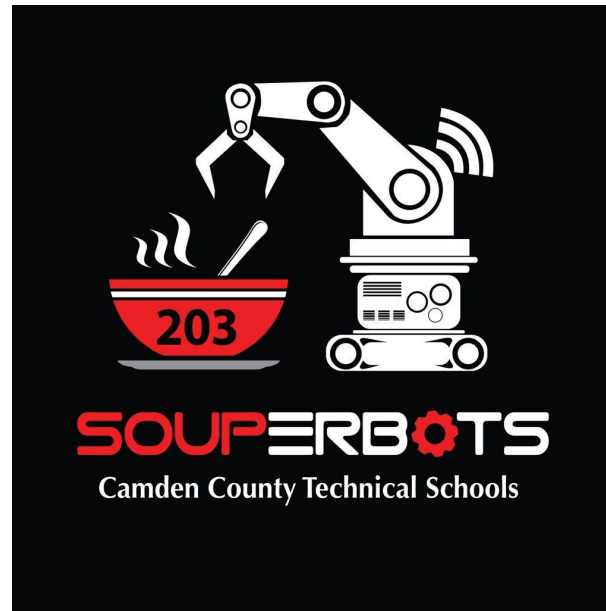


# FRC Power Up 2018 Season



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## ANALYSIS

8 YgW]dh]cb`  
GfUH[ mi

## DESIGN

`7\ Ugg]g`  
`7 i VY`bHJ\_Y`  
.....@Z# `]a V`  
: ]YX`Gi ddcfh

## TECH

.....Dfc[ fUa a ]b[ #`YWfcb]Wg`  
..

# DESCRIPTION

I ] Z ' %&- ; G8 \Vb Z! Edl ZgJe! h i] Z b dhi j c f j Z [ghi gWdi Xh \Vb Z id YViZ#J ca^ Z Vcn di] Zg\Vb Z! ^c V Edl ZgJe b ViX] !ed^cih VgZ^hXdgZY^VXXdgY^c\^id^i^b Z^gVi] Zgi] Vc^f^dcZ^Va^VcXZ^] Vh^b dgZ^Xj WZh^c^i] Z^hXdgZY^i] Vc^i] Z^di] ZgVa^VcXZ#

I d hXdgZ ed^cih! i] Z iZVb h b Vn Z^] ZgdI c i] Z hXVaZ ^c i] Z XZciZgd[ i] Z [Za^! dl c i] Z^ghl ^X] adXViZY XadhZhi id i] Z^g Va^VcXZ hiVi^dc!^dgi] Z^gdeedcZcih^hl ^X] ^adXViZY^dc^i] Z^di] ZgZcY^d[i] Z^Za^#

I d dl c i] Z hXVaZ dghl ^X] Zh! Va^VcXZh b j hi ea^XZ edl ZgXj WZh dc i] Z^gZcY d[ i] Z hXVaZ VcY hl ^X] Zh#=dl ZkZg ed^cih I ^acdi WZ \^kZc WZXVj hZ Vc Va^VcXZ ] Vh b dgZ Xj WZh i] Vc i] Z di] ZgVa^VcXZh dc i] Z hXVaZ VcY hl ^X] Zh#Ed^cih I ^aWZ VI VgZY id i] Z iZVb I ] d dl ch i] Z [Za^ Za^b Zci Vi i] Vi i^b Z#; dgZmVb ea^! i] Z gZY Va^VcXZ b Vn ] VkZ il d Xj WZh dc i] Z hl ^X] VcY i] Z Wj Z Va^VcXZ b Vn dca] VkZ dcZ#9j Z id i] Z Wj Z Va^VcXZ ea^XZb Zci d[ i] Z^gXj WZ! i] Zn b Vn dl c i] Z hl ^X] dkZgi] Z gZY Va^VcXZ#I ] ^c` d[ V [ghi Xa^hh a^kZg dgV hZZ hVI #I I d eZdeaZ I ] d VgZ i] Z hVb Z h^bZ I ] d h^i] Z hVb Z Y^hiVcXZ [gdb ZVX] di] Zgl ^acdi ] VkZ [j c dc i] Z hZZ hVI WZXVj hZ ^I ^acdi b dkZ#=dl ZkZg ^ dcZ d[ i] Zb b dkZh ha^] ian [gdb i] Z [j Xg b ! i] Zn VgZ cdl WZ id \d j e VcY Ydl c dc i] Z hZZhVI #I ] h h ] dl i] Z hXVaZ VcY hl ^X] Zh I dg #I ] Z Va^VcXZ i] Vi h WZ id b V^ Z i] Z [Za^ Za^b Zci \d Ydl c ^c i] Z^g[VkdgVcY ij gc i] Z^a^] i^dc^I ^ahXdgZ^ed^cih^j ci^ai] Z^di] ZgVa^VcXZ^iV Zh^i] Z^hXVaZ^dghl ^X] #

