21 st Century 1/6 scale M5 Stuart R/C tank | home

Motor analyses

M5 Stuart motor analyses

**as I expected from the wire-size of the motor-windings ... 3 pole armature ...
this is a higher wind ,(my guess somewhere between 30 to 50 wind's,) kind of low current motor ....**

**my test's are all done with 7.5 volt ....(6100 rpm's Stuart motor)
means that motor run's under 12 volt with about 9800 rpm's .....**

means , if we want to use a DMD -controller in that Tank , we would have to use a motor what gives as about 10000 rpm's at 7.5 volt's .....to maintain the same speed ....my WWR-truckpuller-motor (what I have run with a Tamiya DMD-controller !!!) would give us in that case not enough rpm's ....but it's worth a test , since .... we have to consider ...I could not test the Stuart motor with it's flux-ring installed (increases torque), means the actual rpm's should be a little lower ...my guess 10% to 15% lower .....what would be only around 8500 rpm's what would match my WWR-Truck-puller motor again .....!!! I have to test that !!!

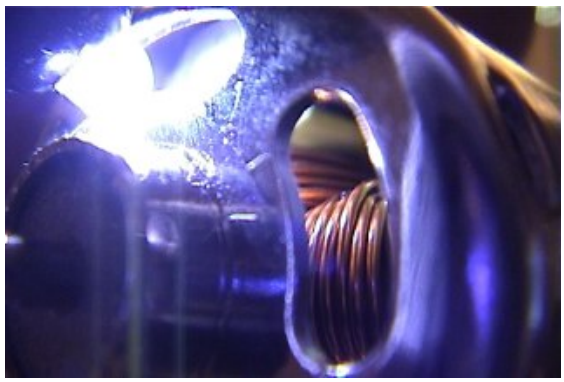
**if yo compare the data to my WWR-truckpuller motor ...the Stuart motor has some more torque ,
but the current-draw is in the same range .....**

**my WWR-truck-puller-motor would be maybe a nice replacement
(as long we use 2x ESC's instead of the DMD-unit , if we want to run it with 12 volt's),
since that motor can be run with 12 volt's .!..
my truckpuller run's with about 8400 rpm's at 7.5 volt's that would mean about 13400 rpm's at 12 volt ....
so we may would have a little bit faster speed ..**

we will see , when I get the time , I check that all out .....

