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CONTINGENCY

"Use and Misuse"

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THE ONLY MEASURE OF PROJECT

CONTINGENCY
"Use and Misuse"

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Introduction

Contingency is probably the most misunderstood allowance in a project estimate, right from its initial definition to its application during the course of the project. Numerous companies use contingency in varying ways. The problem is, with no one systematic approach there is no actual set of rules or guidelines to follow. The application of contingency is really based upon the definition that the owner of the estimate has for contingency.

The purpose of this paper then is to define what CMS Inc.'s definition of contingency is when we believe it should be used, and how it should be utilized as a forecast tool as part of the overall cost summary, and project forecast at completion. In order to do that, we must recognize that we do not have the only definition of contingency. Some companies have specific rules about the application of contingency, which need to be followed during the course of a project. As well, contractors and sub-contractors have their own definition of contingency. These definitions of contingency are normally slightly different to suit a different purpose.

The Definition

CMS Inc will use the following definition:

Contingency is an allowance to mitigate risk to the project.

This allowance is based on the level of definition at the time of the estimate, and is to cover the risk of scope growth due to incomplete definition. Even with a Class II or final estimate with a plus or minus 10% accuracy, the scope is really based on 10% of the engineering, maybe 15% if the owner allows a high degree of front-end engineering. Even when the design basis and specifications are clear, the actual details of how we will execute the project are not. Consequently, contingency is there to mitigate the risk because of expected scope growth. Since contingency is there for risk then it should be considered as a risk allowance to be run down as the project progresses. As more of the project is committed, there is less risk to the project and less of an allowance is required.

The Uses

There are various methods to run down contingency. Contingency can be rundown linearly, as a percentage of commitment, against specific events, or matching progress. All of these methods are acceptable as long as a plan has been constructed to run them down. Our preference is to run them down on a linear basis holding 10% of the contingency for after mechanical completion. This final 10% of contingency is there to cover changes that are required during the commissioning and start-up stages. The 10% is an acceptable number based on historical data and experiences. This ensures that there are reasonable funds available to make changes should something be found to be deficient in the design during commissioning, while not holding on to excess funds that could be more beneficial if applied elsewhere.

With the use of the Monte Carlo analysis risk programs, which is a system where risk is assigned to specific tasks, a contingency allowance is calculated based upon the overall calculated probability of success. Contingency rundown should be based on the completion of those specific tasks. As that task is completed the contingency for that task should also be run down. The advantages of running it down on a continuous basis are that we do not see contingency as a cash account, we see it as an allowance and a forecast buffer. At the start of the project we are really saying our forecast is accurate to 10%, so we have added 10% contingency. As we progress through the project, the level of unknown decreases as commitments are made and work completed. As the unknowns decrease, the risk decreases and the need to fund that risk decreases.

CMS Inc.'s position is that running it down linearly and charting it creates cost awareness amongst the project team. Especially in the early stages when we are still working the process details, and designers are looking to design the best possible plant for the owner. During this time there is often a tendency to forget that the project was appropriated on a certain level of quality, and that construction has risk. Graphically showing how much change we would expect, and how much additional scope is being added quickly communicates how well we are doing in managing changes to the scope of the project. With the plan and results on a chart, if we are above the plan curve you can see quite clearly too much scope is being added to the project. Conversely, if we are below the curve, not as much scope is being added and management becomes more confident that the scope will be delivered for the appropriate dollars.

Only allowing the current budget to change with an approved scope change will keep the playing field fair for the contractor and the owner. The contractor will be held accountable to a true budget, based on their estimate of the cost plus the additional costs for scope that has been added and approved by the owner during the execution of the project. By not allowing contingency to be used for performance issues, we can quickly identify a variance between the forecast and the current control budget. These variances will indicate areas of either poor performance or estimating problems. The other advantage, apart from identifying a problem early and taking actions to mitigate it, is that at the end of project we can quickly reconcile the final costs back to the 'class two' or 'final' estimate.

This provides a two-fold advantage in that it also aids the estimating agency in compiling data in order to close the loop on their estimating factors. If they find that they are consistently high in one area, they have sufficient evidence to change their estimating unit. Equally, if they are low in an area they have the opportunity to change it at the same time. The basis of this also helps to modify a standard estimating database for different locations and work conditions. Then a company could estimate a job the same way for any location and then apply a series of factors based on the historical data that allows them to bring that estimate into a more probable number. A more accurate estimate would make for a more effective use of funds. After all, there is no sense in returning 20% of the appropriated funds, and there is no value to an organization in trying to do a $200 million project for $150 million. So the accuracy of the estimate is a key factor and an important benefit of not using contingency as a buffer to the forecast.

A secondary note on the use of contingency; changes to fabricated items during the course of completing engineering would not be considered added scope. Budgets for equipment and materials should also include allowances for changes made during fabrication, and growth in material quantity. This would be added to what was committed and the growth allowance again would be managed, but the commitment plus the growth allowance would end up being your forecast. This applies in the field also. Its never been known for a construction contractor to come on to a project and execute the scope exactly, as per the drawings, with everything fitting perfectly. There is always some level of change but this amount is dependant upon on the quality of the package put together or the quality of the engineering and the quality of the drawings. Field changes must also be allowed for in the forecast. They need to be segregated into

scope changes, errors or rework. True scope changes would result in a change in budget. The error and rework would become a measure of performance.