6i i] Z hiVg d[ V Edl ZgJe b ViX] ! i] Z ea^iZh d[ i] Z hXVaZ VcY hl ^X] Zh VgZ gVcYdb ^bZY#9j Z id i] h! iZVb h I ^a] VkZ id X] Vc^Z i] Z^g higViZ^n [gdb b ViX] id b ViX] #HigViZ^n h kZgn h Xg X^vai h nZVg^c ; G8 VcY cdi ] Vk^c^ V I Zai] dj \] i dj i higViZ^n i] Vi Xvc higZiX] [gdb ^b ViX] ^id^b ViX] ^Xvc WZ^kZgn^YZigb ZciVa^#

# STRATEGY

A^ Z`hiViZY`WZ[dgZ!`Vi`i] Z`hiVg`d[ZVX] `Edl ZgJ e`b ViX] !i] Z`ea/iZh`d[i] Z`hl ↑X] Zh`VcY`hXVāZh`VgZ`g/cYdb `bZY#HiViZY`WZadl `VgZ`hZkZgVāhigViZ`n`i] Vi`1 Z`] V`kZ`XgZViZY`dkZgi] Z`WY `ā`hZVhdc#l ] Z`higViZ`Z`h`WZadl `VgZ`higViZ`Z`h`[dgYgk`c`Yj g`c`i] Z`iZā`de`eZg`dY#

## Strategy #1

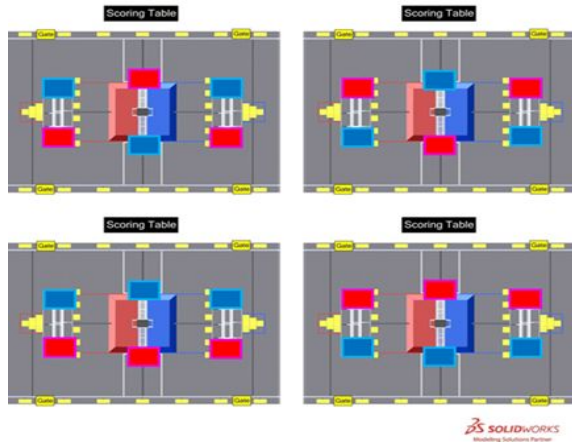
<.....B V`c`dVā`h`i`d`V`c`Xdcigād[i] Z`hXVāZ`  
 <.....9Z[ZcY`i] Z`hl ↑X]  
 <.....<d`[dgWādhi`edl Zgj] e

## Strategy #2

<.....Z`V`gdWdi`XVccdi`Xab`Wi] Z`āZk↑ViZ`edl Zgj e`h] dj ā`WZ`i] Z`[ghi`egdgfn`  
 <.....I V`Z`Xdcigād[i] Z`deedcZcih`hl ↑X] `1 ] `ā`YZ[ZcY`c`d] gdl c`  
 <.....<d`[dgi] Z`Wādhi`edl Zgj] e

## Strategy #3

<.....Z`1 Z`Yd`cdi`] V`kZ`dl cZgh] `e`d[Z↑] Zgi] Z`hl ↑X] Zh`dghXVāZ`i] Z`[dgXZ`edl Zgj e`h] dj ā`WZ`j hZY`  
 <.....L ] `ā`i] Z`[dgXZ`edl Zgj e`h`WZ`c`j hZY!Vc`Z`[[dg`h] dj ā`WZ`b VYZ`id`gZiV`c`i] Vi`dl cZgh] `e`V[iZgi] Z`edl Zg`h`Vāj hZY`j e#



