

DISEÑO DE UN EMULADOR PARA DIAGNÓSTICO Y REPARACIÓN DEL SISTEMA DE CONTROL Y MONITOREO ELECTRÓNICO DE MOTORES CUMMINS ISX SIGNATURE

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Abstract—El presente documento muestra el diseño de un emulador para detección de fallas y diagnóstico del estado eléctrico y electrónico del sistema electrónico para motores Cummins ISX. Con interfaz gráfica para interacción de máquina-usuario.

Index Terms—Emulador, arnés, interfaz gráfica.

I. INTRODUCCIÓN

El transporte de carga pesada en Colombia es considerado uno de los sectores principales de la economía, si se tiene en cuenta que le aporta al producto interno bruto aproximadamente un 9%. El crecimiento vertiginoso de su parque automotor lo debe llevar a replantear estrategias que respondan al crecimiento del sector productivo, para que juntos lleven a Colombia a establecer las reglas de una verdadera competitividad.

Si bien, el gobierno ha consentido por años un sector que parece ignorar las reglas de juego de la globalidad, tarde o temprano tendrá que asumir los costos de pretender buscar su sostenimiento mediante subsidios coercitivos. Al final del día deberá ser considerado, desarrollado y gerenciado como una verdadera empresa, por esta razón sus componentes constitutivos primarios, como son los vehículos se les debe dar el carácter de activo productivo y por supuesto con todos los derivados que de éstos emanan.

Se debe garantizar una muy alta disponibilidad de estos activos y como tal es menester y perentorio garantizar una amplia cobertura de servicios tecnológicos que minimicen los tiempos muertos y al mismo tiempo los riesgos a que estos activos están sometidos por causas de la informalidad. Las pérdidas por lucro cesante son imputables en un 90% a problemas electrónicos y nos plantea el siguiente interrogante: ¿Se constituye una gran oportunidad de aportar desarrollo tecnológico que mitigue dicho lucro y coadyuve con la competitividad de cara a las aperturas venideras?

En la mayoría de los casos cuando se presentan daños en los módulos electrónicos, los conductores y/o dueños de los vehículos, se dirigen a un taller de mecánica para que allí le arreglen un problema que es electrónico. Se debe educar a este sector para que cuando se presenten este tipo de fallas no se dirijan a un taller mecánico, deben dirigirse a gente

especializada y capacitada en electrónica para que le brinden una solución adecuada e integral a sus problemas electrónicos.

Cummins mediante un protocolo de comunicación se conecta el módulo y a través un software (llamado INSITE) realiza un scaneo para leer las fallas que este presente, otra aplicación que posee este software es que realice una programación al módulo con el fin de resetear cierta información en memorias y procesadores.

El propósito es diseñar un emulador que identifique el estado de:

- Sensores y actuadores.
- Arnés.
- Módulo.

El emulador al ser conectado al arnés instalado en el vehículo, debe identificar el estado de cada uno de los sensores y actuadores del mismo.

También debe realizar pruebas al arnés e identificar si hay algún cable en corto que pueda afectar el funcionamiento general del sistema.

Enviar señales para identificar cuál es el dispositivo dañado de acuerdo a la falla que presente el módulo.

II. DESCRIPCIÓN DE FUNCIONAMIENTO DEL MÓDULO

El módulo de control electrónico (ECM) es el centro de control del sistema. Procesa todas las señales y envía órdenes al sistema de combustible, vehículo, y a los dispositivos de control del motor. El ECM efectúa pruebas de diagnóstico en la mayoría de sus circuitos y activará un código de falla si se detecta un problema en uno de estos circuitos. Junto con el código de falla que identifica al problema, también es almacenada en la memoria una instantánea de los parámetros de operación del motor en el momento de activación de la falla. Los códigos de falla activos causarán que se active una lámpara de diagnóstico para avisar al operador. El ECM puede comunicarse con la herramienta de servicio INSITE™ y algunos otros controles del vehículo, tales como transmisiones, sistema de frenado antibloqueo (ABS), reducción automática de deslizamiento (ASR), displays de tablero electrónico, etc., a través del nuevo enlace de datos SAE J1939 ó del enlace de datos más antiguo SAE J1708. Algunos vehículos y equipo tendrán redes J1939 que enlazan juntos muchos de los controles inteligentes. Los dispositivos de control del vehículo

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