



**Flows as smooth as oil** Highly precise metering technology in tank trucks for large-quantity deliveries of edible oil. Large quantities of edible oil can be delivered to bulk consumers in a short time using mobile metering systems from GEA Diessel.



**Technological advancement due to measuring and control optimised in actual practice** Precise in-line blending in a matter of seconds with DICON™ blending systems.

**Carbonation of beverages** The trend towards beverages that are as natural as possible without use of additives has prompted producers to develop new methods to do justice to the requirements of aseptic carbonation.

## Dear readers,

Welcome to another issue of DIESSEL NEWS. This year we will be providing you with detailed information about new opportunities and examples of how we have been successful in our markets. We hope that you will find the news of what's going on in the next few months interesting and maybe there will be a report on a project you are already working on.

One of the main topics in DIESSEL NEWS is the technical progress we have made. As a technology provider, our performance is measured by our customers' successes. A process innovation or a new component alone is not a guarantee of success; an innovation, however, could provide the key to help us unlock success and bring a project to a satisfactory conclusion. To stimulate this innovation, we need your active support: we must understand what you need for projects that are coming up in the future. It's your demands that drive our product development and help us to continually set new standards for the technical advancement that represents the value of GEA Diessel.

Nature responds to new challenges with extraordinary evolution over long periods. Our professionals, however, do not have the luxury of time: we need them to come up with answers quickly. We must work together to achieve this market advantage. Often this process begins with the first meeting with a customer at one of the international trade fairs at which we exhibit. These trade fairs give us opportunities to demonstrate our innovative and creative abilities that allow us to stretch what it is possible to achieve.

Our next big exhibition will be INTERPACK 2011: details are in this issue of DIESSEL NEWS. There are also further exhibition announcements and reports about successful projects on the following pages.

We hope you enjoy reading DIESSEL NEWS and look forward to receiving your feedback.

With kindest regards,

Heinz Waltersdorf  
Managing Director  
GEA Diessel GmbH



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## Flows as smooth as oil: Highly precise metering technology in tank trucks for large-quantity deliveries of edible oil

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There are countries in which edible oil is considerably more important than in Germany. Due to the sometimes needed large quantities, for deep-frying for example, bottles or cans are insufficient ...

The solution is found in storage tanks of 500 litres, for example, which ensure continuous availability of edible oil in large restaurants or further processing plants. Supply is from tank trucks. To ensure flawless settlements of accounts between suppliers and consumers, it makes sense to equip these tank trucks with the most modern, highly precise measurement technology.

Large quantities of edible oil can be delivered to bulk consumers in a short time using mobile metering systems from GEA Diessel. The quantities of vegetable oil are measured exactly, and all required delivery data is saved in the onboard computer. The desired delivery quantity can even be preset, so that the delivery process is fully automatic.

A record of the delivery is printed for the consumer as a standard. The delivery address is detected automatically via satellite. This is an advantage for the supplier, because the invoice can then be created fast and clearly in his EDP. Time is money – and that applies everywhere in the world. All delivery data can be transmitted automatically and promptly to the main office via telephone service, e. g., per GPRS. As a result, all data is already available when the tank truck is back in the factory after its delivery tour. With this prompt communication, the supplier can also provide bulk consumers with a comprehensive logistics management system at the same time. The quantity in the storage tanks of every consumer can be monitored continuously. The delivery tour can be managed using an always updated, optimised route schedule.

The unbroken chain of traceability of vegetable oil is a more or less automatic result provided by the mobile measurement and data system from GEA Diessel. Foodstuffs are valuable products. Consequently, precise measurements, hygiene and manipulation security are important aspects for systems of this type. Nobody has money to give away, and quality is a matter of trust.

All components are normally set up within a basic framework to save space; they are delivered to the tank truck manufacturer, connected via pipes/tubes and wired as a unit, inspected and prepared for installation in the measuring cabin of the tank truck. Due to the decades of experience of GEA Diessel engineers dealing with metering systems and milk collection trucks, the metering systems are optimally equipped for the rough everyday conditions on roads in all continents – 365 days a year in all weathers.

The basic version of a GEA Diessel metering systems consists of:

- Delivery pumps
- Air separators for precise separation of air from the measuring equipment
- Measuring equipment for mass or volume and temperature
- Nonreturn and shut-off valves in the delivery line
- Onboard computer with display, control and printer



# Technological advancement due to measuring and control optimised in actual practice: Precise in-line blending in a matter of seconds with DICON™ blending systems

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The many decades of experience in the development and manufacture of systems for in-line-blending (DICON™) and the ever increasing precision and speed requirements for final compensation, have resulted in special processes for flow metering and control. These processes do justice to even the most demanding and extreme requirements.

