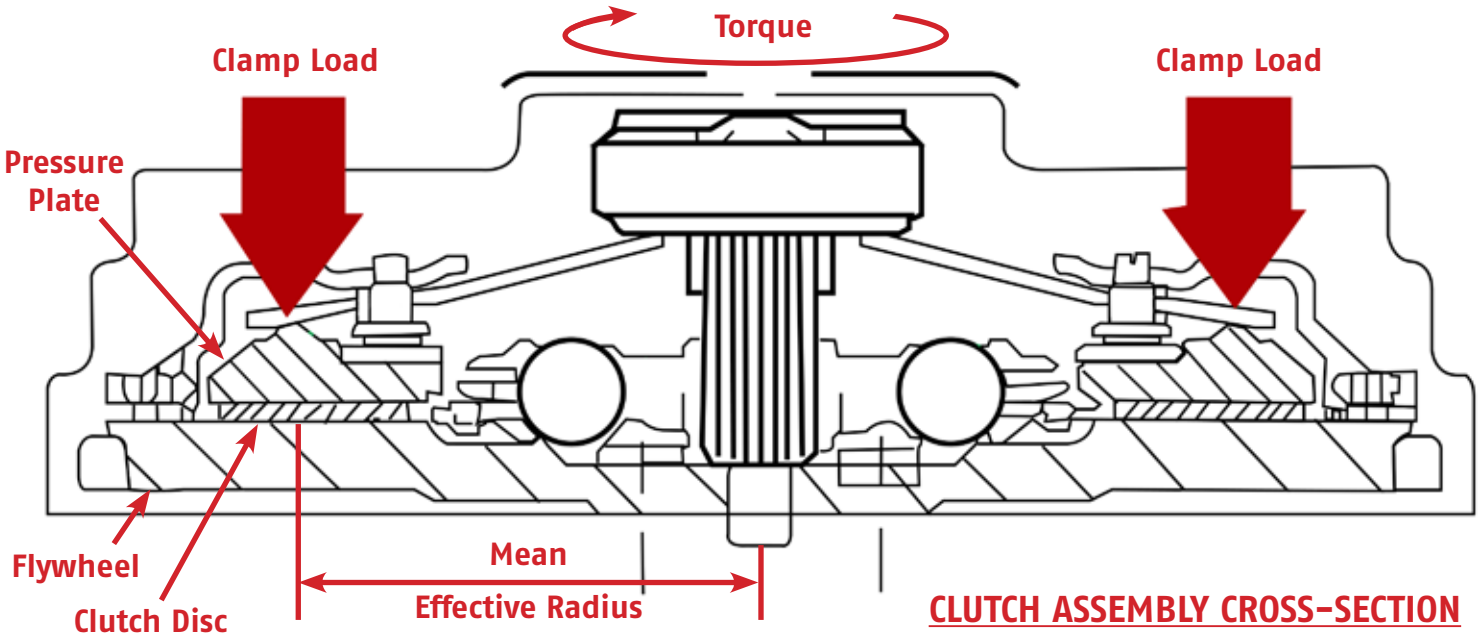

CLUTCH ASSEMBLY CROSS-SECTION

Corvette Tech Tip

Clamp Load Vs Torque Capacity

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The most widely misunderstood characteristic of a clutch cover assembly is the Clamp Load. Clutch cover assemblies have been rated by clamp load since their invention. The clamp load is one of the main factors influencing how much torque can be transmitted by a clutch. But there are other factors that also affect the torque capacity and these can be overlooked when selecting a clutch for a vehicle.

THE FUNDAMENTAL DEFINITIONS OF CLAMP LOAD AND TORQUE CAPACITY ARE:

Clamp Load – The load exerted by the diaphragm to clamp the clutch disc between the pressure plate and the flywheel.

Torque Capacity – The load exerted by the diaphragm to clamp the Clutch disc between the pressure plate and the flywheel multiplied by the coefficient of friction multiplied by the mean effective radius multiplied by the number of clutch discs.

It is possible to have two cover assemblies with the same clamp load but have different torque capacities due to differences in the coefficient of friction, the inside and outside diameters of the clutch disc or the number of clutch discs.

Traditionally clutches have been sized by using comparative measures, i.e. previously the owner had a10"clutch with 650kg clamp load. Now they are looking for more capacity, for example 20% more so they assume they need a 10" clutch with approximately 650 x 1.2 = 780kg of clamp. This is a reasonable argument if the friction coefficient, the diameters and the number of discs are identical but this is not always the case.

A major reason for this method of measurement has been that without a clutch dynamometer, all calculations are just that – calculations. Mantic uses figures that mean something, because ***"We have the only clutch dynamometer in Australia"*** which allows us to accurately measure torque capacity.

