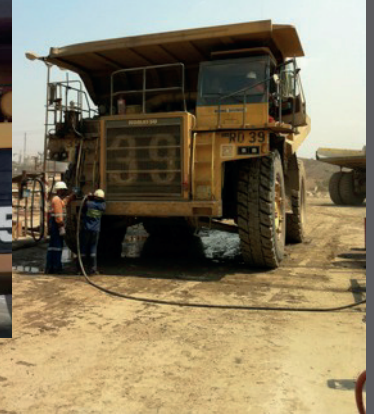


JIGSAW

Real Time Fuel Management



MINES AND QUARRIES

JIGSAW

Real Time Fuel Management

Our Mission ...

Jigsaw Fuel Management was established in 2007 specifically to develop a new generation of fuel management system. The developers had many years of experience designing what were at the time the best fuel management systems on the market.

The aim was to exploit the convergence of reliable Internet access and low cost, reliable mobile data communications to develop a fuel management system which had not been possible until this time.

The resulting system has changed the face of fuel management. Jigsaw now manage more than a Billion litres of fuel a year with sites not just in the UK, but across the globe.

Jigsaw strive to make the most reliable systems anywhere. The systems use switch mode power supplies to combat mains fluctuations, they are not based around PC's and they do not use membrane keypads to ensure long term reliability. The enclosure is fabricated stainless steel so that it will stand up to the rigours of any environment.



Our Partners ...

Jigsaw have developed a network of distributors who not only understand how fuel management works in a mining environment, but can also support your pumps and gauging equipment so that you can be confident that all work is carried out to the latest standards by professionals.

Jigsaw work with a range of suppliers to the Fuel Management Industry so that we are able to not only supply Fuel Terminals, but also to supply and advise on Tank Gauge Equipment, Flow Meters, Pumps, Solenoid Valves, Nozzles, Hoses and the rest of the equipment necessary to install and support a complete fuel management solution.

Our Customers :

Jigsaw supply fuelling control equipment to some of the largest mines in the world. Kansanshi in Zambia alone manages 8.5 million litres per month with Jigsaw systems.

Jigsaw systems can manage just a few vehicles refuelling at static pumps all the way to mixed static and mobile refuelling solutions across several sites with hundreds of vehicles.

Kansanshi has 900 vehicles and pieces of plant fuelling at 85 mobile and static pumps. Stock is managed as it received on to the site, from static tanks to mobile bowsers and from bowsers to vehicles - so no matter how large or small your operation, Jigsaw have a solution to suit.

Our Products ...

- **Eclipse** - 2 or 4 Pump, AlphaNumeric Keypad, Large Character display, Pump Integrated Versions and Retrofits available.
- **Nova** - Single pump, Numeric Keypad, Mains or DC powered, Ideal for mobile refuelling.
- **TankGuard** - Tank Stock Management System - wide range of gauges supported.

Our Range of ID Options :

- RFID Tags - Including non-Jigsaw Tags
- Magnetic Cards (eg Fuel Cards)
- Jigsaw EasyFuel - Nozzle ID System
- Jigsaw Midas - Auto Hours Run Capture
- Jigsaw FuelGuard - Auto ID/ Hours Run
- Jigsaw FuelWand - Remote Tag Reader
- Jigsaw TeleTag - Auto ID

MINES AND QUARRIES SOLUTION - COMPONENTS



At fixed fuelling points where vehicles drive up to the pump to fuel, fit an Eclipse pump controller. Here, the user would normally use a tag attached to the vehicles key ring to identify what is being fuelled. Up to four pumps may be controlled from one Terminal. This system would also be used to fill the fuel bowsers using a tank stock transfer tag to maintain stock control. The terminal can be linked directly to any tank gauge equipment fitted to the tanks.



For cars, vans and other light vehicles which are able to fuel at a fixed fuelling position, each is issued with a small, robust RFID tag which is usually attached to the vehicles key ring. A second tag may be issued to the drivers so they may also be identified at the time of fuelling.



To fuel equipment where it is impractical to drive to a fixed fuelling position, or for immobile equipment such as graders, generators or lighting rigs, the Jigsaw Nova would be fitted to a mobile fuel bower. The equipment to be fuelled is fitted with a "Mount-on-Metal" RFID tag which is read by the fueller prior to filling. The bower and the fueller are identified by scanning a similar tag at the start of any fuelling shift.