Such a requirement is the direct supply of a filler (directly from a continuous blending system) with in-line mixed products, for example. Compliance with these requirements is achieved using various measures:

- Flow recording in the PLC not via the relatively slow and imprecise analogue flow signal, but instead via the precise quantity pulse output of the flow meter.
- Pulse output and recording are achieved with a very high resolution of up to 100 pulses per mg or ml for the most precise measurement and to achieve higher pulse frequencies.
- Use of flow meters and PLC counter modules with pulse frequencies up to 100 kHz.
- Evaluation of the count pulse and intelligent flow calculation in the PLC in 100 ms time periods.
- Control with self-learning software controls and data storage especially developed for flow and ratio control: the output signal is recalculated continually from saved and current data (also before the start).
- Product monitoring and also control in part via downstream analyses, e. g., measurements of brix, alcohol, wort, CO<sub>2</sub>, O<sub>2</sub>, dye, turbidity and conductivity.



You can see the success of these measures in the following charts:

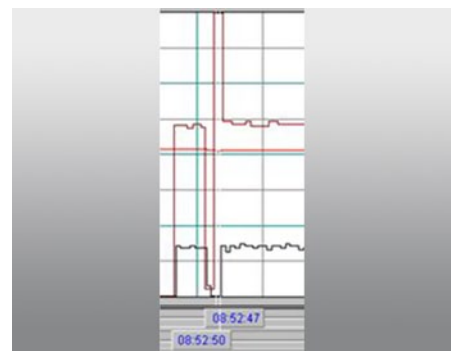
## 1. Start and failure without compensation of the absolute control deviation

The controller is to set the desired flow as quickly as possible.

The control value is immediately in the correct position at the start by the calculation of the required output signal.

After the failure (no flow; this extreme failure was caused by a manual closing of the control valve here), the control valve opens 100 %. The valve is immediately in the correct position after three seconds at the first flow detection.

There are no delays or transient effects.



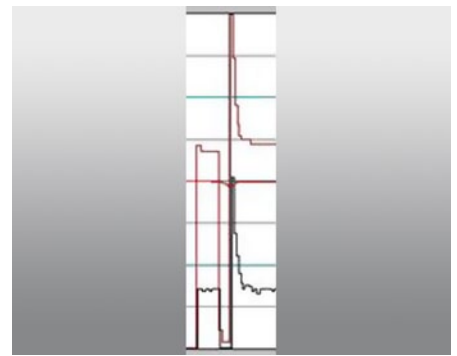
brown: control valve 0–100 %  
black: flow 0–1000 kg/h

## 2. Start and failure with compensation of the absolute control deviation

Compensation is immediately made for differences of the actual share and target share of the components in the product via short-term changes of the flow.

The control value is immediately in the correct position at the start due to calculation of the required output signal. There is practically no control deviation.

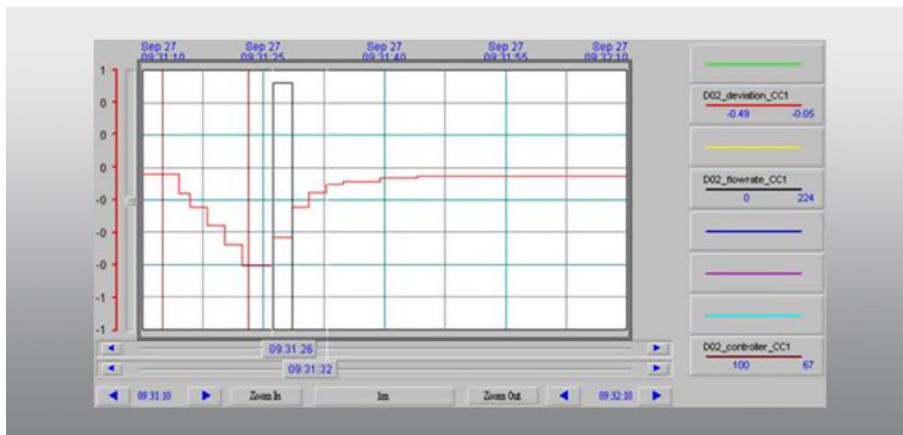
After the failure (no flow; this extreme failure was caused by a manual closing of the control valve here), the control valve opens 100 % and sets the maximum possible flow. After six seconds, the absolute control deviation (0.49 kg of the component missing in the mixture due to the failure) has been compensated by the temporarily significantly higher flow rate, and the valve is in the correct position again.



brown: control valve 0–100 %  
black: flow 0–1000 kg/h

### You can clearly see the compensation in the control deviation chart

Due to manual closing of the control valve, 0.49 kg of the component is missing in the mixture. After switching the valve to automatic, the lacking quantity is at 0.05 kg within six seconds and completely balanced a short time later.



