

GEAR

MANUFACTURING CHECKLIST



Gear Manufacturing Checklist

Introduction

The subject of gear manufacturing is complex. All of this talk of modules, pressure angles, diametrical pitches and numerous international standards (ANSI, DIN, ISO, JIS and even BS) leaves some of the most seasoned engineers swimming and reaching for textbooks not read since they finished trade school.

If you have a broken gear that stops a machine from running, time is money and you need to know if you should repair or replace as fast as possible.

We are going to quickly demystify the subject of gear manufacturing. Then show you how to provide your gear manufacturing professional everything he needs to know so he can give you an estimate to manufacture a replacement component to get you up and running again. If you choose us to manufacture a gear for you, from that point your gears are our concern and we'll take care of the hard stuff for you.

So let's start by defining some of the myriad of terms used to describe a simple gear with a diagram. Of course, we manufacture many more different types of gears other than this one but first the basics.

Definitions

Base Circle

Nothing to worry about - The circle used by the engineering boffins to derive the tooth involute

Pitch Circle Diameter (PCD)

Don't worry too much about this one as it's hard to measure. This is diameter defined by the point of contact between two meshing gears.

Flank

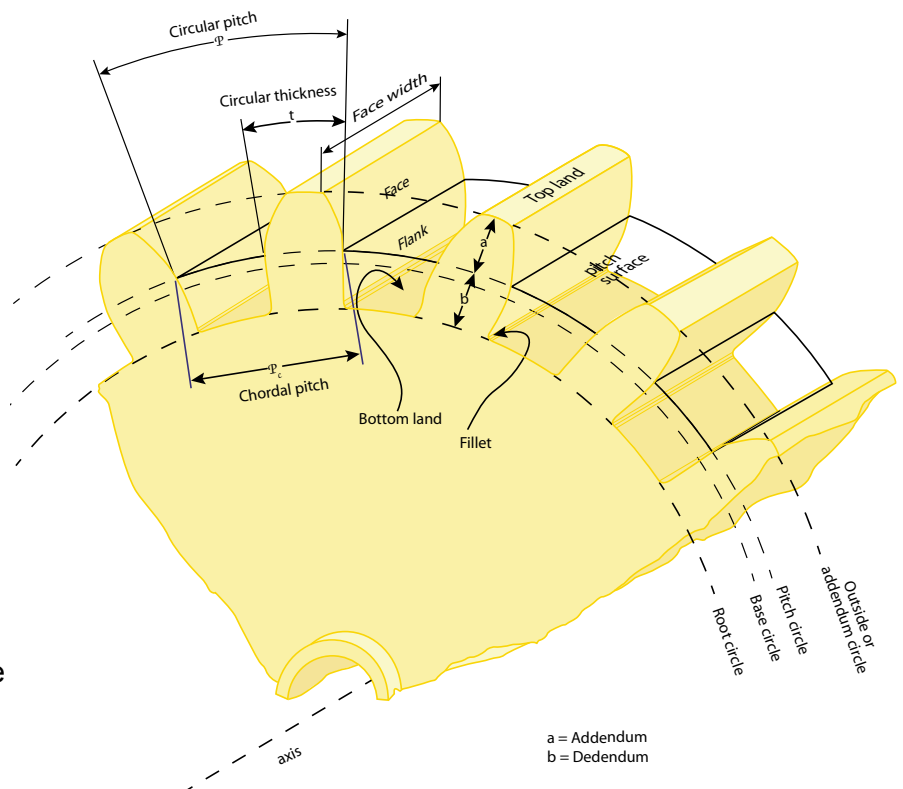
The base of an individual tooth below the base circle.

Pitch Surface

The imaginary surface on the pitch circle diameter between each tooth.

Pressure Angle

Leave this one for the engineers. The acute angle between the line of contact and the tangent to both pitch circles of two meshing gears. Luckily these are standardised so once your manufacturer matches your gear to the correct engineering standard, he'll know what it is (or he'll measure it with precision instruments) so you don't need to worry about it.



Addendum

The distance from the PCD to the tip of a tooth. Nothing you need to worry about.

Dedendum

The distance from the PCD to the bottom land (base of tooth). It's rare you need to get down to this level of detail.

Outside Diameter

This is important and it's easy to measure. The diameter of the gear from tooth tip to tooth tip.

Circular Pitch (Cp)

Important if your broken gear is made to an imperial standard. The distance from a point on one tooth to the same point on the next tooth measured around the pitch diameter.

Metric Module Pitch

Important if your broken gear is made to a metric standard. A standardised numerical set of metric gear tooth sizes. (The lower the number, the smaller the tooth) It is:

$$\text{pitch circle diameter (mm)} \div \text{number of teeth}$$

There's a bit of maths involved in this so to make it easy for you, we've got a calculator on our web site that will work it out for you. Check it out here:

<http://www.gearconcern.com.au/gear-size-calculator/http://www.gearconcern.com.au/contact/>

Diametrical Pitch (Dp)

Important if you have a gear made to an imperial standard. A standardised numerical set of inch based gear tooth sizes. This is:

$$\text{number of teeth} \div \text{pitch circle diameter (inches)}$$

There's a bit of maths involved in this so to make it easy for you, we've got this cool calculator on our web site that will work it out for you. Check it out here:

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Number of teeth

Important. You can count right? Tell your gear manufacturer this and the outside diameter and he'll know everything he needs to know about how to manufacture a replacement gear for you.

