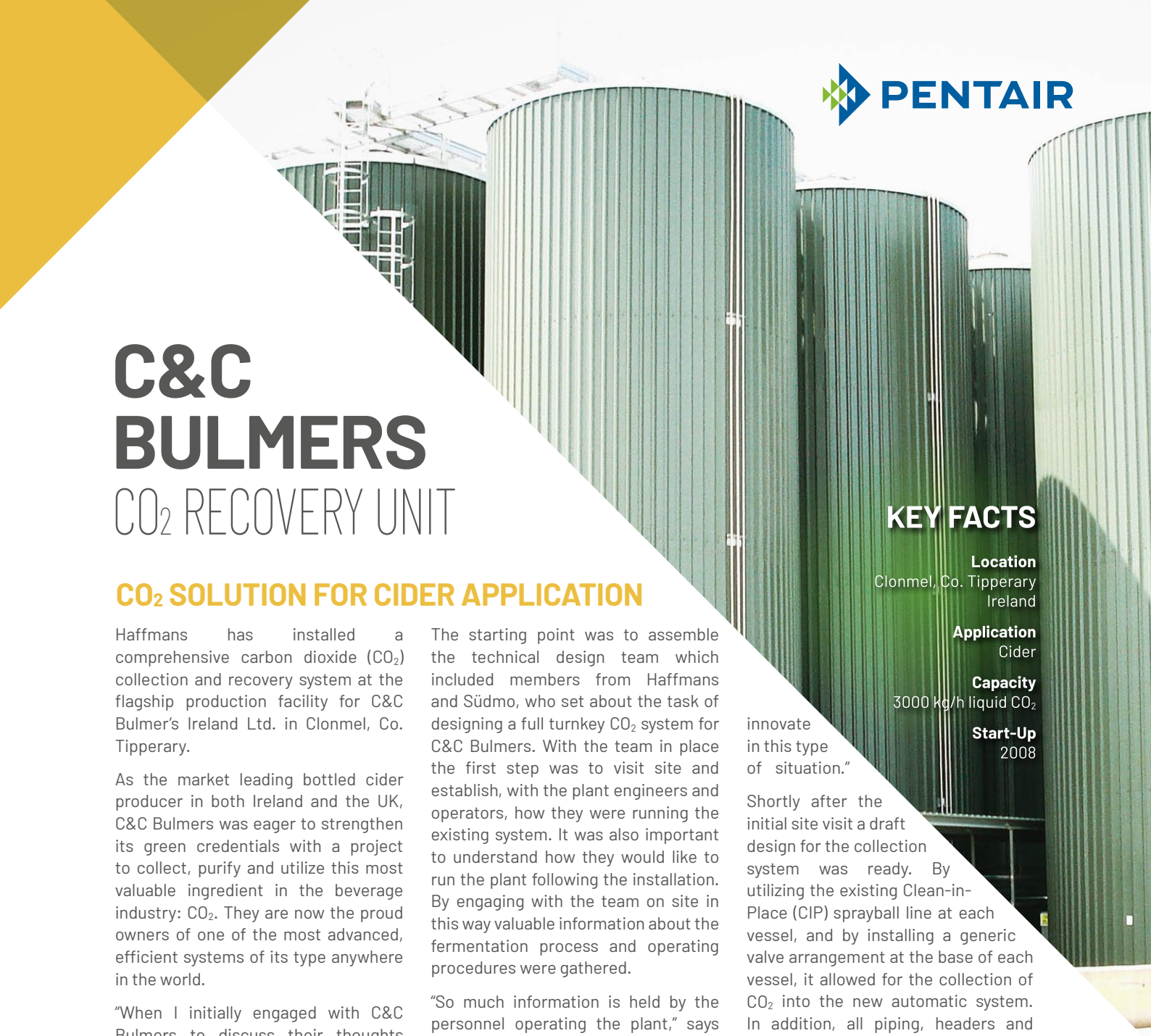

C&C BULMERS
CO_2 RECOVERY UNIT

KEY FACTS

Location
Clonmel, Co. Tipperary
Ireland

Application
Cider

Capacity
3000 kg/h liquid CO_2

Start-Up
2008

CO_2 SOLUTION FOR CIDER APPLICATION

Haffmans has installed a comprehensive carbon dioxide (CO_2) collection and recovery system at the flagship production facility for C&C Bulmer's Ireland Ltd. in Clonmel, Co. Tipperary.

As the market leading bottled cider producer in both Ireland and the UK, C&C Bulmers was eager to strengthen its green credentials with a project to collect, purify and utilize this most valuable ingredient in the beverage industry: CO_2. They are now the proud owners of one of the most advanced, efficient systems of its type anywhere in the world.

