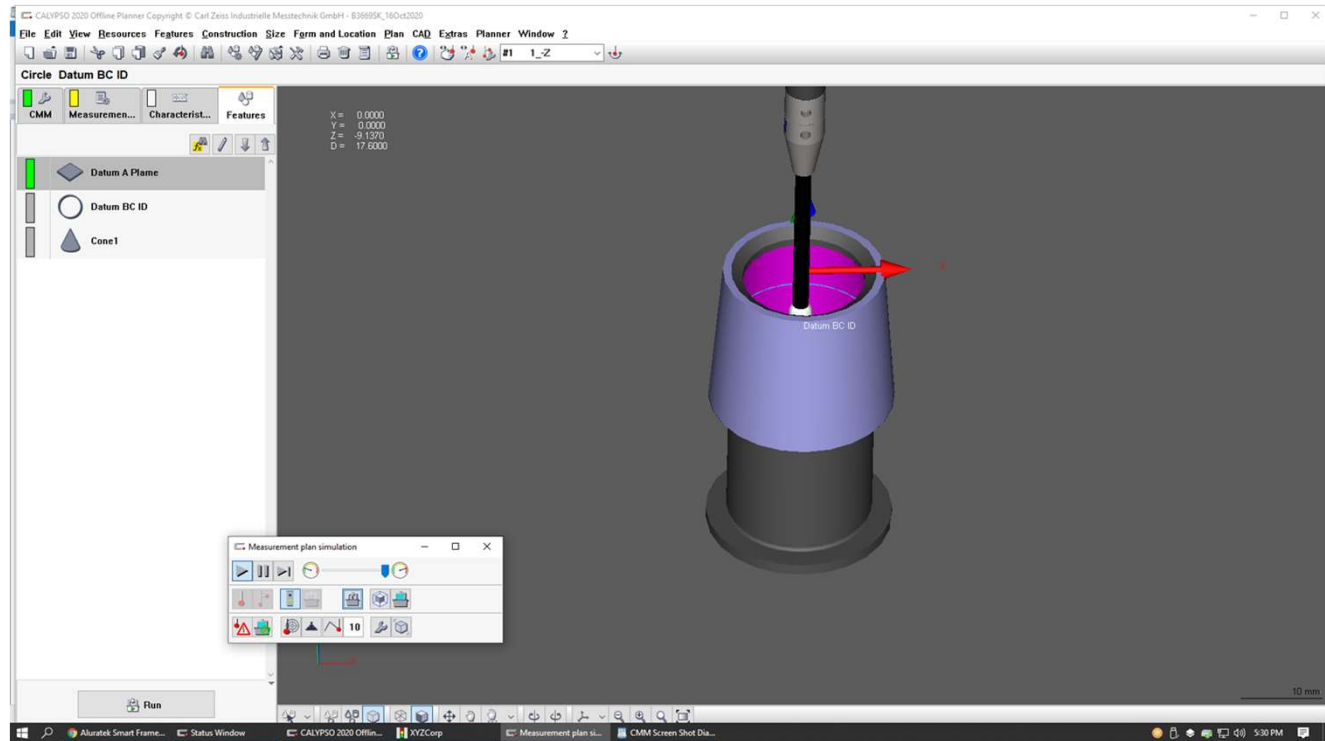
For Outside Diameters we want to select Minimum Circumscribed Element

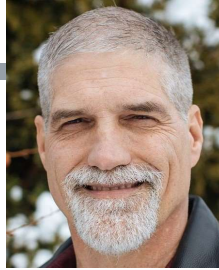
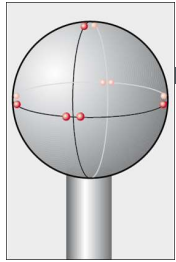




## SO HOW DO WE DO THAT?

The change in evaluation from LSQ to Maximum Inscribed Element is instantaneous, so when you close these windows you will immediately see a different (more accurate) reported value.





## SO HOW DO WE DO THAT?

But this is only one reason CMM's do not always report diameters correctly.

What about burr, unstable geometry (flexible materials), other types of deviations from perfect form like taper, etc.?

These each deserve a presentation of their own.

Watch for that in one of the next issues from [All Things Quality](#)