## Strategy #4

<.....L ] Zc`i] Z`b ViX] `ādd`h`ā`Z`i] Z`Wāi`db`il`d`e`Xij`g`h`i`d`i] Z`āZ[i!`dcZ`gdWāi`dj`i`d`i] Z`  
 VāVcXZ`h] dj ā`b V`Z`Vc`Z`[[dg`i`d`egZkZci`i] Z`di] ZgVāVcXZ`[gdb`hXdg`c`#`ā`h`ZVhni`d`  
 [dgZi`VWā] i`i] Z`di] ZgVāVcXZ`1 ] Zc`i] Z`b ViX] `h`hZi`j`e`i] h`l Vn#

Uqwtg<HKTUV'RQY GT'WR'I co g'O cpwcn''



# CHASSIS

I tqwr 'Ngcf <Cf tlcppc'Twi i lgtq'  
Tgugctej Ngcf <Cdi chg Ub cmgwu'

## U/A-Shaped Chassis Design

- <Vb Z'Zāb Zcih'l dj ā'cdi WZ'WZ'id\Zi'XVj \]i'j e'l ↑] ē'i] Z'X] Vhh'h
- 6Wā'nid'b dkZ'i] gđj \] 'i] Z'hb VāzghZXi' dch'd[i] Z'[Zā
- xY'k'Yj Vāb didg[dgZVX] 'db c'li ] ZZa

## Wheels

) ] ^] ig/Xi'đc g WZgI ] ZZāh VcY ' db c'li ] ZZāh ē i] Z [gdci d[ i] Z X] Vhh'h

## Motor

- 8-B 'b didgh

## Shifter

- ' 8-B '7VāiH] ↑iZg



### Speeds per Gear Ratio

8VÅj a/i ðch`YdcZ`[dg- °c#

#### Standard 12-tooth Pinion (40:12)

HeZZY`[dg###	Cd*(g`HiV\Z`<ZVgç\	(g`HiV\Z`Dei`dc`&` t*%( ) )	(g`HiV\Z`Dei`dc` t*) / (%	(g`HiV\Z`Dei`dc`( t+%') )	(g`HiV\Z`Dei`dc`) t+) / %
= ^]`<ZVgDj iej ih	) &#&%"[i \$h	' , # * "[i \$h	' ' # ( "[i \$h	&+##) "[i \$h	& #) "[i \$h
Adl `<ZVgDj iej ih	&- #/% "[i \$h	& # % "[i \$h	&#/#* "[i \$h	, # ( "[i \$h	* #* "[i \$h

### Speeds per Gear Ratio

8VÅj a/i ðch`YdcZ`[dg+ °c#

ŽXj ggZci

	9gkZig/ç°; gZZ`HeZZY	9gkZig/ç° GZVãA[Z HeZZY	Ej h] ç\ 8j ggZci`9gVl `eZg<ZVgWm	DkZg/ãGVi ð
= ^]`<ZVgDj iej ih	' &#&)"[i \$h	& #&("[i \$h	' +' #%%6b eh	+ # % / &
Adl `<ZVgDj iej ih	. # % "[i \$h	, #) "[i \$h	&&- #&'6b eh	&* #%% / &

# CUBE INTAKE

I tqwr'Ngcf gtu<Go o c'Dett'ēpf 'Xlewtk'J qpi "  
Tgugtej 'Ngcf <F {rp'Tsej "'

- 7Zā'9gkZc; anl ] ZZāHnhZb
- (9'EgēciZY'Ej æzh
- +) ,8db eaVci'L ] ZZāh

## Materials for Intake Mechanism

- )• ] Zm̄h] V[ih
- -• ] Zm̄VZVgē\h'aē
- 6āj b ēj b 'Eā/i'ē\` ` ' ] 'X`
- ' ] ē\Zh
- ' VZāh
- )'ej æzh
- &%• h] V[i`XdaVgh

