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A Literature Review on composite Material For Drive Shaft

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Abstract : A drive shaft is a pivoting part that transmits control from the motor to the differential apparatus of a back wheel drive vehicles. The steel driveshaft is utilized as a part of car, these days this steel drive shaft is supplanted by composite material drive shaft. It has been demonstrated that composite drive shafts are successful in over-coming the confinements, for example, weight, vibrational qualities and basic speed. Their flexible properties can be tailored to increase the torque as well as the rotational speed at which they operate. The drive shafts are used in automotive ,aircraft and aerospace applications. The automotive industry is exploiting composite material technology for structural components construction in order to obtain there reduction of the weight without decrease in vehicle quality and reliability. The drive shafts are utilized as a part of car, air ship and aviation applications. It is known that energy conservation is one of the most important Indeed, the very way of the composite materials (fiber and resinous fastener) permits drive-shafts to be intended to meet particular basic operational characteristics ,and accordingly custom fitted to coordinate the prerequisites of individual applications. The consequence of this are utilized for demonstrating of carbon/epoxy composite drive shaft and steel drive shaft utilizing CAD programming to perform static, clasping and modular examination of both drive shaft utilizing ANSYS programming.

Keywords - *Drive shaft, composite material, ANSYS*

I. INTRODUCTION

When all is said in done, the car drive shafts are being made by one of the routine assembling process succession i.e. Hot Forging, Normalizing and consequently case solidifying and hardening to accomplish the coveted useful quality prerequisites. The case solidifying process like acceptance solidifying or gas carburizing might be chosen in light of geometry, material science and utilitarian necessities. The part like drive shafts which are subjected to torsional stack at the surface and bowing burden at center amid application. Composite drive shafts have fathomed numerous mechanical and auto-thought process issues. The innovation is demonstrated; it stays for potential clients to perceive these favorable circumstances and make the move far from metal tubing. As in the presentation of most new ideas, there has been much misconstruing about the capacities of carbon fiber drive shafts. It is tended to by the data displayed underneath will clear up this circumstance.

The torque that is delivered from the motor and transmission must be exchanged to the back wheels to push the vehicle forward and turn around. The drive shaft must give a smooth, continuous stream of energy to the axles. The driveshaft and differential are utilized to exchange this torque. The propelled composite materials, for example, Graphite, Carbon, Kevlar and Glass with appropriate saps are broadly utilized on account of their high particular (quality/thickness) and high particular (modulus/thickness). Propelled composite materials appear to be preferably suited for long, control driver shaft (propeller shaft) applications. Their flexible properties can be custom fitted to build the torque they can convey and in addition the rotational speed at which they work.

II. COMPOSITE MATERIAL DRIVE SHAFT

L.V. Pavan Kumar Maddula, Ibrahim Awara [1],. Concentrated on fuel effectiveness and vehicle outflows and has driven the car business to investigate low weight elective plans for power train framework components. The display work clarifies how a potential outline change of drive shafts driven by a longing to decrease weight and cost can prompt to NVH (Noise, Vibrational& Harshness) issues brought on by driveshaft resonances and clarifies how utilizing numerous dynamic vibration safeguards (DVA) can tackle the issue to meet client desire while enhancing efficiency.CuipingFeng, Zhihong Dong, Yuliang Yang,

ChaoxingXie, Kai Wanget., al[2],. With the guide of Finite Element Analysis (FEA) and enhancement programming, communications between various DVA's on a framework was comprehended and ideal damper parameters for compelling damping was distinguished. The last DVA configuration was tried and checked on the vehicle for ideal trait execution.

Victor Baumhardt, ValdineiSczibor[3]have concentrated the significance of Halfshafts as Halfshafts are essential segments from vehicle powertrain. They are the components mindful to transmit torque and revolution from transmission to wheels. Its fundamental plan comprise of a strong bar with joints at every outrageous. Be that as it may, contingent upon its length, the regular recurrence of first bowing mode may have a model arrangement with motor, bringing about undesired clamor on vehicle inside.