This complicated calculation and control provides decisive advantages:

- Best possible in-line mixing
- Small buffer container without agitator/circulation possible
- Because practically no transient times occur, slight tolerances and fast switching off are possible in failure cases.
- No product loss in failure case

## Carbonation of beverages

The trend towards beverages that are as natural as possible without use of additives has prompted producers to develop new methods to do justice to the requirements of aseptic carbonation.

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The basis for aseptic carbonation is the use of the unit after an existing pasteurization. The advantage is that the system component for heat treatment only needs to withstand lower maximum pressure, because the CO<sub>2</sub> is only dosed after heating and cooling. As a result, customers have lower investment costs.

GEA Diessel dealt with this topic at an early stage. Already as early as 2006 it optimised its versatile non-aseptic carbonation system and adapted it to the requirements of aseptic design.

### Requirements for carbonation systems

A carbonation system for beverages has the task of binding a pre-defined share of CO<sub>2</sub> in a product. The integration of the carbonation should be uniform, permanent and fine sparkling. The share of CO<sub>2</sub>, which can be lost during the filling process, must be considered, and the "gushing effect" has to be avoided.

Because carbonation often takes place directly before the filler in the production process of a beverage, high demands are also put on possible interfaces here. In addition, the process has to be flexible to adjust the system to very different filler and packaging types. Of course, simple and intuitive operation is a must to provide operators with the simplest solution possible to set the system for very different products.

The cleanliness of these systems presents another challenge. Under normal circumstances, the system is cleaned together with the filler, and it must also be possible at this stage to fulfil the individual needs of different filler systems.

### Description of DICAR-C™ (aseptic)

GEA Diessel has already had DICAR-C™ in its product range for carbonation of beverages since 1993. DICAR-C™ is designed for highly precise, continuous carbonation of beverages. It is suited for both alcohol-free beverages as well as for alcopops and sparkling wines.

In addition to the pressure tank, an essential component of the system is the saturator, which works according to the Venturi principle. The finished, mixed beverage is fed to the saturator via a booster pump. The flow rate in the saturator is kept constant. In the area of the smallest diameter of the saturator, the increased flow speed causes a reduction in the pressure level and consequently the desired suction effect in the area of CO<sub>2</sub> supply. The precise distribution of the CO<sub>2</sub> gas in the beverage ensures fast saturation and the desired fine-sparkling behaviour.

CO<sub>2</sub> is fed directly from the pressure tank, the constant overpressure of which ensures uniform carbonation of the beverage. This method enables loss-free use of CO<sub>2</sub> in continuous operation and makes the need for expensive mass flow meters for the CO<sub>2</sub> unnecessary. Carbonation quality is determined decisively by the temperature, the saturation pressure resulting from it and specific product properties as well as the individual design of the saturator.

Specific parameters are stored in recipes to achieve the required CO<sub>2</sub> target value for different products and temperatures. System design depends on the required filling capacity. DICAR-C™ can be combined with almost every filling machine on the market.

One component of DICAR-C™ is a highly precise in-line CO<sub>2</sub> analysis, the measurement value of which serves for quality control, but also as a feedback variable in the control algorithm. In addition, a brix measurement, conductivity measurement, colour measures, pH measurement or other measurement device can be integrated, which provide product quality assurance.

A frequency-controlled pump supplies the finished carbonized product to the filling machine pressure-controlled. This pump ensures circulation in the tank and continual replacement of the product in the analysis equipment at the same time.

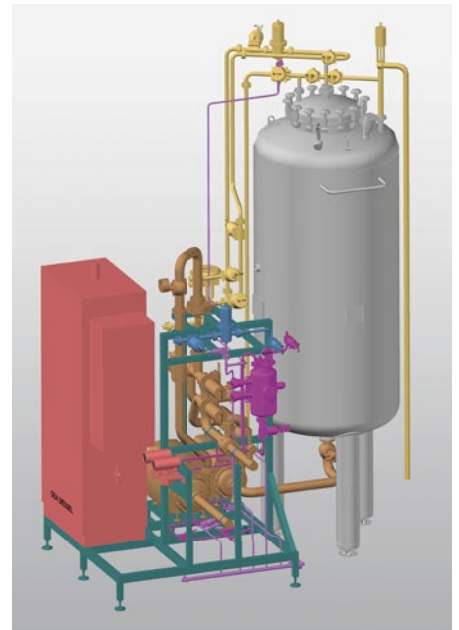
Optionally, DICAR-C™ can also be designed as an "aseptic" version with the properties described above. The focus is then on the capability of sterilisation of the complete system, including the CO<sub>2</sub> line. The system design has been optimised and adapted to the requirements of an aseptic model. To that end, the valves used in the product line are sterile valves.

