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TS-CV CONTRACTS FOR THE LHC: CASE STUDY FOR THE TS WORKSHOP 2004

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Abstract

The cooling and ventilation group deals with a great number of supplies and installation contracts, as well as some service ones, in relation to the LHC project. In the course of the last years the group has increased its experience in the handling of these contracts in particular as a consequence of the difficult situations sometimes faced, which have been trying but enriching. This paper reviews some statistics on the performance of the CV contracts and draws some conclusions from a set of key cases. These cases can be helpful in identifying possible weak points during the different project phases (engineering, tendering and contracting, installation, etc.) and can provide a basis for the discussion of potential solutions.

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1 INTRODUCTION

At the onset of the LHC project, a strategic choice was made that the infrastructure for the future accelerator would be made via industrial supply and installation contracts (some times service contracts), on the basis of the engineering and integration being made at CERN.

Based on the estimated resources required to refurbish the existing installations to be reutilized for the new machine and to install new material when required, and also in view to provide as wide as possible a possibility for the companies of the Member States to participate in the fair return of their financial contributions, the scope of the Cooling and Ventilation (CV) group was broken down in a number of future tenders following the disciplines involved, the spatial location and the schedule constraints and access availability.

When the CV contribution to the project will be finished (after a time span of some seven years) the group will have originated above 30 international invitations to tender (and subsequent contracts to monitor on the sites) and more than 100'000 hours of drawing office for the LHC project alone, for a total expenditure well above 100 MCHF.

Almost all of these contracts are multidisciplinary (in what contains mechanical, electrical, controls and communication engineering) thus requiring different profiles (both in the CV and the contractors' teams) during the engineering and installation phases of the project. Such a wealth of people involved, together with the particular CERN environment make that a hard laboured experience is being developed in the handling of these contracts. This paper focuses on two particular cases, which illustrate the difficulties observed and the solutions put in place.

2 CERN RESPONSIBILITIES AND CONTRACTS CHARACTERISTICS

All the CV contracts have undergone a pre-tender phase in which market surveys have been conducted for the selection of bidders. CV contracts are always based on functional specifications (in which, for reasons of integration, the routing of the services are particularly developed) and are usually set as lump-price or re-measurement, according to the definition of details available at the time of the tender. During the early stages of the contract these differences are of no consequence.

The analysis of the bids for the adjudication is done not only from a technical compliance point of view but also regarding the financial content of the offers (not considered for the adjudication) in order to ascertain if the prices employed correspond to the market values of the goods and services proposed. This has allowed in the past to determine that some bids were substantially below the market value.

Regarding the infrastructure of the LHC, CERN has chosen to produce the basic design in house. The added value of this approach is to present a unique interface between the industrial contractors and the machine and the experiments' communities. This is of particular value due to the cultural differences that exist between the two end participants, and the consequences of skipping this stage would most likely be of great financial importance.

The detailed engineering is always part of the contractual scope, as it is the selection of material for commissioning and start-up responsibility reasons. CV's role during the contractor's engineering phase is the verification of the compliance of the material and detailed layout proposed with the specifications and the respect of the allotted space.

Finally, in accordance with the contractual payment conditions CERN will verify the correctness of the installation and its performance and proceed to the payment (after joint verification of the quantities in re-measurement contracts).

3 CONTRACT A

When the time came for the write-up of the technical specification for this contract, the basic engineering for the LHC tunnel was still missing. Nevertheless, the decision was taken to go ahead

with the document production, trying to clarify all the pending points during the tender process, which normally takes few months.

For this purpose, the group was asked to draft a “reasonable” scenario and produce a technical specification based on it, taking an acceptable safety margin depending on the level of uncertainty. In three months, after a considerable effort, the design office managed to provide all the tender drawings and a complete technical dossier ready for the price inquiry. In May 2002 the contract was awarded to the firm which had presented the lowest bid, technically compliant with the adjudication criteria.

During the first installation period, which we could define as the “learning” phase, the contractor appeared to be poorly prepared to face most of the technical challenges and the level of collaboration supplied by CERN had to be particularly intense. At this moment, the CV group provided a real support to the company, by re-adjusting the schedule in function of the contractor performance, collaborating to the development of the welding techniques and the installation procedures and so on. The additional supervision effort, unavoidable in such a situation, was absorbed by the CV group, which did not receive any specific additional resource for this purpose.

The end of the “learning process” opened a new chapter in the relationship between CERN and the company. After the initial difficulties, the contractor became more and more confident on the technical point of view and started to increase its pressure on CERN on a commercial level: a number of daily transmittals started to submerge the technical sector, criticising all CERN demands to an extreme level of detail and multiplying the financial requests and the legal exchanges. Tens of documents flooded day after day the desk of the CV engineers involved in the project, pushing to the limit the response capability of the internal structure. A real “massive attack”, associated to an unscrupulous lobbying attitude and continuous by-pass of the hierarchy. This contractor’s attitude certainly implied a big investment of time and resources, legal and contractual competencies, but could produce a large benefit compared with the small margin that this kind of mature technical work can normally assure.