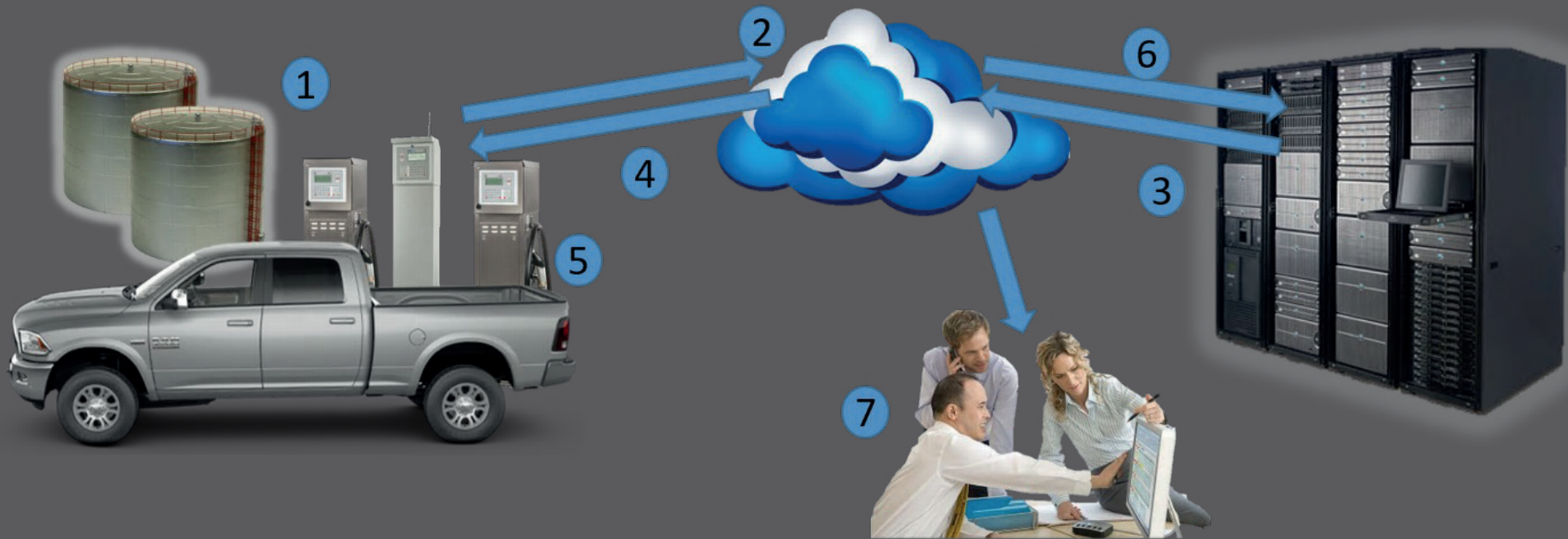
For mobile refuelling, tags are permanently fixed to the asset to be fuelled. Each bower driver is issued with a hand held tag reader at the start of a fuelling shift which identifies both the fueller and the bower used. The hand held reader is linked to the fuel control terminal by radio.



If required, as well as the tag, a FuelGuard unit may also be fitted to any vehicle or asset so that the mileage or hours run is automatically captured at the time of fuelling. The FuelGuard also verifies the presence of the asset so that stolen tags cant be used without the asset being nearby.