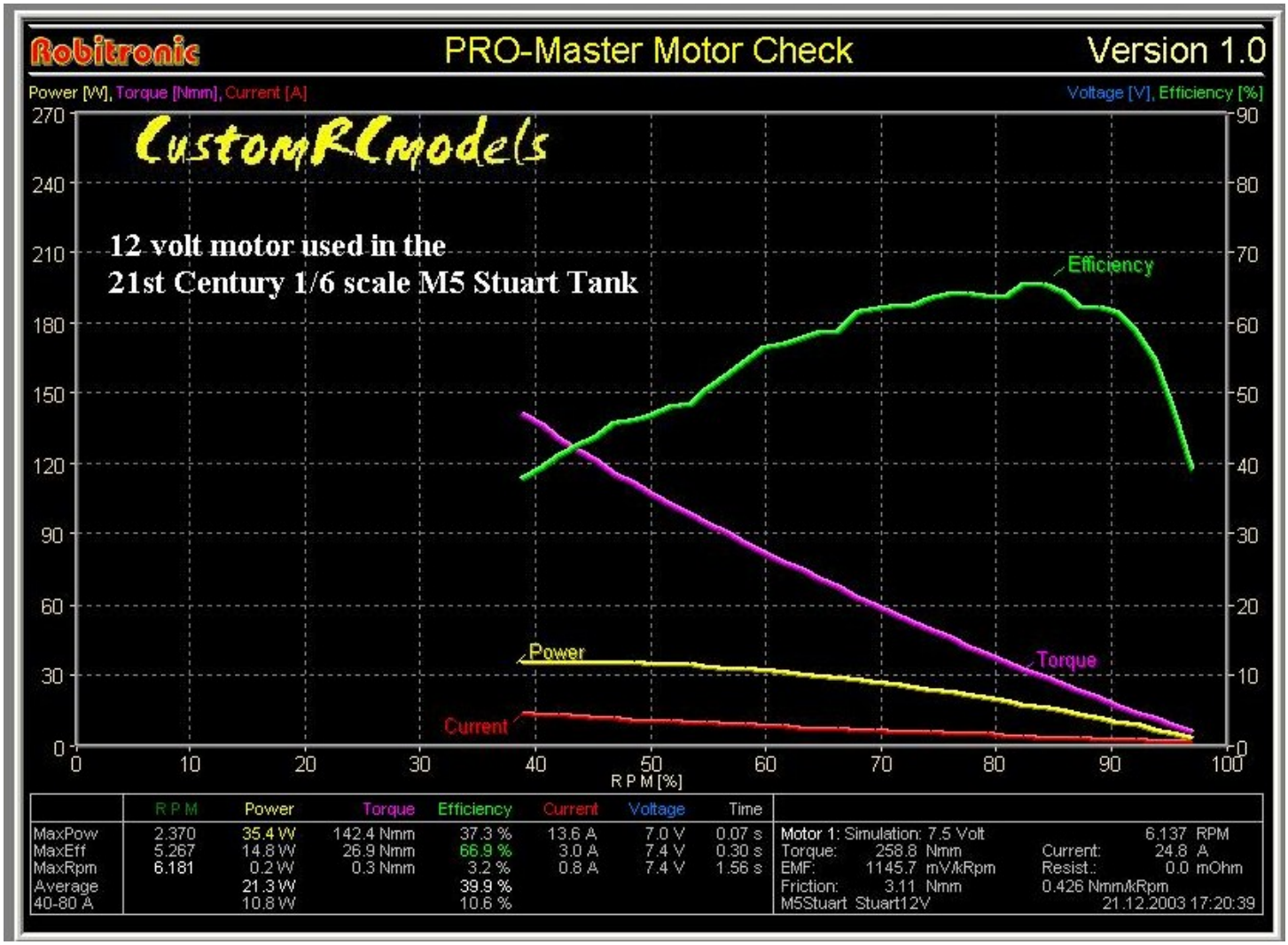
as a comparison see also the data from a stock 27 turn 7.2 volt Mabuchi motor ....

