

DEPARTMENT OF MECHANICAL ENGINEERING
Purdue School of Engineering and Technology

FALL 2008 SEMINAR SERIES

Date: Thursday, October 30, 2008

Time: 11:00 am – 12:00 pm

Room: SL 165

Everyone is invited

ME 597 Presentation

Design of an Asphalt Zipper drum & CFD analysis of a medium duty truck

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Abstract.

(1) Asphalt reclamation machines are used to cut roadways when a repair is required. Typical cutter head patterns have the picks placed in regular spacing around the circumference of the drum. These arrangements of the cutter head patterns would leave the drum unbalanced. The unbalanced drums of the reclamation machines should be balanced to avoid vibrations and support uniform wear. As an effort to automate this design aspect, a procedure to balance a 3-D model was developed. A SolidWorks API program would assemble the drum with the chosen cutter heads, taking the input from an excel sheet. The same excel sheet would also be an input for a MATLAB program that calculates the weight of the balancing masses that are to be added. ANSYS workbench was used to select the right cutter head assembly for the drum. Two configurations of cutting head assemblies are investigated for failure and maximum load bearing capacities.

(2) CFD analysis was carried out on a medium duty truck. CATIA and SMARAGD were used to pull up the geometry for the particular specification of the truck. The class- A surfaces like the hood, bumpers, grills etc., of the truck which comes in direct contact with the high speed air are decomposed and meshed in ANSA. The non critical parts like the under hood geometry and the under chassis geometry are wrapped and decimated in POWER WRAP, POWER PREP respectively. The essential difference between the above two procedures is that meshing in ANSA would preserve the critical features of the surfaces. These meshed components are read into POWER CASE and the case file with physics and boundary conditions is set up. POWER FLOW, POWER THERM are used to solve the setup. This particular analysis was carried out to see the effect of ATS (After Treatment System) temperature on the cab and its surroundings and to estimate the drag.

About the Speaker.

Chagarlamudi V K Mohan is a graduate student in mechanical engineering at Purdue School of Engineering and Technology at IUPUI, Indianapolis, Indiana (2006-present). He earned his bachelors degree in mechanical engineering from Andhra University, Visakhapatnam, India. Before starting his masters program at IUPUI, Chagarlamudi worked at the center for Computational Fluid Dynamics, Bharat Heavy Electricals Limited (BHEL R&D), Hyderabad, India as project engineer (2004-2006). His present area of work includes external aerodynamics and heat transfer analysis of medium and heavy duty trucks.