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JIGSAW FUEL MANAGEMENT SOLUTION OVERVIEW



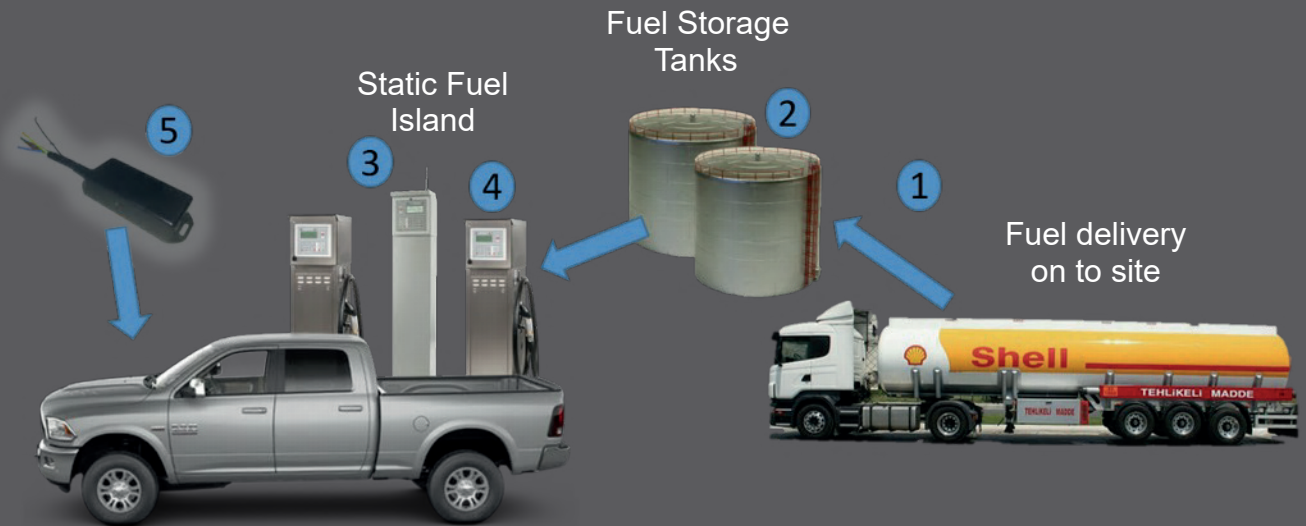
1. Fuel Control Terminal is presented with vehicle ID tag (hand held or FuelWand)
2. The Terminal is connected to the Internet using the GSM Data Network
3. The Terminal contacts the Fuel Server to validate the tag
4. The Fuel Server sends back authorisation along with requests for more information and transaction limits (eg fuel type, quantity).
5. The fuelling starts and the fuel quantity monitored.
6. At the end of the delivery, the fuelling details are stored locally and also forwarded to the Fuel Server in real time.
7. As the fuellings are received at the server, the transactions appear on the "Sites" screen on the fuel server and tank stocks are updated and also displayed so that the user has a real time view of on site activity.

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MINES AND QUARRIES SOLUTION - STATIC REFUELLING

Complete Stock Control

1. A bulk meter may be used to monitor all fuel delivered in to the on site storage tanks. Fuel deliveries are logged with quantity, time and date.
2. The stock in the tank is continually monitored using tank gauges.
3. A valid vehicle ID must be used to start the fuel pump. This would normally be a hand held tag fixed to the vehicles key ring. Optionally, the driver may also be identified.
4. The fuel pumps are controlled and monitored by the fuel island controller.
5. If required, a FuelGuard unit may be fitted to the vehicle for automatic mileage capture.



Before Any Fuelling :

1. Each Vehicle to be fuelled is issued with a vehicle ID Tag.
2. Optionally, each driver is issued with a second ID tag or a Driver ID Number which can be typed in at the time of fuelling.
3. The details of the tag assigned and the vehicle are fed in to the web service through a browser.
4. Optionally, the driver details and the ID assigned are fed in to the web service through a browser.

Fuelling Sequence :

1. The driver pulls up to the fuel island.
2. The driver presents the vehicle ID tag and enters any requested information (eg odometer miles/km).
3. Optionally, the driver identifies himself to the system.
4. The driver lifts the nozzle of the selected pump and fuels.
5. At the end of the delivery, the fuelling is uploaded in real time to the Jigsaw Fuel Server.

Transaction Data :

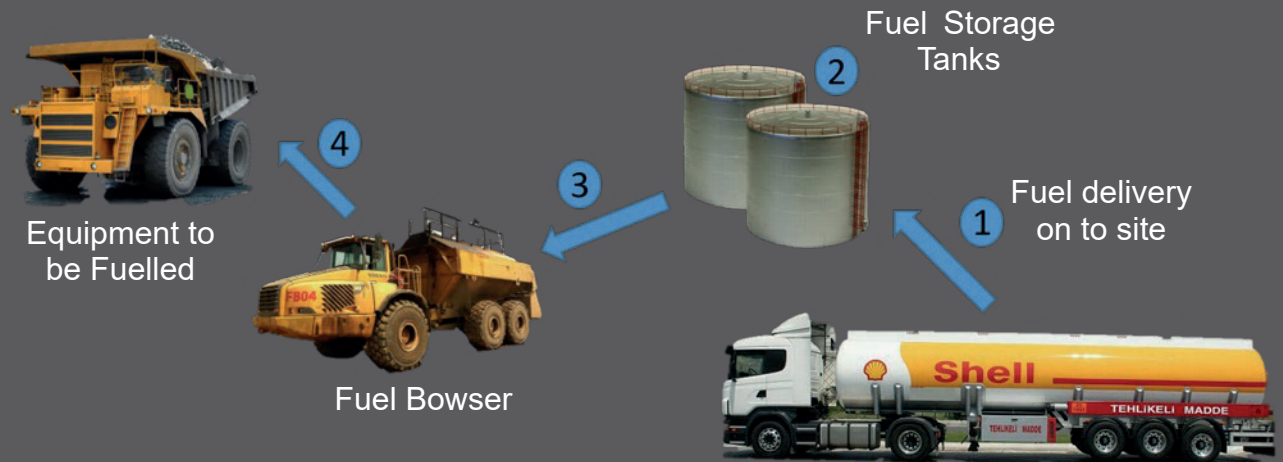
- Time and Date of Fuelling
- Vehicle being Fuelled
- Driver ID (Optional)
- Pump ID
- Product Type
- Fuel Quantity and Units
- Tank Gauge level for relevant tank (if fitted)

