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POLYURETHANE TECHNOLOGY DIVISION

5F

CarDio™ Project - Works Order 03.1761

Phasing Out CFC-11 at Serra Sunger Foam Factory - Turkey

Project Number:	MP/TUR/98/056	Contract Number:	98/223/VK
UNIDO P.O. No.	05 - 8 - 46003	Issue Date:	24 July 2000

FINAL REPORT

This Final Report is submitted in accordance with the UNIDO Terms of Reference dated 18th September, 1998, Section 6, to report on the Installation, Commissioning and Acceptance of the CarDio™ Process and Equipment, fitted to a four-year old Laader Berg Maxfoam machine, at the Serra Sunger Foam Factory in Bursa, Turkey.

As with any new installation, retrofitting to an existing process machine, there will inevitably be a number of problems to resolve. It is not the intention of this report to itemise every problem, but to focus on the main points of interest and provide a general overview of the installation and progress.

Installation

Installation of the CarDio™ equipment took place between 3rd April 2000 and 5th May 2000. Whilst the installation was not without its problems, with Serra Sunger not having manufactured parts for which they were responsible, Cannon Viking having to send out some replacement parts and the Installation Engineer being required to work around the normal Maxfoam production, generally the installation went well. All mechanical and electrical components were fully installed, leaving the installation in a condition whereby the Commissioning Engineer could begin functional testing and calibrations upon his arrival without having to complete an unfinished installation.

Commissioning

Commissioning commenced with the arrival of the CarDio™ Commissioning Engineer on 15th June 2000, and, at the time of writing, is scheduled to run through to 28th July, 2000.

Commissioning (continued)

After checking the CarDio™ installation, concern was expressed regarding the CO_2 bulk storage tank, which had been supplied locally by the company Habas. The vessel was not new equipment, and had obviously been used for some other purpose as it was fitted with an immersion heater. It was reported to be of shoddy construction. The cooling circuit had lost its refrigerant, resulting in an increase in temperature of the tank contents and subsequent rise in pressure to 22 bar – too high for the CarDio™ Process. Habas CO_2 engineers later refilled the refrigerant and reduced the tank pressure to between 17 and 18 bar. No further problems were encountered with the CO_2 bulk store during the commissioning period.

The electrical supply to the CarDio™ panel was from a generator rated at 310 amps, even though Cannon Viking had advised a rating not less than the incoming isolator rating of 400 amps. Nevertheless, it did not prove to be a problem to the commissioning of CarDio™.

After correcting some minor electrical, wiring and software teething problems, the variable speed motor drive cards were set up and the Activator metering units calibrated and checked for accuracy – all okay. Calibration of the High Pressure Polyol and TDI streams was delayed. The customer did not have a sufficiently large weigh scale needed for these streams, as he had not previously calibrated them on his Maxfoam machine. A suitably sized weigh scale was procured, but a further delay ensued, as the scale was broken and took time to repair.

Two days were lost due to the illness of our Commissioning Engineer, diagnosed by a doctor as sun stroke and dehydration. Commissioning resumed on Monday, 3rd July, 2000.

The computer was now programmed with dispense start/stop sequence timings and the 1200 mm Gatebar made ready with a 300 micron shim in preparation for the first CarDio™ run to produce a 13.5 kg/m³ density foam, with a block width of 1415 mm.

All the subsequent CarDio™ runs could only be carried out after the daily Maxfoam production, which were limited to around one per day and were of short duration – four minutes or less – due to a lack of TDI and the production of CarDio™ commissioning grades which, to Serra Sunger, was not saleable foam. The early runs were not without problems. Leakage from the Gatebar end plates, waiting for newly delivered TDI to be temperature conditioned and, more importantly, mixer pressure too low which caused gas pockets to appear in the foam.

The Gatebar shim size was reduced to increase mixer pressure to 16 bar. This resulted in a four minute run which produced a good regular cell structure foam. Serra Sunger was satisfied with the quality, but not the hardness. Our commissioning engineer explained that CarDio™ is commissioned using standard materials producing standard grades, which give known results. This is the benchmark for Process acceptance.

Commissioning (continued)

We requested that the equipment and Process Acceptance be signed on the results of these standard grades, before moving on to unknown and untried grades. Serra Sunger was reluctant to sign, in the belief that it was not possible to produce hard foam grades with a CO_2 process, in this case - CarDio™.

The following day, with Serra Sunger refusing the sign the Acceptance Protocol, our Commissioning Engineer made a four minute run using a different Polyol – Caradol MD 43 containing 10% filler – and TDI index increased to 112 to give a hardness ILD 78 Newtons on a 13.5 kg/m³ density foam. Foam quality was good, with increased hardness. The following day – 12th July 2000 – Serra Sunger eventually signed the Acceptance Protocol, a copy of which is included with this report.