M5 Stuart 12 volt motor

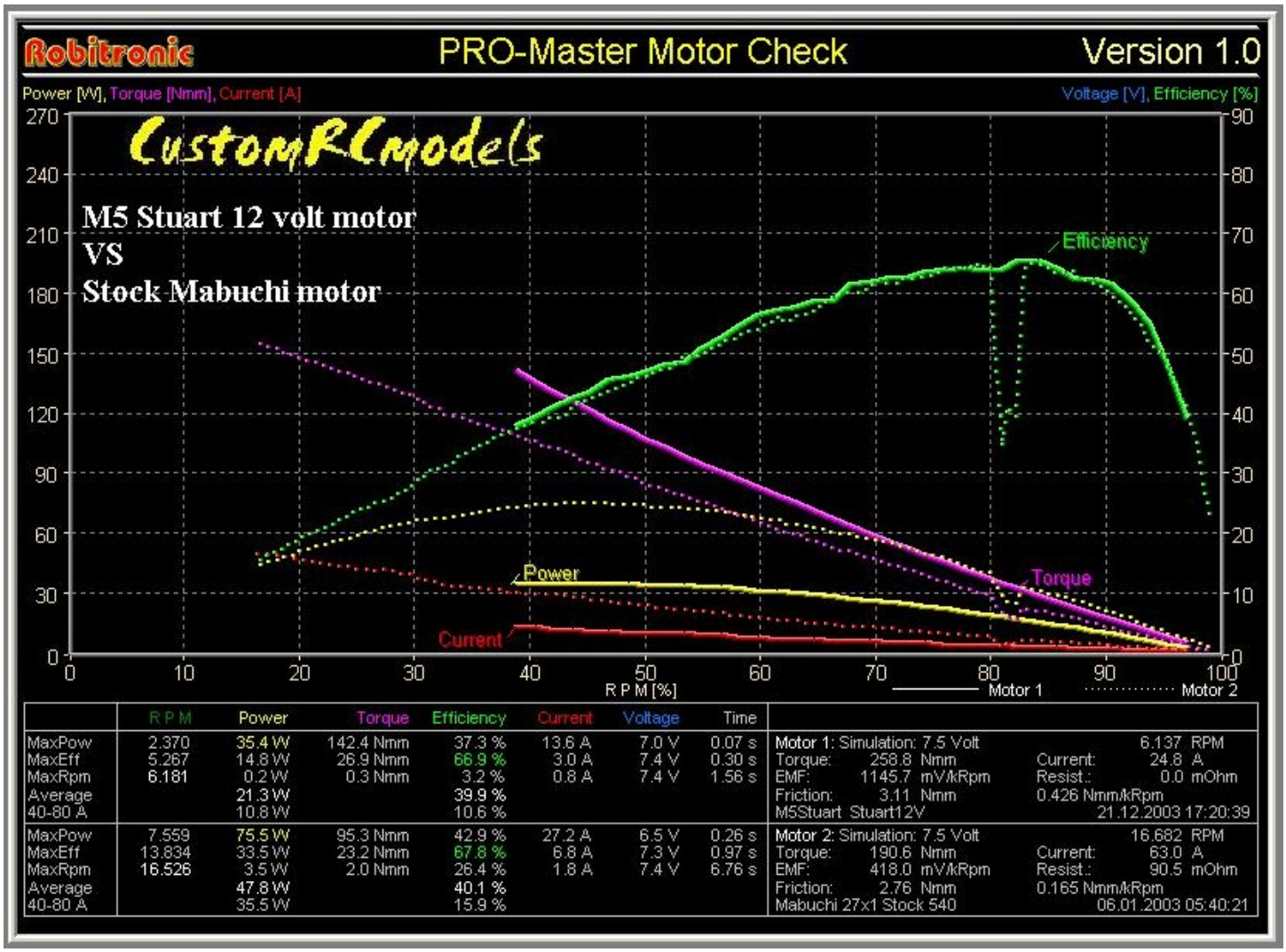


stock 27 turn Mabuch motor

Wi



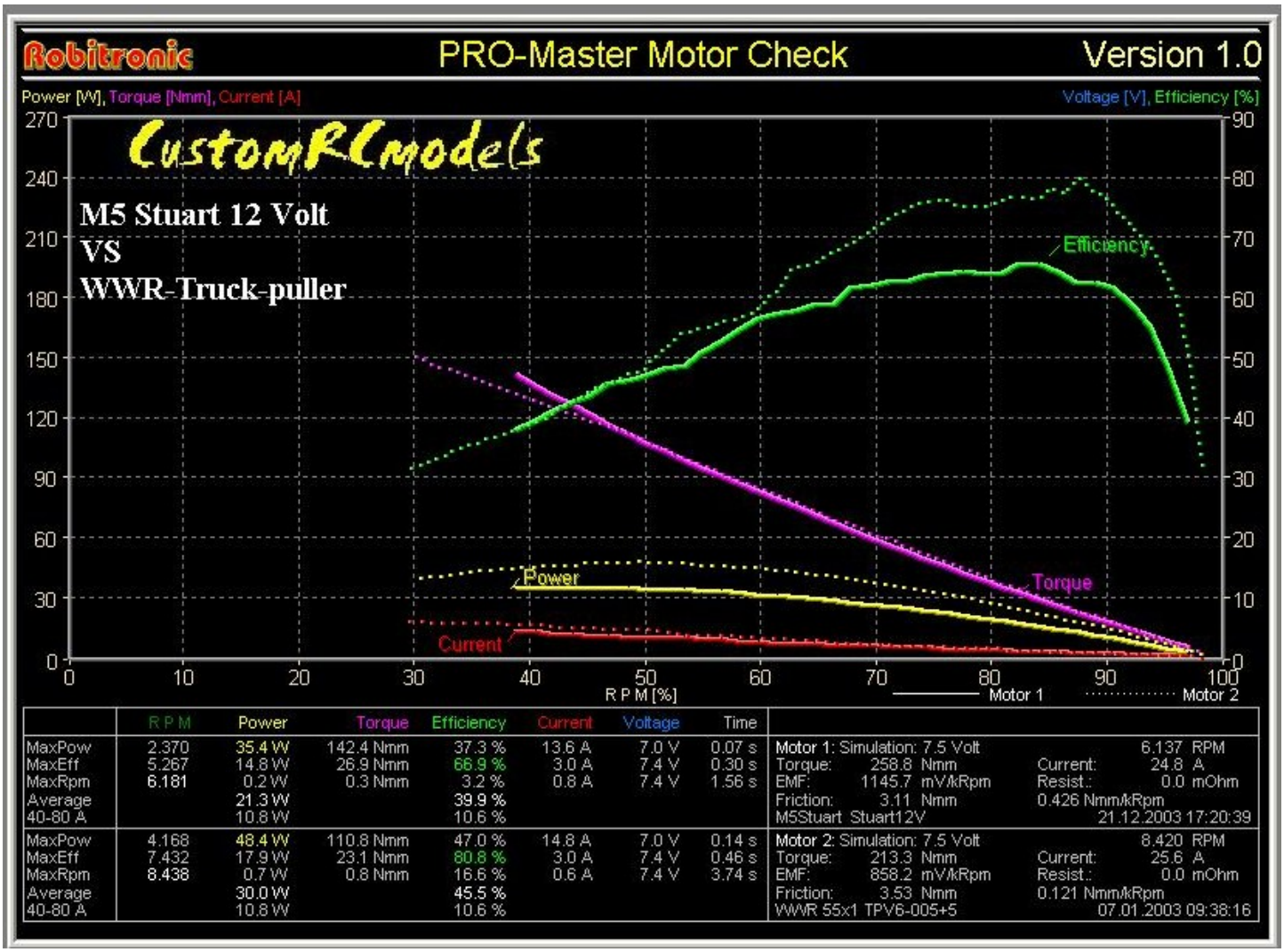
M5below **below are comparison-chart's.....**