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MINES AND QUARRIES SOLUTION - MOBILE REFUELLING

Complete Stock Control

1. A bulk meter may be used to monitor all fuel delivered in to the on site storage tanks. Fuel deliveries are logged with quantity, time and date.
2. The stock in the tank is continually monitored using tank gauges.
3. A Fuel Transfer Tag is used to pump fuel from the storage tanks to the mobile fuel bowser.
4. Tags fixed to the vehicle to be fuelled are read by a FuelWand to log each delivery from the fuel bowser.



Before Any Fuelling :

1. The Bowser Driver is issued with a tag to identify that person.
2. The Bowser is fitted with a vehicle tag so that it can be refuelled.
3. The Bowser is fitted with a Pump ID tag.
4. The Bowser is issued with a Fuel Transfer Tag so that fuel can be moved from the static tanks to the fuel bowser
5. All Equipment to be fuelled is fitted with a vehicle tag.
6. The Bowser driver is issued with a Fuel wand

Fuelling Sequence :

1. At the start of the fuelling shift, the fueller scans his personal ID tag, and scans the Bowser's Pump ID Tag with his FuelWand.
2. He drives to the fixed fuelling point and uses his Fuel Transfer Tag to restock the bowser with fuel.
3. He drives to the equipment to be fuelled, pulls out the hose and scans the equipments ID tag. Fuelling starts.
4. On Completion, the driver simply winds up the hose and moves to the next piece of equipment.
5. If the equipment is fitted with a Fuel-Guard unit, then the hours will automatically be gathered during fuelling.



At the start of a fuelling shift, the driver scans his ID tag, then scans the bowser he is using. This information is passed back along with the individual fuel transaction data.



Each Vehicle to be fuelled is fitted with a "mount-on-metal" ID tag which is read prior to fuelling with the FuelWand. The FuelWand is linked back to the Bowser using radio.

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FUEL

Fuel Management Software

- Simple to Understand - Minimum Training
- True Real Time system - No polling required
- Unique Vision Tiles allow at-a-glance management
- Web Based (View Anywhere)
- Real Time View across all sites and assets
- No Dedicated On-Site Software
- Only a Browser Required for access
- Desktop, Laptop, Tablet and Phone Sensitive site
- Real Time Stock Management
- E-Mail and Text Prompts
- Fully Automated Reports Generation

FUELLING YOUR FUTURE



JIGSAW FUEL

Fuel Management Software

Ground Breaking Software ...

The Jigsaw Fuel Software has been designed specifically to reflect the benefits of Real Time Fuel Management. The colour coded user interface highlights any issues as they occur, and allows the causes to be investigated easily. The unique user interface is very simple and intuitive to use requiring only minimal training and little in the way of IT experience.

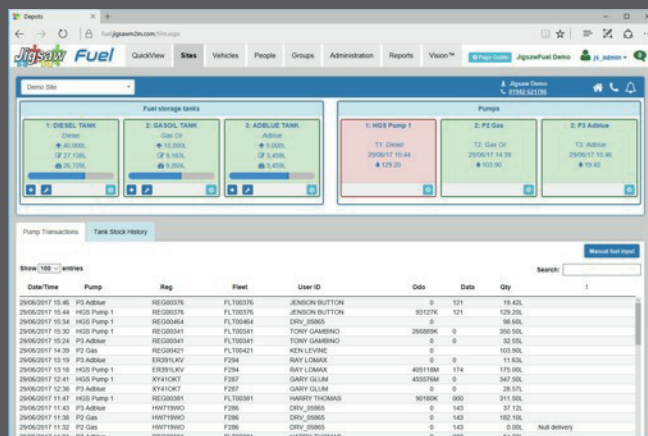
The software has been designed so that most functions can be accessed by no more than two mouse clicks.

