ENGINUITY TUTORIAL

Completing Jobs Early

Completing Jobs Early

Trying to complete a job early has a number of benefits to the company, including :-

- The client may pay a **bonus** for early completion.
- The **company's own labour** that was being used on the completed job can be used on other sites, preventing the need to take on new recruits, or having to use subcontractors.
- The **project manager** on site can be relocated to another job, preventing the need to employ a new one, which incurs recruitment costs'
- The **company's capital assets** (plant, buildings etc) being used on the job can be diverted elsewhere.
- **Cash flows** are improved as any profit made from the job is earned quicker.

Completing Jobs Early

Early completion of a job means **completing at least one period before the end of the planned duration** e.g., if the planned duration is 4 periods, it must be completed in 3 periods or less to obtain the client bonus.

The bonus paid for early completion varies by client.

Client information

Navigate to "Main ... tion/Client information"

[R] [ALL] [ALL]

				Procurement restrictions		Payment terms		
Name	Base country	Type	Current relationship	From period	Minimum relationship required to continue bidding	Retention	Late completion penalty	Early completion bonus
AeroPower	United States	Private sector	satisfactory		no restriction	1.0 %	1.2 %	0.4 %
Al Mahran Developments	United Arab Emirates	Private sector	No relationship		no restriction	1.0 %	1.2 %	0.4 %
American Steel Corporation	United States	Private sector	satisfactory		no restriction	1.0 %	1.2 %	0.4 %
Amrail	United States	Public sector	satisfactory		no restriction	1.0 %	1.2 %	0.4 %
ANZ Water	New Zealand	Private sector	satisfactory		no restriction	1.2 %	1.3 %	0.5 %
Auckland City Developments	New Zealand	Private sector	satisfactory		no restriction	1.0 %	1.2 %	0.4 %
Australian Sport Institute	Australia	Public sector	No relationship		no restriction	1.0 %	1.2 %	0.4 %
AustRoads	Australia	Public sector	fairly good		no restriction	1.0 %	1.2 %	0.4 %
Breeze Energy	United Kingdom	Private sector	satisfactory		no restriction	1.4 %	1.6 %	0.6 %
Cane and Beet Sugars	United Kingdom	Private sector	fairly good		no restriction	1.0 %	1.2 %	0.4 %
Chicago City Developments	United States	Public sector	No relationship		no restriction	1.0 %	1.2 %	0.4 %
Crawford Petrochemicals UK	United Kingdom	Private sector	No relationship		no restriction	1.4 %	1.6 %	0.8 %
Dales Water Services	United Kingdom	Public sector	satisfactory		no restriction	1.2 %	1.3 %	0.5 %

Completing Jobs Early

MAKING Job progression decisions (Labour) for period 5 in the Early Years

Change period Key information Help

IDLE LABOUR POOL

START OF THE PERIOD

Number in the idle pool: 132

Number to layoff: 0

Number available for jobs in progress: 132

AFTER DECISIONS

Net transfers: 0

Number left in the idle pool: 132

JOBS IN PROGRESS

						This period		Own Labour						Subcontract Labour				
									To site		From site							
Job	Country	Sector	Plan Dur	Remaining planned periods	Progress so far	Status	Plan lab	Last per	From ILP	New	To ILP	Paid off	On site	End last	Take on	Lay off	On site	Total
29	UK	Transport	2	FINAL planned period	Ahead of schedule	2nd period	21	20	0	0	0	0	20	0	0	0	0	20
32	US	Building & Commercial	2	FINAL planned period	Ahead of schedule	2nd period	102	22	0	0	0	0	22	70	0	0	70	92
34	UK	Energy	3	2 planned periods remaining	Ahead of schedule	2nd period	48	34	0	0	0	0	34	0	0	0	0	34
49	UK	Water & Sewage	2	2 planned periods remaining		1st period	11	0	0	0	0	0	0	0	0	0	0	0
52	UK	Transport	3	3 planned periods remaining		1st period	95	0	0	0	0	0	0	0	0	0	0	0
67	SYR	Energy	3	3 planned periods remaining		1st period	9	0	0	0	0	0	0	0	0	0	0	0

