Subject: – G&L Hydro-Planer Mill – Spindle Gear Range Torque Calc

Date: 9/13/13

Torque Formula T = (Hp * 5252) / RPM(@Spdl)

In order to calc torque at spindle, there are a couple factors that need confirmed:

1. As motor RPM is reduced below its Base Speed(1800) the Hp reduces proportionally.

YES

2. As motor RPM is increased above its Base Speed(1800) the Hp is constant.

    1. YES

3. RPM in the formula above, is based on the RPM at the Spindle(?).

    1. YES since T is also as Spindle.

High Range Torque:
214RPM @ Spdl (1200RPM @ Motor) = (50*5252)/214 = 1227Ft-lbs
321RPM @ Spdl (1800RPM @ Motor) = (75*5252)/321 = 1227Ft-lbs
600RPM @ Spdl (3365RPM @ Motor) = (75*5252)/600 = 656Ft-lbs

Mid-High Range Torque:
80RPM @ Spdl (900RPM @ Motor) = (37.5*5252)/80 = 2462Ft-lbs
160RPM @ Spdl (1800RPM @ Motor) = (75*5252)/160 = 2456Ft-lbs
214RPM @ Spdl (2400RPM @ Motor) = (75*5252)/214 = 1840Ft-lbs

Mid-Low Range Torque:
39RPM @ Spdl (1200RPM @ Motor) = (50*5252)/~~214~~ 39= 6733Ft-lbs
58RPM @ Spdl (1800RPM @ Motor) = (75*5252)/~~214~~ 58= 6791Ft-lbs
80RPM @ Spdl (2475RPM @ Motor) = (75*5252)/~~600~~ 80= 4923Ft-lbs

Low Range Torque:
19RPM @ Spdl (1200RPM @ Motor) = (50*5252)/ ~~214~~ 19 = ~~13542~~ 13821Ft-lbs
29RPM @ Spdl (1800RPM @ Motor) = (75*5252)/ ~~214~~ 29 = 13582Ft-lbs
39RPM @ Spdl (2400RPM @ Motor) = (75*5252)/ ~~214~~ 39 = 10100Ft-lbs

Recommendation #1: Set the smallest gear ratio (5.6087), use the High/Low shifter to get (30.942) ratio for low speeds, add 2-speed gearbox to Motor Input Shaft (1:1 & 2:1) to produce 4 gear ranges and RPM's of 29–877 at the spindle (1800-4920 at Motor, 30-82Hz).

Gear Range	Spindle Speed	Motor Speed	Drive Hertz
High = 5.6087	214-600	1200-3365	40-112
Mid-High = 11.2174	80-214	900-2400	30-80
Mid-Low = 30.942	39-80	1200-2475	40-82.5
Low = 61.884	19-39	1200-2400	40-80