Unique Features :

- Fully Centralised System - No on site server to manage.
- Software Updates Managed Centrally
- No Limit on Sites, Pumps, Tanks, Users or transactions - Large or small networks accommodated
- Configurable Report Templates that can be periodically auto e-mailed
- Graphical Gauge and Book Stock Comparison
- Unique Vision Tiles - Configure the site with information relevant to your business.
- Server to Sever Data Links - Where compatible, Auto Mileage Update from your vehicle tracking system.

Clear User Interface...

Above all other factors, Jigsaw have designed the user interface to be as clear and simple as possible. The site is consistent so that if you see something in red, you know there is an issue - click that warning and you see the details. The site screen is the heart of the user interface. This shows the status of all pumps and tanks on the site along with a list of all the latest fuelling events.



Whether you have one fuelling site or fifty, the data is shown in the same clear format. On larger networks, the QuickView page comes in to its own. This highlights any issues across an entire network of sites all on one page.

Real Time Stock Management :

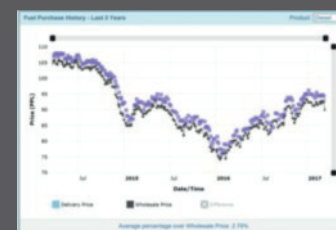
As stock deliveries are entered, and transactions are received from your site, the fuel stock situation is updated on the web service. With a connected tank gauge, you get a real time comparison between book and gauge stock highlighting any issues in real time.

Jigsaw Vision™ Tiles :

The Jigsaw Fuel system has the Unique Vision Tiles which show real time information answering specific questions the user may pose about vehicles, people, fuel stocks, efficiency and even CO2 emissions.

Here are a few of an ever growing suite of jigsaw Tiles :

- Annual Fuel Usage Plot - 3 Year Overlay
- Unique Fleet "Swarm" Plot easily highlights mis-performing vehicles
- Fleet Highest Fuel Usage
- Driver Highest Fuel Drawings
- Fuel Price Plot - Direct Comparison of your purchase price to UK Average Price.
- CO2 Emissions equivalence Tile
- Unfuelled Vehicle Tile - Updated every Minute - ideal for bus refuelling operations



Average UK Fuel
Stock Price



Fleet Efficiency
"Swarm" Graph

Real Time Support :

As your Support Agent can view the same data as you, at the same time, any issues raised can usually be resolved during a telephone conversation so that support is fast and efficient.

JIGSAW

TANKGUARD

Fuel Stock Management

- Clear Web Site - Minimum Training
- True, Real Time system - No polling required
- Systems update on Significant Stock Change
- Web Based (View Anywhere)
- Real Time View across all sites
- Interfaces to most common gauge types
- Only a Browser Required for access
- Desktop, Laptop, Phone and Tablet Sensitive
- Optional E-Mail and Text Prompts

Remote Stock Management

The Jigsaw TankGuard adds a near real time interface to any compatible electronic tank gauge system. The system reads the gauge constantly and updates the web site periodically, or on any significant stock movement (up or down).

The system doesn't just cater for the high end tank gauges but can accommodate even the most modest. Also, gauging isn't just limited to fuel or fuel oils but can be used on just about any liquid or even bulk powder and pelleted products.



TankGuard Web Service

The Jigsaw TankGuard Web service logs the data from the on site tank guard units and presents it in a clear format, clearly showing low and critical stock levels, and graphing historic stock data. The system will also estimate the volume of deliveries in to the tanks, and predict when the tank will next need to be refilled.

The system can generate stock reports for any given date and time, and can even raise alarms if there is stock movements out of normal operating hours.

JIGSAW ID OPTIONS



RFID Tags

Most common form of ID, easily fitted to vehicles key ring, very robust.

- Simple to use
- Low Cost
- Use for Vehicle, Fueller or Driver ID
- Existing Third Party Tags may be used



Fuel Cards

Although not as reliable as RFID tags, If vehicle already issued with fuel card then may be used.