At this point, our Commissioning Engineer had been on site for 28 days, of which 21 days were actual working days. This meant the number of commissioning days budgeted for in the project had been used up. Whilst there were problems to resolve by both parties, the major source of delay was undoubtedly fitting in with the Maxfoam production and waiting for the Sunkist block cut-off machine to be repaired, which had failed on a number of occasions during this period. Strictly speaking our engineer should either have returned to Cannon Viking to take up other work, or have obtained the customer's agreement to pay for additional commissioning time at the prevalling rate, to run and evaluate customer foaming grades. The customer was concerned that on a previous CO_2 installation in Turkey by one of our competitors', where the engineers left immediately after the Acceptance was signed leaving the operators will little experience of running the machine in CO2 mode, that we would do likewise. This may explain, in part, their reluctance to sign. Our engineer took the decision to remain on site, with no agreement to pay for his time.

Further runs continued at a slow pace - again, for the usual reasons, and because the TDI drum transfer pump was broken. Run tank filling was now using a low capacity pump and very time consuming. During this extended period, Serra Sunger staff were being trained in the operation of the CarDio™ process. This was made more difficult due to two key personnel leaving the company during the commissioning period (one sacked and one for family reasons) and being replaced by inexperienced operators, having the learn the Maxfoam Process as well as the CarDio™ Process. As Serra Sunger grow in confidence, it is their intention to begin using the 1800 mm wide Gatebar and introduce Colour Pigments.

Summary

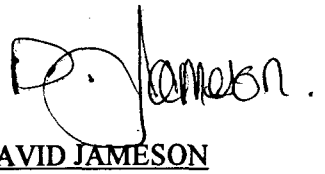
In summary, relations between Cannon Viking and Serra Sunger have generally been good – much better than with some previous CarDio™ customers. Serra Sunger has realised that running CarDio™, or any CO_2 process, is more complex than running their Laader Berg Maxfoam machine but, nevertheless, have learned the Process quite well.

At the time of writing, it is the intention of our Commissioning Engineer to remain on site for a further week, to make certain that Serra Sunger are fully conversant with the operation of the CarDio™ Process, which should mean a follow-up visit in the foreseeable future will not be necessary. This will make a total of 34 working days on site – 13 days beyond the signing of the Acceptance Protocol and the budgeted commissioning period – which at present is to Cannon Viking's cost – a seemingly unfair situation.

Within United Nations funded projects there is a contingency to compensate end users for lost production and chemical usage – perhaps there should be a contingency to compensate machine builders for extended installation and commissioning costs not of their making, as it is unlikely these costs will be recoverable from the customer. Your thoughts and comments regarding this issue would be most welcome.

This Final Report is submitted in compliance with Contract Document Section 5.0, together with the signed Certificate of Acceptance, advising the satisfactory installation, commissioning and conclusion of this project.

For and on behalf of -
CANNON VIKING LIMITED



DAVID JAMESON
Project Manager – CarDio™

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United Kingdom

Acceptance Protocol
Ref. No. E99/6-1-1

Certificate of Completion

Customer: Serra Sunger
Org. San. Bol. 4 cd
Inegol
Bursa
TURKEY

Works Order No. 03 – 1761

Project Number: MP/TUR/98/056

Equipment Details : CarDio Equipment

Please tick box as appropriate

☑ This document serves to record that the above equipment, supplied by Cannon Viking Limited to the order of the above mentioned company, has been completely installed and commissioned to the Customer's satisfaction in accordance with acceptance protocol E99/6-1-1, conforms to the underlying contract against which it was supplied subject to Cannon Viking Limited conditions of sale.

☐ This document serves to record that the above equipment, supplied by Cannon Viking Limited to the order of the above mentioned company, has been completely installed to the Customer's satisfaction but was unable to be commissioned in accordance with acceptance protocol E99/6 - 1-1 during a six week period, due to incorrect process conditions to be listed on a separate sheet.

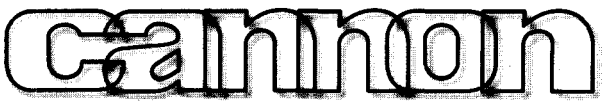
K [illegible]
Signed for:
Cannon Viking Limited

12/7/00
Date:

Signed for:

12/7/2000
Date:

The Customer and Cannon Viking representatives will each sign two copies of the Certificate of Completion document. One copy should be retained by the Customer and the other copy returned to Cannon Viking Limited with the commissioning engineer.



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