	R P M	Power	Torque	Efficiency	Current	Voltage	Time
MaxPow	2.370	35.4 W	142.4 Nmm	37.3 %	13.6 A	7.0 V	0.07 s
MaxEff	5.267	14.8 W	26.9 Nmm	66.9 %	3.0 A	7.4 V	0.30 s
MaxRpm	6.181	0.2 W	0.3 Nmm	3.2 %	0.8 A	7.4 V	1.56 s
Average		21.3 W		39.9 %			
40-80 A		10.8 W		10.6 %			
MaxPow	7.559	75.5 W	95.3 Nmm	42.9 %	27.2 A	6.5 V	0.26 s
MaxEff	13.834	33.5 W	23.2 Nmm	67.8 %	6.8 A	7.3 V	0.97 s
MaxRpm	16.526	3.5 W	2.0 Nmm	26.4 %	1.8 A	7.4 V	6.76 s
Average		47.8 W		40.1 %			
40-80 A		35.5 W		15.9 %			

Motor 1: Simulation: 7.5 Volt 6.137 RPM
Torque: 258.8 Nmm Current: 24.8 A
EMF: 1145.7 mV/kRpm Resist.: 0.0 mOhm
Friction: 3.11 Nmm 0.426 Nmm/kRpm
M5Stuart Stuart12V 21.12.2003 17:20:39

Motor 2: Simulation: 7.5 Volt 16.682 RPM
Torque: 190.6 Nmm Current: 63.0 A
EMF: 418.0 mV/kRpm Resist.: 90.5 mOhm
Friction: 2.76 Nmm 0.165 Nmm/kRpm
Mabuchi 27x1 Stock 540 06.01.2003 05:40:21



	R P M	Power	Torque	Efficiency	Current	Voltage	Time
MaxPow	2.370	35.4 W	142.4 Nmm	37.3 %	13.6 A	7.0 V	0.07 s
MaxEff	5.267	14.8 W	26.9 Nmm	66.9 %	3.0 A	7.4 V	0.30 s
MaxRpm	6.181	0.2 W	0.3 Nmm	3.2 %	0.8 A	7.4 V	1.56 s
Average		21.3 W		39.9 %			
40-80 A		10.8 W		10.6 %			