As we will address in our paper on Change Management, you must really consider that there are three types of changes to a project. First, the big “S” scope change is a change in the project basis, i.e. a change in the original definition of the project. Second, is the small “s” scope change, which are the ones that are required to make the project safe and operable. Thirdly, are deviations that really reflect project performance such as over-runs in engineering, or the fact that a piece of equipment cost more than what was originally estimated. These are trend changes or estimating errors, but not additional scope. For example, if you are purchasing a 90,000-barrel tank and the estimate was a million dollars for the tank. When it was actually tendered and awarded, the best bid was $1.2 million. This would give you a trend for $200,000. To cover this trend off with contingency is not an acceptable way to use it since this is the same tank as described in the basis nothing has changed, we just got the cost wrong.

In the next section, we will discuss how we see the misuse of contingency and explain why we feel that there is an appropriate way to use contingency.

The Misuses

Contingency is used improperly in many ways. For one, it is not there to cover additional scope due to a change in basis. For example, if the project is to deliver a plant capable of producing 20,000 bpd and the Owner changes it to 22,000 bpd then the costs associated with the increase in capacity should be funded separately, including its own contingency. If during the course of design you needed to put in two additional heat exchangers, then this would be what we term as a small “s” scope change. This is an addition to the scope as defined by the design specification, but not a scope change as defined by the basis. This means we are still building a 20,000 bpd unit, however we need additional heat exchangers to make the process work. The budget for those heat exchangers, engineering associated with them, and all other associated costs would be increased to make it fair to the contractor. So the sum total of all of those small 's' scope changes should be equal to the contingency that was allotted to the project. However, we do not actually make a budgetary transfer. Considering contingency to be an actual pocket of money is also a mistake. Contingency should always be considered to be an allowance for the amount of risk that is left in the project. So early on in the project, we have done little, therefore we carry the full contingency. Conversely, at the end of the project, the risk is minimal so we should carry a minimal contingency to the project forecast.

A major concern with contingency is its use as a “slush” fund. We would normally find that this starts during design engineering, and the overruns in engineering get covered by that “slush” fund. The reason being is that is a natural tendency to believe our own organizations operate effectively. Therefore any cost overrun must have come from the changes introduced by the owner and not from inefficiencies within ourselves. Changes are inevitable, especially early in the design stage. The initial design is really only a preliminary one, although with the use of front end loading and allowing engineering to progress before the project is appropriated, project definition is becoming clearer and the overall overruns to the project can be reduced. As a side note, this will probably lead to a reduction in the amount of contingency to future projects. Since the risk to scope is becoming less, then the need for that amount of contingency is also being reduced. Again, contingency is dependent on the risk that is left to the scope, in the project, when appropriated.

With projects, there are always going to be changes so it is unrealistic for an engineering contractor to believe that they can do a job without any changes. Many of the changes are generated during owner

reviews. These changes should be expected and should be allowed for in the contractor's original budget. If the contractor has set aggressive targets in order to win the contract, then that is their business decision, and they should be accountable for it and not expect the owner to bury their poor performance with contingency.

Engineering is not an exact science; it develops as the project progresses. However, when using contingency to continually 'fill the pot' we easily lose sight of engineering overruns. You will also lose sight of how much real scope has been added into the job**.** The contractor has very little control over new scope brought into the project. Historically, the owner, as a desire for something better, adds most of the new scope. Reviews or new process design parameters may cause equipment to be sized or located a little differently. Performance is totally a contractor issue. The contractors are responsible for their own efficiencies and for managing its personnel. The owner needs to know the difference.

The other danger of using contingency to fill the pot is that no one is accountable for the budget. Every time someone says, "we had to change this", or "it took us a little longer to do that than we had in the estimate", or "this was not quite right so we had to rework this issue", the budget is continually moved. It is difficult to track a moving target, forecast where it is going, and hard to hold those who have control of the budget accountable for the budget. If no one is accountable then it makes it difficult to manage the project effectively.

A greater danger of using contingency as a "slush" fund is that the issues causing project overruns become hidden, and therefore cannot be readily dealt with. The filling of the pot technique allows the contractor to continue working without the owner recognizing that there is a problem. This removes the ability to see the problems and we lose the ability to see the opportunities.

Since engineering and procurement budgets are the first to be used, they would also be the first to be topped up with the "slush" fund. By the time we go into the field to construct the project, there is insufficient contingency left to manage the risk through the execution stage of the project. Once the project reaches the execution phase, you have reached the point of no return. Changes in the way the job is to be executed are legitimate applications of contingencies. There is always an inherit risk in construction. There is a risk to the availability of manpower, or having to do things in a different sequence, so

contingency is there for the owner to cover the risk and to take advantage of opportunities that may arise. Consequently, if there were one overwhelming misuse in applying contingency, it would have to be its use as a “slush” fund.

Conclusion

We will summarize CMS Inc.'s position on the use of contingency as follows:

- Contingency is an allowance for unknown scope
- It must have a rundown plan, developed early in the project
- CMS Inc.'s preference is to run it down linearly over time, holding 10% back for completion / startup activities
- Contingency is not a slush fund to be used to top up poorly performing areas