The mechanical seals of the pumps are rinsed using sterile condensate, which is produced continually and directly at the system using a thermal siphon system. In addition, the CO<sub>2</sub> has to be fed via a sterile filter to prevent entry of germs. There is no additional pump in the analysis line. This task is handled by the frequency-controlled discharge pump. The complete system together with the product line is then cleaned and sterilized using hot water before production start.

#### Applications:

GEA Diessel has already been producing DICAR-C™ and supplying it to beverage manufacturers in the whole world since 1993. In 2006, the first aseptic models were supplied to producers of beverages containing juice in Europe.

In 2010, GEA Diessel in collaboration with GEA PE Shanghai supplied eight aseptic models of DICAR-C™ to a large Asian juice producer. This order was part of a project, in which the customer invested in more than 50 filling lines for still and carbonized beverages.



## GEA Diessel awarded Elanco contract for fermentation plants and formulation line

GEA Diessel GmbH has been awarded a contract by Elanco for a fermentation plant. The contract was awarded in 2010 with a further quotation for a formulation plant prepared in January 2011. The total contract value is several million euros. GEA Diessel won the contract against several competitors. The company is proud to have been awarded this second large contract from Elanco in four years.

The plant, designed for the production of veterinary vaccines for the European market, will be located in Ireland where the existing buildings will be extended. The project is a three-step fermentation system with a downstream inactivation tank, a stationary CIP (Cleaning in Place) plant and a formulation system with two process vessels. As well as the design, the contract includes the execution of comprehensive functional tests and an extensive qualification of all system parts.

Elanco is a global company operating in over 75 countries that focuses on innovations that develop and distribute products to improve animal health and protein production. It employs more than 2300 staff worldwide and has subsidiaries in over 40 countries. It is a corporate division of Eli Lilly, the tenth largest pharmaceutical company in the world.

The decisive factors in awarding this contract to GEA Diessel were the successful project management for Elanco four years ago and further references in fermentation and formulation. GEA Diessel also demonstrated a high competence in process technology, automation and qualification during the quotation phase.

Jacobs Engineering is acting as general designer for this project as it did for the project four years ago. A close corporation between all companies involved is absolutely essential to ensure that the plant is completed on time.

It's a so-called 'fast track project' that will see the whole project, from awarding the contract through to delivery, completed in less than one year. This will require comprehensive on-site tests at GEA Diessel and on-site installation and commissioning at the customer's premises. Several qualification measures have to be carried out on site to ensure the plant functions properly. One of the last steps for GEA Diessel is to calibrate the measurement positions and to perform a sterile test of all system components. This work will take place next year.

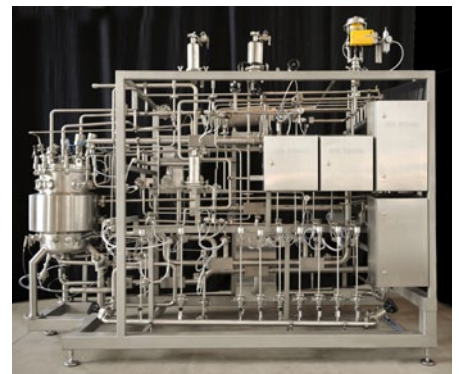
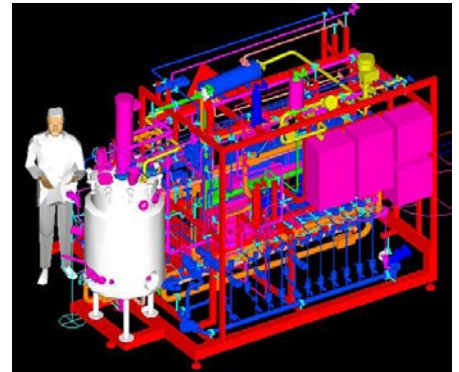
After a successful kick-off meeting in January this year, project management is still in progress. The management has created a target-oriented, harmonious atmosphere of cooperation within the whole project team that will help to ensure a successful project completion.