# LIFT/CLIMB

I tqwr'Ngcf <Go o c'Dett.'Xlevqtk'J qpi.'čpf "Lctgf '[ quw'  
 Tgugctej 'Ngcf <Cřř ek'Nlr ueqo d'čpf 'F {mp'Tkěj "  
 "

- )- °7n&, °- ° °: āzkVidgA[i!'B VYZ'dj i'd[i] Z°- %" %Dei'đc
- Ej āzn'HnhiZb
- =dd` j hZY'id`g\WWWgd[i] Z'hXVā`[dgXab Wc\

→ B ZiVaE ZXZh

- &M °- %" %dgHfj VgZ'Hi dX`
  - ; dgi] Z'hiVi'đcVgn'hYZ'g/`h
- &M °A'hidX`
  - ; dgi] Z°XVe'd[i] Z'hiVi'đcVgn'hYZ'g/`h'id`b V` Z'hj gZ'i] Z'afi`YdZh`cdi`YZiVX] #

## CIM

; gZ°HeZZY`tGEB †	Hi Vaıl dgf j Z`tCŽb †	Hi Vaı8j ggZci`tVb e†	; gZ°8j ggZci`tVb e†
* (( %	' # &	&( &	' #

## Gearbox

~ °B didgh`eZg <ZVgWdm	<ZVgWdm : [[°X°ZcXn	l g/kZa 9 hiVcXZ`t`c#	6eeaZY°AdVY tđV#	Ej āzn 9 Vb ZiZg`t`c#
&	- %/	&' °c#	&+%đVh#	' °c#



9gk`c\`<ZVg	9gkZc`<ZVg
&	*
&	,
&	&
&	&

\*DkZg/aGVi`d/( \* &

: aZkVidgA`cZVgHeZZY	6gb`l`b`Z`i`d`b`dkZ`l`g/kZa 9`hiVcXZ
&*`#`^`c`\$`h	%#`*`^`hZX
&&#`^`c`\$`h	&#%(`^`hZX

8j`ggZci`^9gVl`^eZgB`didgla`dVYZYf	HiVaiAdvY
(`%#`%Vb`eh	*`.`#`^`aVh

- .
- .



# PROGRAMMING/ELECTRONICS

I tqwr Ngcf gt <F cplgr Dqgi o "  
Tgugej Ngcf <Xcpgur O gpvq

---

## ACCOMPLISHMENTS

- ; G8'l ZVb " % (HXdj i c\`Vee
  - 6kV aWZ`dc`i] Z`iZVb `l ZWhfZ`VcY`l aWZ`Vkv aWZ`hddc`id`i] Z`<dd\ a`E a/n`HidgZ
- CZl `B Zb WZgh`aVgcZY`8z`!`Eni] dc!`?Vkv
  - B VYZ`i] Z`hXdj i c\`Vee`j h`c\`i] ZhZ`a/c\j V\Zh`VcY`VeeaZY`cZl ` cdl aZY\Z`id`V`] db Zb VYZ`iZa`deZgvi kZ`egd\g/b #
- 6j idcdb dj h`VcY`l Za`De`8dY`c\`dc`dj g" %&- `GdWdi
  - L Z`] VkZ`V`idiVad[`&%Y`f[ZgZci`6j idcdb dj h`gdj i cZh`Vh`d[`dj g[`ghi`; G8`8db eZi`f`dc#
  - ; dgl Za`De`f`l Vh`YZh`cZY`Vgdj cY`V" `?dnhi`X` `6gXVYZ`YgkZ#
- CdiVWZ: aXigXVa8db edcZcih
  - A`96G`"AVhZgh[`dgY`hiVcXZ!`kZgn`VXXj g/iZ[`dgY`hiVcXZ!`] Zaelj aYj gc\`Vj idcdb dj h#
  - GZea/XZY`HeVg h`l `f] `K`XidgHEMb didgXdciglaZgh[`dgdWj hicZh`VcY`l `gc\`Z[[`XZcXn#