4 CONTRACT B

This contract was awarded to a firm that had proposed a bid that at the time of the opening was not fully conforming. After thorough study with the person in charge of purchase, the bidder was approached to make sure that the supply would comply with CERN specifications, without any modification to the quoted price, as requested by the rules. Once the bidder had given the necessary assurances, the contract was awarded for a price some 7 MCHF less than CV’s estimated price.

Soon the first problems appeared. The contractor’s engineers began to leave the team, slowing the progress at every change. The most acute case presented itself when the electrical engineer in charge of the project left the company at a time when more than half of the total quantity of cubicles had been built, but not yet been fully tested or accepted. It was also often the case that drawings were sent back to the contractor for modification after approval, only to be receiving new sets of drawings in which the corrections were not all done or new mistakes had appeared.

The situation on the work site followed this trend. The Contractor gave the impression during a long period of time that his team on the site did not have enough numbers to make sure that the activities of the many subcontractors working for him on the site were under control. This led to uncontrolled deliveries of contractor’s material on the site, not accepted by CERN (and in most cases shipped back to the manufacturer due to non compliance). The storage of material has been the source of much criticism (for safety reasons) and the contractor found himself not being able to find pieces on the site when needed. This situation much improved since mid 2003, when a more experienced site manager was sent to CERN and one subcontractor replaced. This brought much needed improvement on the quality of the work and the working conditions although much damage had already been done to CERN’s image.

CV has noted in this particular case, that most foreign contractors misunderstand the rules in force in the Host States, in particular regarding safety and social conditions. The financial consequences of these aspects have had repercussions on the schedule as the Local Authorities have

the power to fine or even refuse the work. Again CERN has found itself caught in a delicate situation vis-à-vis of the Authorities due to the miscalculation of the bidder at the time of setting the offer. These elements are enough to convey to the reader the difficulties faced by the CV group in the handling of this contract.

5 CONCLUSIONS

5.1 Risks of dumping prices

Both cases presented in this paper are very different in nature. Contractor A turned out to be a technically competent firm that employs a very aggressive commercial approach whereas Contractor B showed clear signs of being inexperienced in the scope of the contract. In both cases, however, the bids were well below CV estimated values based on price lists (updated for annual price indexation) from previous contracts of similar scope. One first conclusion to be drawn from these years experience is that contracts undervalued are more likely to be problematic than those whose prices correspond to market values.

The question is often asked whether undervalued bids should be disqualified. In the particular case of the two contracts described in this paper, there were at the time of the analysis of the offers thorough discussions on the convenience of accepting the least expensive bids. The supply and installation contracts run in the CV group (where the scope of supply is usually well determined) seldom leave room for the contractor to recuperate financial gain by doing additional works with the unoccupied available manpower or tooling on the site. In the absence of these, the contractor usually reacts by reducing the quality and quantity of available manpower, which will almost inevitably lead to delays in the installation, further complicating the problem. The only alternative to disqualification for CERN in these cases is to provide the means for a close monitoring of the contract. This means more CERN staff (quantity and quality counts) than initially foreseen (which obviously CERN cannot afford for all contracts being executed at any given time).

In retrospect, the risks (problems) faced in these two cases are more than justified in view of the substantial savings with respect to other bids.

5.2 CERN commercial team

When faced with potentially troublesome contracts CERN finds itself in serious difficulties to react. It appears in these few cases that, unlike in the technical field in which the contractor's team is usually faced with a reasonable CERN team, the legal and commercial teams on the contractor's side are much stronger than CERN's. In practice, CERN engineers and technicians find themselves replying to legal argumentations from the contractors' legal services. This experience although enriching for our staff is a serious risk for the Organisation and should be considered for future projects.

5.3 Day-to-day relations with the contractors

It has been fit to implement a project coordination team, which acts much in the fashion of the OPC role defined in the French law. This however has been done at a late stage of the project, and in what regards the relationships with the contractors on the sites, some fine tuning seems to be necessary still. Again in the case of difficult contracts, it is of the utmost importance that the communication be done always via the persons responsible for the contract. It has been unfortunately the case that when trying to help the contractors in their work that they have used the information given on the site to file claims against CERN. The undeniably primordial role of the work coordination with respect to the contractors also needs to be tuned in the few cases in which problems are found, perhaps via the creation of a joint team with CV (or other installation groups). It is essential to understand the contractual (financial) implications of any communication with the contractors on sites, and this can only be achieved by knowing the contract in depth.