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## GEA Diessel at P-MEC India

India's pharmaceutical machinery and equipment market is growing at 15–20 % per year, expected to reach US\$ 25bln in 2010. P-MEC India 2010 gave an unprecedented insight into the future of pharmaceutical equipment and machinery. The event highlighted the latest knowledge and trends in the industry.

GEA Group reported a tremendous success at P-MEC India at the Bombay Exhibition Centre in Mumbai. After attending the show regularly in recent years the group says that this was by far the best.

The company showed its technology for the manufacturing of oral and parenteral dosage forms. Navin Lakhanpaul, the Business Head for GEA Pharma in India, said: "We always expected it to be a good show but we didn't realise that it had grown so fast to become such an international platform." Comparing the event with previous P-MEC shows, Navin said: "Although we've been to P-MEC before, this was the pinnacle. We identified great business potential in providing technology benefits to our customer base in India going forward."

At P-MEC GEA Diessel was showing its fermentation module and IZMAG™ flow meters for sterile process lines. GEA Diessel and GEA Lyophil are cooperating very successfully with their representing partner ACE technologies. Ace Managing Director Ajay Mehra agreed with the impression of other members of the Group reporting "brisk attendance at the ACE stand throughout what was a highly successful exhibition".

GEA will participate again in P-MEC India 2011, Hall 5-I26.

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## GEA Diessel at Interpack

Fermentation units and IZMAG™ flow meters for the pharma industry.

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GEA Diessel will be exhibiting its GD-Ferm, 100 litre, fermentation unit and its IZMAG™ flow meter at Interpack in Düsseldorf from 12 – 18 May 2011. The exhibits represent inspired engineering that provides the ultimate in quality and control for liquid pharmaceutical processing.

GEA Diessel fermentation units are characterised by their quality of manufacture, their simple design without dead areas, making them ideal for sterile operation, and the accuracy with which the temperature and agitation can be controlled. They are ideal for pharmaceutical and microbial operations where the highest possible quality is required.

IZMAG™ is a new generation of stainless steel electromagnetic flow meters that is ideal for applications throughout the pharmaceutical industry. IZMAG™ flow meters offer the unrivalled accuracy and reliability plus a host of new features including a visual display, 360° positioning, automatic calibration, automatic alarms both on the instrument and to a central monitoring station and Bluetooth® compatibility for simple data gathering. IZMAG™ has no moving parts, offers bi-directional metering for all conductive liquids, is suitable for aseptic processing and can be used at high temperatures or under vacuum conditions.

The company will share the stand with its fellow GEA Pharma Systems companies that together provide everything that is needed for complete pharmaceutical processing plant. Visit GEA Diessel and GEA Pharma Systems on stand number F24, Hall 8a and see a complete production plant in operation. Experienced GEA Diessel engineers and sales staff will be on hand to answer questions.

Learn more about fermentation and flow control at Interpack 2011 or on our homepage: [www.diessel.com](http://www.diessel.com)



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## Meet us at these events!

As in every year, GEA Diessel can be found at all the international industry events 2011. Please take note of the following dates – we're looking forward to seeing you there!

| Time                             | Event                      | Description   | Homepage   |
|----------------------------------|----------------------------|---|--|
| 12–18 May 2011                   | interpack,<br>Düsseldorf   | Please read our comprehensive preliminary report in this issue of our DIESSEL NEWS!   | <a href="http://www.interpack.com">www.interpack.com</a>           |
| 29–01 July 2011                  | Interphex,<br>Tokyo        | Asia's Largest Exhibition featuring Pharmaceutical, Cosmetic and Detergent R&D and Manufacturing Technology.  | <a href="http://www.interphex.jp/en/">www.interphex.jp/en/</a>     |
| 11–13 October 2011               | TechnoPharm,<br>Nuremberg  | Experience the latest developments in the world of life science process technology at the European exhibition for cleanroom technology, analysis and packaging technology for the pharmaceutical, cosmetic and food industries. | <a href="http://www.technopharm.de/en">www.technopharm.de/en</a>   |
| 09–11 November 2011              | Brau Beviale,<br>Nuremberg | Visit us at the exhibition with a shot of emotion for the European beverage industry, presenting trends and new products for the production and marketing of beer and non-alcoholic drinks.                                     | <a href="http://www.brau-beviale.de/en">www.brau-beviale.de/en</a> |
| 30 November–<br>02 December 2011 | P-Mec,<br>Mumbai           | Focusing on pharmaceutical machinery, equipment and technology, P-MEC India is part of the largest and most comprehensive pharmaceutical events in South Asia.  | <a href="http://www.pmec-india.com">www.pmec-india.com</a>         |