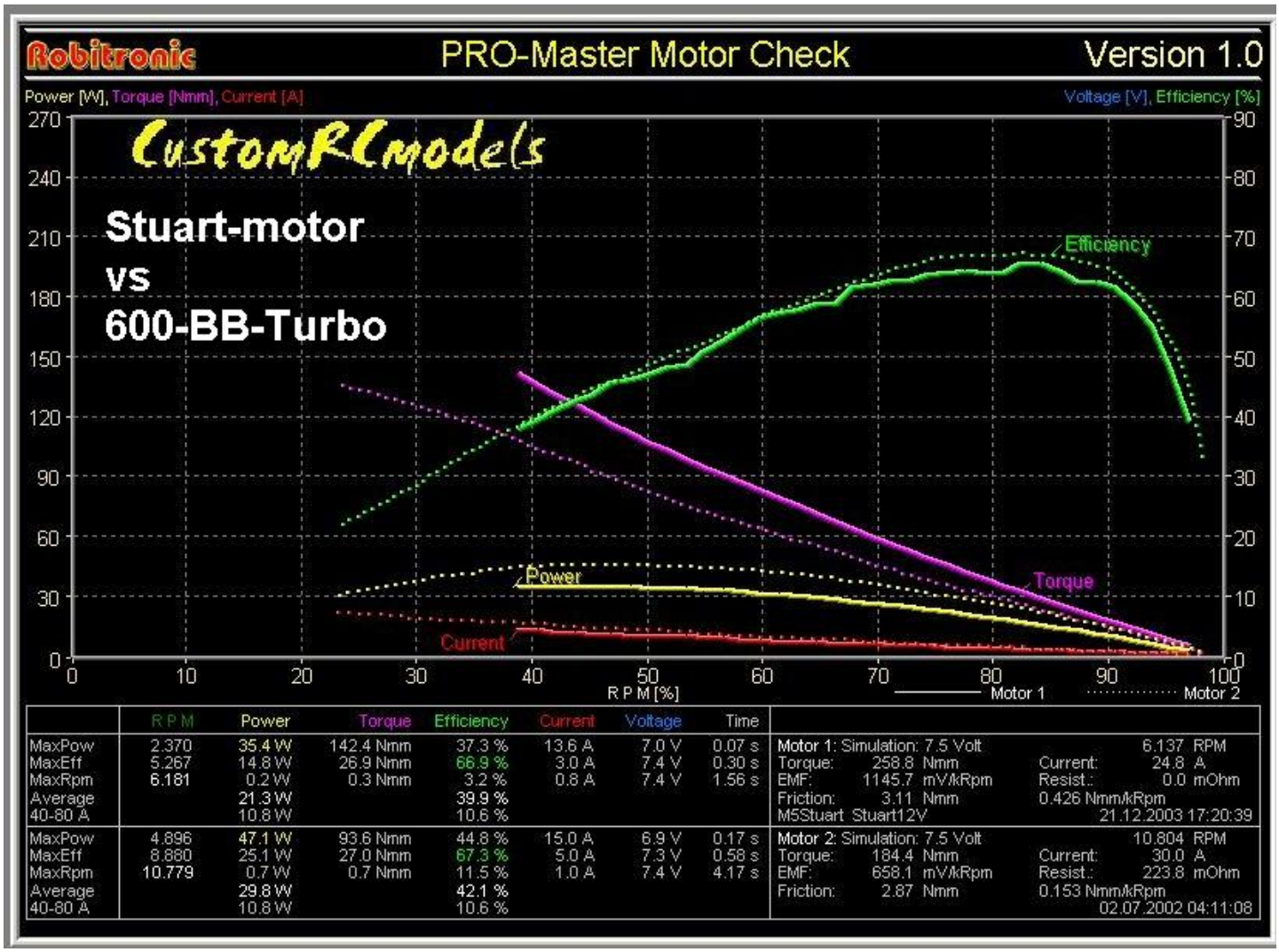
Motor 1: Simulation: 7.5 Volt — 6.137 RPM
Torque: 258.8 Nmm — Current: 24.8 A
EMF: 1145.7 mV/kRpm — Resist.: 0.0 mOhm
Friction: 3.11 Nmm — 0.426 Nmm/kRpm
M5Stuart Stuart12V — 21.12.2003 17:20:39

MaxPow	4.168	48.4 W	110.8 Nmm	47.0 %	14.8 A	7.0 V	0.14 s
MaxEff	7.432	17.9 W	23.1 Nmm	80.8 %	3.0 A	7.4 V	0.46 s
MaxRpm	8.438	0.7 W	0.8 Nmm	16.6 %	0.6 A	7.4 V	3.74 s
Average		30.0 W		45.5 %			
40-80 A		10.8 W		10.6 %			

Motor 2: Simulation: 7.5 Volt — 8.420 RPM
Torque: 213.3 Nmm — Current: 25.6 A
EMF: 858.2 mV/kRpm — Resist.: 0.0 mOhm
Friction: 3.53 Nmm — 0.121 Nmm/kRpm
WWR 55x1 TPV6-005+5 — 07.01.2003 09:38:16

update 4/2003

found new motor !
perfect replacement !