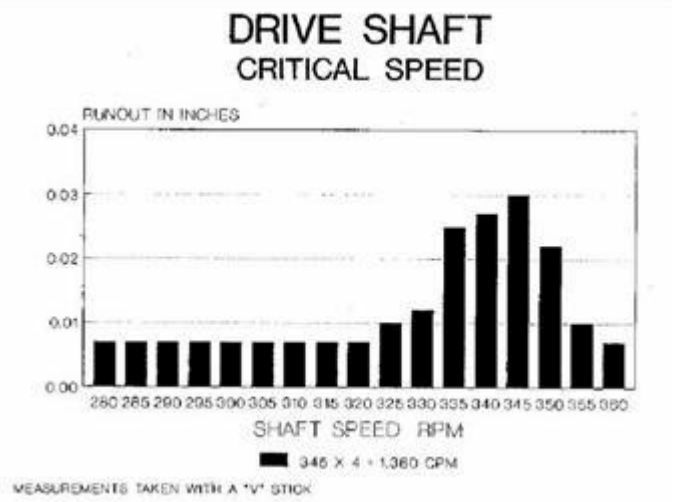
Joseph V. Gabiniewicz, Douglas M. Dough puncher, Michael Testani[5] Historically, driveshaft torque information has been gotten utilizing slip rings. Slip rings, in any case, are costly, and require time-serious driveshaft alterations for appropriate establishment. Also, the time and cost required in field overhauling units is restrictive

Chaithanya G Rothe[6] et., al., broke down the outline requirements because of the physical geometry (bigger range) of the drive shafts utilized as a part of the said applications, including car applications, the shear quality which determines the heap conveying limit, is of minor plan significance since the disappointment mode is commanded by clasping; along these lines, the fundamental outline components are the twisting common recurrence and the torsional clasping quality, which are elements of the longitudinal and loop bowing firmness, individually. The variable of the cover thickness bigly affects the clasping quality, and a slight impact on the bowing regular recurrence.

The thickness of the particular fiber fortified layers herefore examined can be fluctuated as per plan rule that basic speed of the pole is adequately lifted to a point that no major spin speed commotion issue is experienced inside the mulled over end utilize application. Such outline standards are directed by the Young's modulus of flexibility of the glass and carbon filaments, fiber arrangement and the way of alternate segments of the drive shaft, the drive shaft distance across, the aggregate divider thickness, and the general length of the drive shaft over an extensive variety of working velocity.

Properties of HS Carbon / Epoxy and HM Carbon / Epoxy

Mechanical Properties	**Units**	**HM - Carbon / Epoxy**	**HS - Carbon / Epoxy**
E_{11}	Gpa	190	134
E_{22}	Gpa	7.7	7.0
G_{12}	Gpa	4.2	5.8
ν_{12}-	0.3		0.3



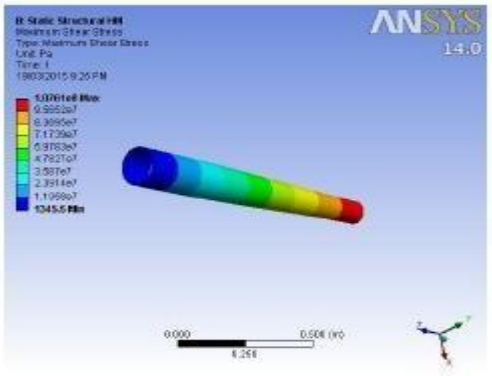
Mechanical Properties and Prices of Typical

Graphite Fiber[*].

Material Name	PAN/ Pitch	Density lbs/in	Tensile Kpsi	Modulus Kpsi	Price/ Pound
T-300	PAN	0.064	530	33.5	$ 23
T-650/92	PAN	0.064	730	42.0	$ 50
T-40	PAN	0.065	820	42.0	$ 59
T-50	PAN	0.065	420	57.0	$ 90
T-1000G	PAN	0.065	924	42.7	$ 75
P-55S	Pitch	0.072	275	55.0	$ 52
P-75S	Pitch	0.072	300	75.0	$ 385
P-120	Pitch	0.079	350	120	$ 800
K-1100	Pitch		350-550	130	$ 1,750

III. SUMMARIZATION OF ANYSIS RESULT

It is educated the one-piece composite drive shaft for back wheel drive vehicle was outlined ideally by utilizing genetic Algorithm for High Strength Carbon/Epoxy and High Modulus Carbon/Epoxy composites with the target of minimization of weight of the pole which is subjected to the limitations, for example, torque transmission, torsional buckling capacities and common bowing recurrence.