The maths you need to know

There's only 2 simple formulas you need to know. One for metric module and one for Imperial Diametrical Pitch (Dp)

Metric: $Outside\ Diameter = (number\ of\ Teeth + 2) \times Module$

Imperial: $Outside\ Diameter = (number\ of\ Teeth + 2) \div Diametrical\ Pitch$

But there is no need to work through these, just go to our simple calculator at:

<http://www.gearconcern.com.au/gear-size-calculator/http://www.gearconcern.com.au/contact/>

and it will calculate the module and DP for you. That will make it super easy to determine if your gear is metric or imperial.

Gearing Systems

There are numerous engineering standards around the world that define the tooth profile on a given gear. Here are just a few of them that we deal with at Gear Concern every day.

Gearing System	Spline System
ISO Metric 20° (adopted in Australia)	Din 5480 30°
British Standard 20°	Din 5482 30°
American Standard 14½°	ANSI 30°
American Standard 20°	ANSI 30°
American Standard Composite 14½°	ANSI 45°
American Standard Stub Tooth 20°	
Japanese Industrial Standard 20°	

You just never know until you get into a job exactly what standard has been used so make sure you choose a manufacturer who is not only conversant with all of these standards but has the tooling and precision equipment to machine gears compliant with all of the standards listed. Some of this equipment is horrendously expensive so it pays to deal with a specialist gear manufacturer like us. If you don't, you'll probably pay more as the average engineer will subcontract the job out and add a margin for himself.

Gear Cutting Capacities

The other thing you need to know is if your gear manufacturer can actually make a gear big enough for you. Here are the maximum capacities we can cut at Gear Concern. More than large enough for most applications.

	Diameter (mm)	Diameter (inches)	Module	Dp
Spur Gears	800	32	12	2
Helical Gears	700	27	10	3
Bevel Gears	300	12	6	4
Internal Gears	600	24	8	3
Pinion Gears	360	14	20	1.5
Spiral Bevel	400	16	5	5

	Diameter (mm)	Diameter (inches)	Length (mm)
Splined Shafts / Gear Shafts	200	8	1250

Conclusion

So now you have all of the information you need to talk to the experts knowledgeably. All that's left is to complete the simple checklist on the next page and we'll be able to provide you with an estimate to get your machinery back on the rails. If you still have questions, please give us a call and we'll do our best to solve your gear problem.

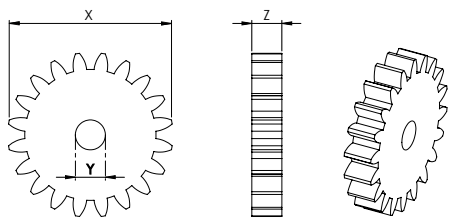
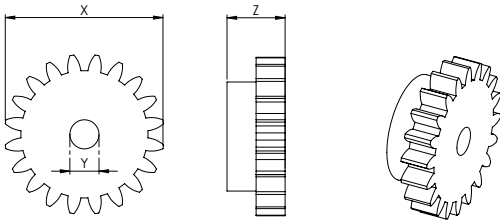
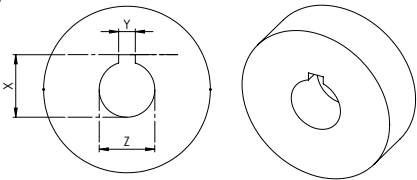
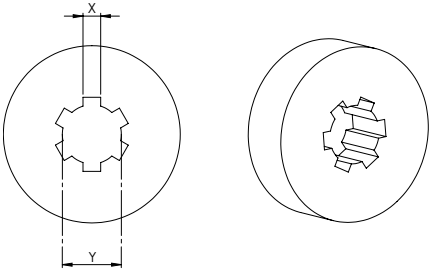
Gear Manufacturing Checklist

Once you have made the measurements below to describe your gear, do one of the following:

- Scan and email to sales@gearconcern.com.au
- Drop this page in the fax to 07 3255 5586
- Email us with the type number (1-4) and dimensions (X, Y, Z, N etc) to sales@gearconcern.com.au
- From that point, your gears are our concern and we'll be in touch to answer your queries promptly.

Customer: _____ Contact Name: _____

Contact Phone Number: _____ Email Address: _____

Type	Diagram	Symbol	Measurement Description (mm)	Measurement
1	<p>Gear</p> 	X Y Z N	Overall Diameter Bore Diameter Thickness Number of teeth	_____ _____ _____ _____
2	<p>Gear with Boss</p> 	X Y Z N	Overall Diameter Bore Diameter Thickness (inc. Boss) Number of teeth	_____ _____ _____ _____
3	<p>Keyway</p> 	X Y Z	From bottom of bore to top of keyway Width of keyway Diameter	_____ _____ _____
4	<p>Internal Spline</p> 	X Y	Width of Spline Smallest Diameter	_____ _____

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Gear Calculator: <http://www.gearconcern.com.au/gear-size-calculator/http://www.gearconcern.com.au/contact/>

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