	R P M	Power	Torque	Efficiency	Current	Voltage	Time
MaxPow	2.370	35.4 W	142.4 Nmm	37.3 %	13.6 A	7.0 V	0.07 s
MaxEff	5.267	14.8 W	26.9 Nmm	66.9 %	3.0 A	7.4 V	0.30 s
MaxRpm	6.181	0.2 W	0.3 Nmm	3.2 %	0.8 A	7.4 V	1.56 s
Average		21.3 W		39.9 %			
40-80 A		10.8 W		10.6 %			

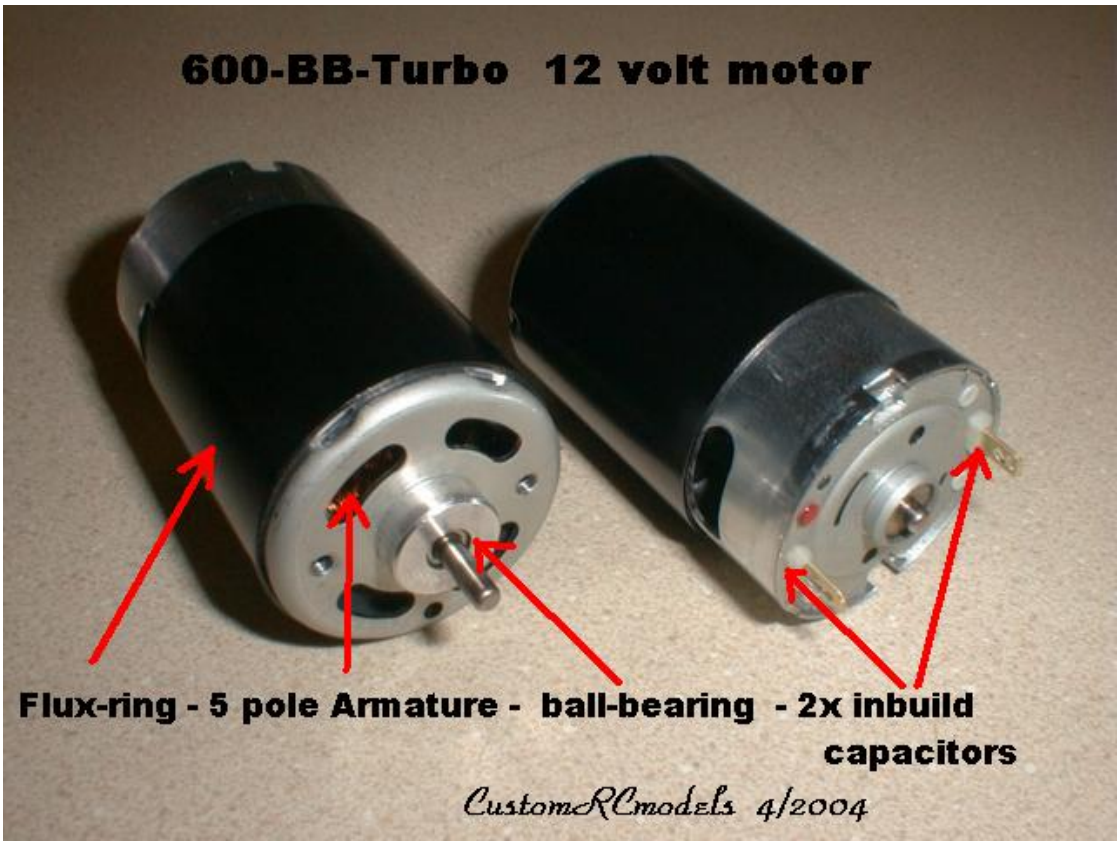
Motor 1: Simulation: 7.5 Volt — 6.137 RPM
Torque: 258.8 Nmm — Current: 24.8 A
EMF: 1145.7 mV/kRpm — Resist.: 0.0 mOhm
Friction: 3.11 Nmm — 0.426 Nmm/kRpm
M5Stuart Stuart12V — 21.12.2003 17:20:39

