Whitney, C. (2005, October 25). Sliding Motor Mount. FineWoodworking; Fine Woodworking. <https://www.finewoodworking.com/2005/10/25/sliding-motor-mount>

Supporting documentation for developing a ***Sliding Motor Mount***.

Conceptual design of automobile engine rubber mounting composite using TRIZ-Morphological chart-analytic network process technique. (2018). *Defence Technology*, *14*(4), 268–277. <https://doi.org/10.1016/j.dt.2018.05.009>

Information extracted (referred pages; pg. 266-270, pg. 273-275):

(1) Need for the usage (purpose) of rubber mounting – vibration dampening.

(2) Considerations when selecting material.

(3) Considerations when selecting mounting; This includes whether: (a) if a mounting is necessary,

(b) if ***YES***, what are the relevant design/selection criteria (i.e., performance, weight, cost & etc)

(4) Criteria for weighing conceptual design (opt.)

Khan, A., Razlee, A., Zainal Nazri, Razak, A., & Ahmad, M. N. (2022). Topology Optimization of an Engine Mounting Bracket Using Finite Elements. *Advanced Structured Materials*, 243–254. <https://doi.org/10.1007/978-3-030-93250-3_21>

Information extracted (referred *“Introduction”*; pg. 1)

(1) FEA vs EMA  
(2) Topology Optimization

(3) *“x”* Mount to be able to withstand, *“x”* load, *“x”* vibration/frequency.

*Design and Construction of Motor Mounts*. (2008). <https://roblab.org/theses/2008-REV-Motor-Tan.pdf>

Information extracted (referred pages; pg. 5-7, pg. 17-20. pg. 21-36):

(1) Further discussion on rubber mounting. *This report discusses the general integration of rubber mounts for an engines & motors –* To Dampen any resultant (BLDC) motor vibration and isolate these vibrations from the chassis.

(2) Assembly of ***rear support mounts, front support mounts & coupling.***

(2.1) Depending on the motor, select a suitable mount design (i.e., middle-style, plate mounts)

(2.2) Motor front mounting plate/adapter design process + CNC machined, for precision using Al13.

(2.3) Coupling – ***TAPER LOCK HUBS (favoured)*** due to *coupling security + ease of maintenance*.

Look here for in-market options: <https://www.ptparts.com.au/products/category/JADNKLMX-special-hubs/N100-TL-J-HUB--taper-lock-hubs>

(3) Design options + ideation + finalisation of design (pg.)

Galloway, K. C., G. Clark Haynes, Deniz Ilhan, & Koditschek, D. (2010, November 4). *X-RHex: A Highly Mobile Hexapedal Robot for Sensorimotor Tasks*. ResearchGate; unknown. <https://www.researchgate.net/publication/49128188_X-RHex_A_Highly_Mobile_Hexapedal_Robot_for_Sensorimotor_Tasks/figures?lo=1>

Information extracted (referred pages; pg. 7-10):

(1) Spring loaded quick-release latches.   
(2) Gearing offsets (opt.).

(3) Motor shaft extension.   
(4) Overall motor mount design that consists of the assembly of a back plate & front plate.

Motor Mount Design Examples

1. Ideation of mounting system  
2. Ideation of subsystem(s) + subsystem breakdown  
2.1 Force distribution considerations (system suited to handle lateral and vertical loads)  
2.1.1 Calculations/justifications for 2.1 – TBD  
2.2 Decision to use tilted + angled ***Mount\_Legs*** to distribute load(s) over a wider area.  
2.2.1 Angle of 70 degrees, between ***Motor\_Base\_Plate*** & ***Mount\_Legs*** (for optimal load distribution)  
2.2.2 Calculations/justifications for 2.2.1 – TBD  
2.2.3 FIND; Angle of ‘*x*’ for tilt – TBD  
2.3 ALL req. dimensions for ***Motor\_Base\_Plate*** & ***Mount\_Legs*** – TBD  
2.3.1 ***Motor\_Base\_Plate*** “material selection” (6061, Al) – TDB; shy 2  
2.3.1.1 ***Motor\_Base\_Plate*** spec. re-evaluation2.3.2 ***Mount\_Legs*** “material selection”  
2.3.2.1 ***Mount\_Legs*** spec. re-evaluation  
2.4 Decision to design the ***Motor\_Base\_Plate*** separately + mount to ***Mount \_Legs*** (for ease of handling)  
2.4.1 Mounting ***Motor\_Base\_Plate*** to ***Mount \_Legs*** Using: ***External\_Slotted\_Flange***+ \*Bolts + \*Lock nuts + \*Washers (*Nord-Lock*)  
2.4.2 ***External\_Slotted\_Flange*** to be supported with ***Gusset\_Plate(s)***  
2.4.3 ***External\_Slotted\_Flange*** with “vertical/horizontal slot” + “slot dimensions” – TBD  
2.4.5 ***External\_Slotted\_Flange*** dimensions – TDB  
2.4.4 ***External\_Slotted\_Flange*** “material selection” (100% infill, PLA) – TDB; shy 2  
2.4.4.1 ***External\_Slotted\_Flange*** spec. re-evaluation  
2.4.5 ***Gusset\_Plate(s)*** dimensions – TDB  
2.4.6 ***Gusset\_Plate(s)*** “material selection” (100% infill, PLA) – TDB; shy 2  
2.4.6.1 ***Gusset\_Plate(s)*** spec. re-evaluation  
2.4.7 \*Bolts selection (for fastening ***Motor\_Base\_Plate*** to ***External\_Slotted\_Flange***) – TBD   
2.4.8 \*Bolts; quantity + dimensions – TBD  
2.4.9 \*Lock nuts; quantity + dimensions – TBD  
2.4.10 \*Washers; quantity + dimensions – TBD  
2.4.11 Calculations/justifications for 2.4.7 + 2.4.8 + 2.4.9 + 2.4.10 – TBD  
Component List (Not complete):  
***Motor\_Base\_Plate,***  ***Mount\_Legs, Motor\_Base\_Plate, External\_Slotted\_Flange, Gusset\_Plate(s),*** \*Bolts; ***MotorToBase\_Plate\_Bolt,***  ***Base\_PlateToMount\_Leg\_Bolt, Mount\_LegToFloor\_Bolt*** \*Lock nuts, \*Washers  
  
