THE CENTER FOR
PROFESSIONAL STUDIES




Compressed Natural Gas (CNG) System - Engineering Vehicle Integration

Compressed Natural Gas (CNG) vehicles have been operating in the medium and heavy duty market for many years, highlighting significant reductions in emissions and increase in fuel economy. CNG is domestically abundant and a clear path to a reduced reliance on foreign supplied oil. The high volume passenger vehicle markets have been served by the aftermarket industry and there is only one passenger vehicle in production with a limited supply.

- First, the value propositions of CNG Vehicles are explored in each market segment, exploring the potential projections as the market grows.

- Next, individual Original Equipment market engineering specifications and configurations will be reviewed and understood. The aftermarket segment will be also reviewed for technical configuration and performance along with certifications for both installation and inspection standards.

- Lastly, participants will outline a block diagram of components needed to meet specific project engineering requirements for a selected passenger vehicle. This will outline the high level needs of a production passenger vehicle that meets TS 16949, FMVSS and CMVSS standards.

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Course Syllabus

I IDENTIFYING INFORMATION

Course:	CNG System – Engineering Vehicle Integration
Prerequisite:	Understanding of vehicle systems
Time Frame:	24 total contact hours
Instructor:	Daryl Patrishkoff, PMP
	Chief Executive Officer, CPS
	BS in Vocational Industrial Education
	MA in Business Management
	30 years in the product design engineering profession
	20 years managing sales, operations & plant business units
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II REFERENCE MATERIALS

1. Advanced Product Quality Planning and Control Plan, 2nd Edition by AIAG
2. Potential Failure Mode and Effects Analysis, 4th Edition by AIAG
3. Production Part Approval Process, 4th Edition by AIAG
4. Federal Motor Vehicle Safety Standards
5. Canadian Motor Vehicle Safety Standards
6. CNG United Installation Certificate Program
7. CSA Vehicle Fuel Systems Inspector Certificate Program

III COURSE GOALS AND OBJECTIVES

1. Understand the CNG market, segments and growth potential
2. Understand and interpret the medium duty CNG market technical solution
3. Understand and interpret the heavy duty CNG market technical solution
4. Understand and interpret the passenger CNG market technical solution
5. Understand and interpret the aftermarket CNG conversion technical solution
6. Understand FMVSS and CMVSS standards as applied to CNG Vehicles
7. Understand the installation and inspection techniques for CNG Vehicles

IV METHODOLOGY

This course is a micro view of the various CNG Vehicle market segments and the technical solutions to meet each market's specific needs and expectations. Each module will introduce new material that will prepare the student for the projects to be completed.

Lectures

Each detailed subject will be presented in a lecture format outlining the theory and standardized accepted methodology and technical specifications. A PDF file of the lecture material will be provided for the student's personal use as reference material. Lecture note outlines will be distributed to the students for each lecture to help the student capture personal notes. A short video showing the concept covered will be used to facilitate a discussion regarding application.

Specific Industry Examples

Real life industry examples will be presented that detail application of the theory to demonstrate how different companies apply these tools and techniques. This will give the students a clear understanding of how and why these techniques are utilized at different companies and industries in different manners.

In-Class Assignments

Using the theory and industry examples the student will conduct several projects that outline each key principal as in-class projects. These projects will increase in complexity as the students further develop their skills in applying these tools and techniques. The students will present their work to the group for review and discussion.

Specific Company Application

As a summary of the training we will apply these tools, techniques and methodologies on a specific CNG Vehicle project that is currently in development. This will build a basic outline of the technical approach to a specific solution.

V COURSE OUTLINE & ASSIGNMENTS

Module 1

Introduction to CNG Vehicles and Market Segments	PowerPoint lecture
Medium Duty CNG Market	PowerPoint lecture
Heavy Duty CNG Market	PowerPoint lecture
Passenger Vehicle CNG Market	PowerPoint lecture
Aftermarket Conversion CNG Market	PowerPoint lecture

Module 2

Introduction to CNG Vehicles Technical Configuration	PowerPoint lecture
Medium Duty CNG Technical Configuration	PowerPoint lecture
Heavy Duty CNG Technical Configuration	PowerPoint lecture
Passenger Vehicle CNG Technical Configuration	PowerPoint lecture
Aftermarket Conversion CNG Technical Configuration	PowerPoint lecture

Module 3

Key Product Characteristics (KPC) & Safety Related Items	PowerPoint lecture
FMVSS & CMVSS Standards	PowerPoint lecture
Technical CNG System Block Diagrams	PowerPoint lecture
In-Class Assignment, CNG System Block Diagram	Complete & present