MaxPow	4.896	47.1 W	93.6 Nmm	44.8 %	15.0 A	6.9 V	0.17 s
MaxEff	8.880	25.1 W	27.0 Nmm	67.3 %	5.0 A	7.3 V	0.58 s
MaxRpm	10.779	0.7 W	0.7 Nmm	11.5 %	1.0 A	7.4 V	4.17 s
Average		29.8 W		42.1 %			
40-80 A		10.8 W		10.6 %			

Motor 2: Simulation: 7.5 Volt — 10.804 RPM
Torque: 184.4 Nmm — Current: 30.0 A
EMF: 658.1 mV/kRpm — Resist.: 223.8 mOhm
Friction: 2.87 Nmm — 0.153 Nmm/kRpm
02.07.2002 04:11:08

Stuart-motor vs 600-BB-Turbo

this motor has a 5 pole armature (runs smoother as a stock 3 pole armature)
ball-bearing on the output-shaft
can be used all the way up to 14 volt !
perfect motor to be used with the Tamiya battle-system !



the Tamiya DMD-units can handle this motor without any problems !
I even drove it with 8.4 volts instead of 7.2 volts !
with 7.2 volts the Stuart will be as fast as with the stock-motors at 12 volt ..
with 8.4 volts obviously a little faster as the stock Stuart
the stock Stuart-motors do around 820 rpm per volt
the 600-BB-turbo does 1440 rpm per volt
means if you use this motor in your Stuart with the 12 volt battery ,
you will get around 17.300 rpm vs stock Stuart with around 9.800 rpm ..
means your Stuart will be almost twice as fast !
so either if you need a motor to be used with Tamiya's battle-system ,
or you just want your Stuart faster , this is the one !
Motor-size is same as the original Stuart-motor's ,

the motor-shaft is a little bid shorter , but long enought for the Stuart pinion....
550 type with flux-rings installed

**I do get these motors from Germany,
but have always quite a few in stock ,
since I use them now also for some of my other projects**

pop me an email , if you like to get a set of these motors ...

or use that Paypal-button

**I will ship via insured Priority-mail
$55.- per motor plus shipping**

Gear-puller

**to exchange these motors , you should use an gear-puller for the motor-pinions
(haven't found replacement-pinions yet)
these pinions are mounted with a very tide press-fit ,
since the Stuart-motor-shafts are knurled
I did find a gear-puller what works for this task ..
this gear-puller comes with 3 different shafts ,
so it can be used for small motors with just 2mm shafts
all the way up to the larger ones with 3.2 mm shafts ..
I had to re-machine the push-shaft for the 3.2mm ,
so you can fully pull off that Stuart-pinion-gear ...**

if you like to get one of them , pop me an email ...

or you can use that Paypal-button ....

PayPal
Click here to buy

I will ship via insured Priority-mail
(I will send them out with that re-machined shaft of course !)
$ 30.- shipped

instructions for pinion-gear-removal

before you can apply that gear-puller ,
you will have to push the pinion of that motor-shaft just a little bid ,
so that the gear-puller fits between motor-housing and pinion
you can do that with 2 screw-drivers ,
and use them basicly like a pry-bar
but be carfull ! don't heart yourself by doing this !
since the Stuart-motors have knureld shafts ,
these pinions will not press-fit anymore on a differnt motor ..
I drilled and taped 3mm holes in each pinion
and used setscrews to mount them on the new motors ...
with a Dremel-tool I ground a flat-spot on the motor-shafts from the new motors
to insure that these pinions don't slip

If you are not up to this task ,
you can send me your pinion's and I will drill and tap them ,
or you can send me your motor's and I will remove them too..

questions to all of this ..??

IMPORTANT UPDATE

Because of excessive spam I am removing all my feedback/contact forms from my website
For any questions or inquires please contact me at : info (at) customrcmodels (dot) com
Sorry for this inconvenience

WWR-truckpuller-motor

M5 Stuart photos

M5 Stuart in parts.....

conversion to proportional Radio system

21 st Century 1/6 scale M5 Stuart R/C tank

4/2004

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