**Stamp 1:** Steps 1. – 5. Finding *Belt Length* (Distance between ***Motor\_Shaft*** & ***Steering\_Shaft***)  
1. Find Rated Motor torque  
2. Find Req. Steering (Rack & Pinion) torque  
3. Calculate “optimum pulley ratio”  
4. Find Req. “***Motor\_Shaft\_Pulley*** pitch + diameter”using 3.   
4.1 Find Req. “***Steering\_Shaft\_Pulley*** pitch + diameter”Using 3.4.1.2 Hence; Req. “***Motor\_Shaft\_Pulley*** teeth quantity”. Using 3.   
4.1.3 Hence; Req. “***Steering\_Shaft***\_***Pulley*** teeth quanitity”. Using 3.5. Find the belt length. Therefore; “viable ***Motor – Steering\_Shaft*** distance” using [belt length formula](https://sudenga.com/resources/figuring-belt-lengths-and-distance-between-pulleys/)  
**Stamp 2:** Finding *Optimum Belt Parameters* & *Dimensions*6. Find suitable belt specifications using information in 5.  
6.1 Find “belt width” – TBD   
6.2 Find quanitity of “belt teeth” – TBD  
6.3 Finalise belt selection – TBD

(Custom) Motor Mount Design Flow

***Motor\_Shaft*** & ***Steering\_Shaft*** – Assembly

**Stamp 3:** Confirming ***Motor\_Base\_Plate + Mount\_Legs*** *Assembly & Positioning*

7. Decide ***Mount\_Legs*** “mounting position” on vehicle floor. Using 5. – TBD   
8. Find Req. “motor mounting position” on ***Motor\_Base\_Plate*** – TBD   
9. Find Req. ***Motor\_Base\_Plate*** “mountingposition”between the ***Mount\_Legs***10. Model motor mount + Perform FEA + CAD for Motor mount.  
11. Confirm **ALL** “motor mounting positions” **Stamp 1:** Finding *Tensioner Specifications*, *Design & Requirements*  
1. Find Req. “tensioning position” (position along the belt that needs tensioning) along pulley belt  
2. Tensioner specifications (temporary, Req. ***Tensioner\_Pulley*** parameters). Consider info from 7.  
2.1 (Justify)**IS** Tensioner mounted on “*car\_floor/motor\_mount*” – TBD   
2.1.1 Confirms Req. ***Tensioner\_Pulley*** placement along belt – TBD   
2.2 Confirms Req.***Tensioner\_Pulley*** parameters – TBD   
2.2.1 ***Tensioner\_Pulley*** dimensions + “material selection” – TBD   
2.3 Tensioner “*adjustable/spring-loaded*” – TBD  
**Stamp 2: *Tensioner\_Mount*** *Design – Brief overview*   
2.4 ***Tensioner\_Pulley*** to ***Tensioner\_ Mount*** force distribution – TBD  
2.5 ***Tensioner\_ Mount*** “mounting position” on (+ using) outcome of 2.1 & 2.1.1

***Tensioner Specifications –*** *Brief*

Pulley Design

Distance between ***Motor\_Shaft*** & ***Steering\_Shaft:*** <https://sudenga.com/resources/figuring-belt-lengths-and-distance-between-pulleys/>

Pulley & Belt calculator <https://www.blocklayer.com/pulley-belt>

Pulley ratio & RPM calculator: <https://calculator.academy/pulley-size-calculator/>

Pulley Design: <https://assets-global.website-files.com/6321faa31729834cada9ee26/6321faa317298319abaa1420_B107%20Pulley%20Design%20Guidelines%2C%20Material%20and%20Finishes.pdf>

Next stages – Brief overview:  
***Motor\_Shaft*** req. dimensions.  
***Motor*** to ***Motor\_Shaft \****coupling  
Calculations for forces acting on ***Motor\_Shaft***  
(opt.) ***Motor\_Shaft*** dimension + spec. re-evaluation  
***Motor\_Shaft\_InFloor\_Bearing*** spec

Ideation Process for Motor Mounting Mechanisms (Most preferred iteration – See below; circled in ***RED***)