- No additional per vehicle cost
- All major card types accepted (mag only)



Dallas Keys

Used in several older systems, these may still be used when upgrading to Jigsaw.

- Robust Design
- Fit to vehicles key ring



Midas

Jigsaw Midas gives Auto Vehicle ID and Auto Mileage Capture just a touch of the Midas key.

- Miles or hours Run vehicle unit
- Fueller and Vehicle identified and mileage transferred



EasyFuel

Nozzle Based ID system - simply insert nozzle and fuel. ID Tag fitted to vehicles filler neck.

- No wires down fuel hose
- Optional OBD for auto mileage capture



FuelGuard

Fitted to vehicle and converts pulse train to mileage. Radio linked to Fuel Island Terminal.

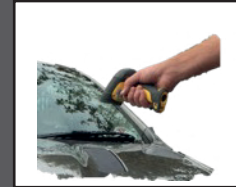
- Auto Mileage or Hours Run capture
- Verifies vehicle present before fuelling.



Fuel Wand

Mainly used in mobile refuelling - tag fitted to vehicle/plant read by hand held FuelWand scanner.

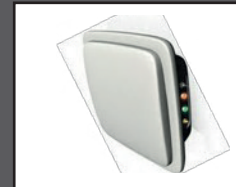
- Ideal for Mobile refuelling Operations
- Simple to operate
- Identifies Fueller and vehicle.



Laser Plate

Radio Linked rechargeable bar code scanner reads ID and data bar codes

- Bar code can be used to limit fuelling quantity
- Low cost ID



TeleTag

Developed to optimise Bus Refuelling operations. Auto ID's fueller and vehicle.

- Speeds up refuelling operations
- Use with FuelGuard for a complete Auto ID/Auto Miles capture system.

JIGSAW SYSTEM OPTIONS

Data Import

If you use Fuel Cards offsite, then the Jigsaw Web Service can read a file from your card provider so that these are listed along with your on site fuellings. A full picture of all vehicle fuellings is essential in order to calculate MPG figures, and to spot poor vehicle performance or fuel theft.

Data Export

It is sometimes necessary for fuelling data to be exported to other software systems such as fleet management packages, SAP, accounting packages and the like. The Jigsaw system can export data in many formats from simple text files such as CSV through Scheduled FTP transfer to Direct, real time Web Service data transfers.

Telematics Interfaces

The Jigsaw system has been linked, server to server with several Telematics (Vehicle Tracking) servers. When a fuelling transaction is received on the Jigsaw server, it connects to the telematics server to recover the mileage at the time of fuelling.

Automatic Reports

Jigsaw provide a range of basic report styles which can be configured to each users requirements. The resulting template may then be saved and scheduled to automatically run periodically and be e-mailed to the relevant user.

Automatic Low Stock Warnings

The jigsaw system may be configured to automatically send e-mails to the relevant users when fuel stocks fall below the tank reorder value.

Pump Types

Normal - Pump started by authorisation, fuel drawn decrements from associated tank.

Debowser - Pump started by Auth, but fuel drawn adds to tank stock.

Integrated - FM Display switches to Large Character Fuel delivery Display during transaction.

Delivery - Forms stock delivery transaction - used to automatically monitor tank inlet.

ID Options :

- RFID Tags - Including non-Jigsaw Tags
- Magnetic Cards (eg Fuel Cards)
- Jigsaw EasyFuel - Nozzle based ID System
- Jigsaw Midas - Auto Mileage Capture
- Jigsaw FuelGuard - Auto ID/ Auto Mileage
- Jigsaw LaserPlate - Bar Code Reader
- Jigsaw Fuel Wand - Remote Tag Reader
- Jigsaw TeleTag - Auto ID/Mileage Capture

Access Options :

- Logged Fueller Mode - Fueller logs on once at start of fuelling shift - types in vehicle ID before each fuelling
- UnLogged Fueller Mode - As Logged fueller, but Fueller ID presented at each fuelling.
- Data Entry - Two unchecked data prompts - eg "Enter Fleet", "Enter Collar Number", "Enter Job Number" etc.
- Odometer entry - Miles, Km or Hours - No check, Under Check or Range Checking (Milage must be larger than last but not too large)
- Fuel Limits - By Transaction, by Day, by Week or by Month.
- Driver ID using second tag or typed ID entry.

JIGSAW - FUELLING YOUR FUTURE



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