"When I initially engaged with C&C Bulmers to discuss their thoughts in relation to this project, it didn't take long to realize the scale of what was being considered," reflects Ivan Rigney, country manager in Ireland. "Collection was the key. With almost 70 fermentation vessels to collect CO_2 from there was an immediate requirement to design and engineer an innovative solution which kept the overall capital cost of the project to a minimum."

C&C Bulmer's key objectives for the project were meeting required purity levels, value & energy efficient design, generating lowest cost CO_2 production and optimizing yield from fermentations. The project was competitively tendered and ultimately awarded to Haffmans whose proposal best achieved the key project deliverables.

The starting point was to assemble the technical design team which included members from Haffmans and Südmo, who set about the task of designing a full turnkey CO_2 system for C&C Bulmers. With the team in place the first step was to visit site and establish, with the plant engineers and operators, how they were running the existing system. It was also important to understand how they would like to run the plant following the installation. By engaging with the team on site in this way valuable information about the fermentation process and operating procedures were gathered.

"So much information is held by the personnel operating the plant," says William Craig at Südmo. "It's always a good place to start the design phase if you're looking to innovate in this type of situation."

From left: Frank O'Rourke and Ger Fox with Ivan Rigney

Shortly after the initial site visit a draft design for the collection system was ready. By utilizing the existing Clean-in-Place (CIP) sprayball line at each vessel, and by installing a generic valve arrangement at the base of each vessel, it allowed for the collection of CO_2 into the new automatic system. In addition, all piping, headers and galleries were designed to an optimum sizing to ensure each vessels' CO_2 could reach the collection balloon under their own motive power whilst not oversizing and therefore incurring unnecessary cost to the project. Overall, the design ensured the existing operating procedures were maintained, with almost no change.

The design yielded a sizeable capital cost reduction to the overall project budget. This was so significant that trials were

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>
> *Frank O'Rourke, Engineering Projects Manager*

C&C BULMERS

required to ensure the calculations that had been made were correct. The trials proved the design. With the collection system designed, tested and validated, the rest of the project was able to move forward. CO_2 is collected from each fermenting vessel once a preset time has elapsed. This ensures that a minimum level of purity is achieved at the source. The CO_2 travels under its own force from the CIP sprayball line of each vessel into the main collection header. Then it runs to a local gallery where a number of headers, local to that area, meet, before the CO_2 transfers into a foam separator. Several of these Foam Separation Systems are installed, guaranteeing foam free delivery of CO_2 gas to the CO_2 Recovery Plant.

Because of the scale of the fermentation tank farm, a balloon was positioned in a central location 200 meters away from the recovery and purification plant area, to collect all the generated CO_2. A 3,000 kg/h booster draws from the balloon, to transport the raw CO_2 gas via a gas washer from the fermenting tank area to the CO_2 Recovery Plant. Applying a booster also had a positive cost effect – it allowed a smaller pipe size to transport the CO_2 gas all the way to the CO_2 engine room.

The CO_2 recovery plant itself is neatly mounted in the dedicated CO_2 engine room. This includes the specifically designed CO_2 compressor units, the activated carbon filter and drier units, all the way up to the efficient CO_2 liquefaction process, purification system and automated CO_2 storage tanks. The result is pure, clean, odorless high quality liquid CO_2 ready for consumption.

During the project realization, Haffmans worked closely with C&C Bulmers in resolving any issues that arose in the course of the project, according to Ger Fox, project engineer on the Clonmel site. "They ran a very professional project right from the initial discussions with Rigney to Ernst Aalbers and William Craig designing and developing the overall proposal to suit C&C Bulmers requirements and finally Bart Gooren who managed the installation with Johan Jongman in the commissioning hot seat," Fox added. C&C Bulmers is now successfully using its own collected and recovered CO_2. Frank O'Rourke, engineering projects manager at C&C Bulmers, is very pleased with the outcome of the project. "The system worked right from the start, producing excellent quality CO_2 with an outlet purity of 99.998 percent for use in our cider process and a yield per fermentation which is in line with expectations," he said. The recovery system now delivers three main benefits for C&C Bulmers: generating CO_2 at a fraction of the bought in cost, reduced CO_2 to atmosphere, which reduces the environmental impact and a more independent supply of CO_2, which means that the site is not totally dependent on outside sources.

To sum it up, Haffmans supplied a CO_2 system with a capacity of 3,000 kg/h liquid CO_2 with expansion possibilities for an additional 1,500 kg/h and a final quality that has comfortably met the customers purity requirements.

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