In the final analysis it is far more important to know how much torque can be transmitted by a clutch than knowing the clamp load. Engines are rated in horsepower or kilowatts and torque, not kilograms.

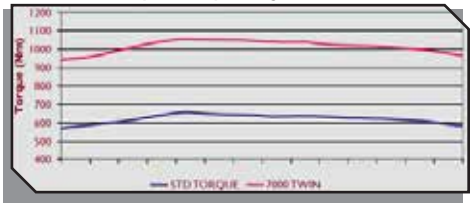
The torque capacity of a single disc clutch:

$$\text{Torque Capacity} = (2\mu N)\,\frac{2}{3}\left[\frac{(R_0^3 - R_1^3)}{(R_0^2 - R_1^2)}\right]$$

"With this in mind, Mantic performance clutches have torque capacity ratings so you can match it accurately to your vehicles maximum engine torque capacity. Next time someone tries to tell you their cover assemblies have more clamp load, ask them what is its maximum torque capacity then do the comparison before deciding which clutch better suits your vehicle".

INCREASED TORQUE CAPACITY

The advantage of increased Torque capacity is that more power/ torque can be transmitted through the clutch. Torque Capacity is calculated



by multiplying the load exerted by the diaphragm to clamp the clutch disc between the pressure plate and the flywheel multiplied by the coefficient of friction multiplied by the mean effective radius multiplied by the number of clutch discs.

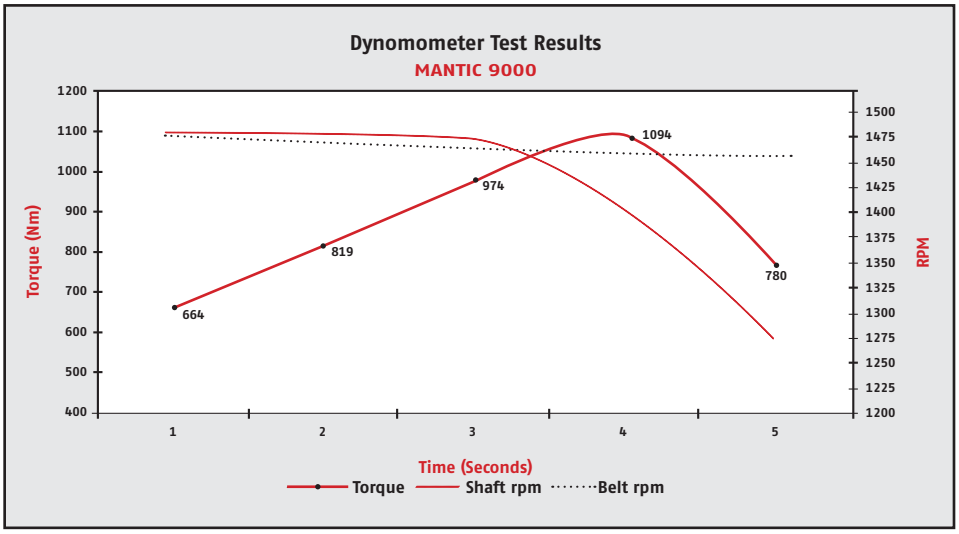
i.e. Torque Capacity = Clamp Load x Coef. of Friction x Mean effective radius x No. of Clutch Discs.

A smaller clutch has a smaller mean effective radius and a smaller diaphragm which usually also means a lower clamping force, so these two features will have the effect of reducing the Torque Capacity. However these two features do not reduce the capacity by the same amount as the extra clutch disc increases the Torque Capacity. The net result is an increased Torque Capacity.

WHAT ARE THESE ADVANTAGES AND HOW IS THIS ACHIEVED?

The Torque Capacity is affected by 4 factors:

- By decreasing the diameter the torque capacity is reduced.
- By decreasing the clamp load the torque capacity is reduced.
- By adding a second clutch disc the torque capacity is doubled.
- By increasing the coefficient of friction the torque capacity is increased.



Conversion Charts

KW	HP	HP	KW
100	134	100	75
150	201	150	112
200	268	200	112
250	335	250	187
300	402	300	224
350	470	350	261
400	536	400	299
450	603	450	336
500	670	500	373

Multiply Kw x 1.34 to get HP
Multiply HP x 0.7457 to get Kw

NM	FT LBS	FT LBS	NM
100	74	100	136
200	147	200	271
300	221	300	407
400	295	400	542
500	368	500	678
600	422	600	814
700	516	700	949
800	590	800	1085
900	663	900	1220
1000	737	1000	1356

Multiply Nm x 0.74 to get Ft lbs
Multiply Ft lbs x 1.356 to get Nm