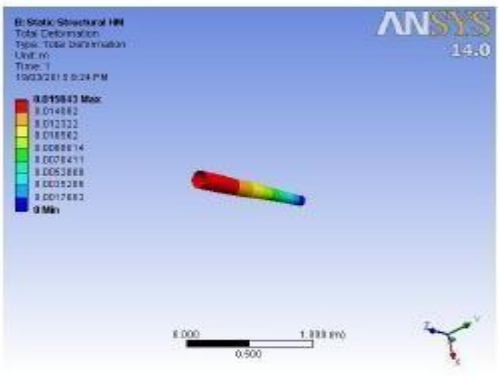


Fig 1 Maximum Shear Stress for HM Carbon/Epoxy Fig 2 Maximum Deformation for HM Carbon/Epoxy

IV. CONCLUSION

In this study, we evaluate several cylindrical composites shafts by carbon laminate in order to ensure maximum strength and reliability with minimum material usage. Improvement of laminate stacking sequence and sheet winding production process result the ultimate strength goes twenty percent higher than conventional concept shaft. In future work, we will try to prove numerically that anti-buckling effect by SMPW's spiral laminate structure. And also we will evaluate the effect on fatigue limit of this technology. This SMPW technology should be confirm greatly contribute to reduce weight ,strengthen and save carbon fiber material to meat cost requirement for automotive parts; typically for light-weight torque shaft like propeller or drive axle to achieve ultimate performance.

REFERENCES

[1] Application of multiple dynamic vibration absorbers to reduce NVH risks caused by alternative half shaft design (2017-03-28 Technical Paper)
[2] Design of Experiment of Dynamic Vibration Absorber for Drive Shaft (2015-04-14 Technical Paper2015-01-0631)
[3] Geometrical Optimization of an Automotive Halfshaft 2017-03-28 Technical Paper (2017-01-1125) Victor Baumhardt, ValdineiSczibor
[4]Jin Kook Kim. Dai GilLee, and Durk Hyun Cho, 2001, "Investigation of Adhesively Bonded Joints for Composite Propeller shafts", Journal of Composite Materials, Vol.35, No.11, pp.999-1021.
[5] Development of a Vehicle Drive Shaft Telemetry System 2016-04-05 Technical Paper 2016-01-0410 Joseph V. Gabiniewicz, Douglas M. Baker, Michael Testani

[6] Design and Analysis of Composite Material Drive Shaft Chaitanya G Rothe, A. S. Bombatkar et., al.
[7] Review of Design of hybrid aluminum/ composite drive shaft for automobile Bushan K. Suryawanshi, G. Damle International journal of Innovative Technology and Exploring Engineering ISSN:2278-3075, vol-2, issue-4, March-2013.
[8] Materials science Vol.11, no.2,2005.
[9] "Design and Analysis of composite drive shaft using ANSYS and GA" A critical review International journal of modern engineering research (IJMER) www.ijmer.com vol.3, issue.1, Jan-Feb 2013 pp 490-496 ISSN:2249-6645 Sagar R. Dharmadhikari, 1 Sachin G. Mahakalkar, 2 Jayant P. Giri, 3 Nilesh D. Khutafale4.
[10] McDermott, J.; Fiberglass Recycling; Composite Fabri-cation, Composites Fabrication Association; Arlington, VA;May 1996, pp. 9-13.
[11] Jones R.M., 1990, Mechanics of Composite Materials, 2e, McGraw- Hill Book Company, New York.
[12] Belingardi.G, Calderale.P.M. And Rosetto.M, 1990, "Design Of Composite Material Drive Shafts for Vehicular Applications", Int. J. of Vehicle Design, Vol.11, No.6, pp. 553-563.
[13] Pollard. A, 1989, "Polymer Matrix Composites in Driveline Applications", Journal of Composite Structures Vol.25, pp.165-175.