Display details for job 52

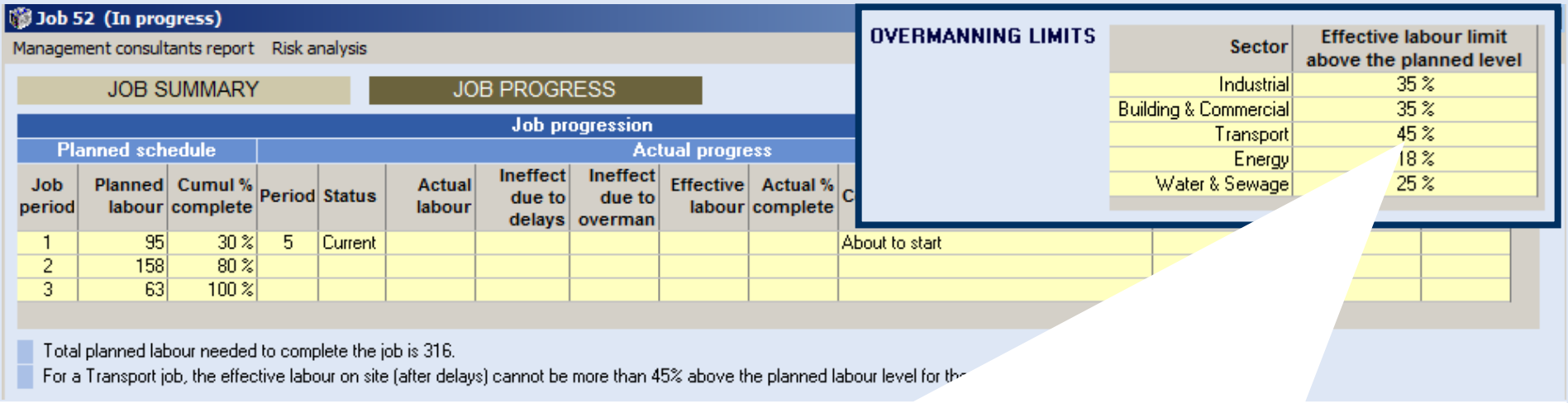
Consider the following example.

It is period 5, and job 52, a Transport contract that has a planned duration of 3 periods, is in its first period.

What overmanning strategy needs to be adopted to try and complete the job in 2 periods, and complete early ?

We can use the **Display details for job 53** option to investigate further.

Completing Jobs Early



To complete a job early the Construction Manager needs to refer to the sector-based overmanning limits defined in the **Industry parameters**.

For job 52, a Transport contract, it can be overmanned above the planned level by up to 45% each period.

If the Construction Manager follows the overmanning guidelines, and the labour allocated to site is fully effective, with no delays, the completion schedule should be as follows.

	<--------- Planned / Labour Limits ---------→			<--- Labour Allocation ---→	
Job Period	**Planned**	**Overmanning %**	**Effective Labour Limit**	**Labour Allocated**	**Cumulative**
1	95	45%	138	**138**	138
2	158	45%	229	**178**	316
3	63				

	316				

The job should complete a period early, earning a bonus from the client, but was and how was this achieved in practice ?

KEY POINTS

Overmanning above the effective labour limits results in ineffective labour that does not contribute to the progress of the job, but incurs labour costs.

Completing Jobs Early

MAKING Job progression decisions (Labour) for period 5 in the Early Years

Change period Key information Help

IDLE LABOUR POOL

START OF THE PERIOD

Number in the idle pool: 132

Number to layoff: 0

Number available for jobs in progress: 132

AFTER DECISIONS

Net transfers: -132

Number left in the idle pool: 0

JOBS IN PROGRESS

								Own Labour									Subcontract Labour				
						This period			To site		From site										
Job	Country	Sector	Plan Dur	Remaining planned periods	Progress so far	Status	Plan lab	Last per	From ILP	New	To ILP	Paid off	On site	End last	Take on	Lay off	On site	Total
29	UK	Transport	2	FINAL planned period	Ahead of schedule	2nd period	21	20	0	0	3	0	17	0	0	0	0	17
32	US	Building & Commercial	2	FINAL planned period	Ahead of schedule	2nd period	102	22	0	0	0	0	22	70	0	7	63	85
34	UK	Energy	3	2 planned periods remaining	Ahead of schedule	2nd period	48	34	23	0	0	0	57	0	0	0	0	57
49	UK	Water & Sewage	2	2 planned periods remaining		1st period	11	0	14	0	0	0	14	0	0	0	0	14
52	UK	Transport	3	3 planned periods remaining		1st period	95	0	98	40	0	0	138	0	0	0	0	138
67	SYR	Energy	3	3 planned periods remaining		1st period	9	0	0	11	0	0	11	0	0	0		11

Display details for job 52

138 labourers were indeed allocated to job 52 in period 5, its first period, as per the completion schedule defined earlier, which should put the job well ahead of schedule.

We can move onto period 6 to see if this is the case.

Completing Jobs Early

MAKING Job progression decisions (Labour) for period 6 in the Early Years

Change period Key information Help

IDLE LABOUR POOL

START OF THE PERIOD

Number in the idle pool: 39

Number to layoff: 0

Number available for jobs in progress: 39

AFTER DECISIONS

Net transfers: 0

Number left in the idle pool: 39

JOBS IN PROGRESS

						This period		Own Labour						Subcontract Labour				
									To site		From site							
Job	Country	Sector	Plan Dur	Remaining planned periods	Progress so far	Status	Plan lab	Last per	From ILP	New	To ILP	Paid off	On site	End last	Take on	Lay off	On site	Total
34	UK	Energy	3	FINAL planned period	Ahead of schedule	3rd period	19	57	0	0	0	0	57	0	0	0	0	57
49	UK	Water & Sewage	2	FINAL planned period	Ahead of schedule	2nd period	17	14	0	0	0	0	14	0	0	0	0	14
52	UK	Transport	3	2 planned periods remaining	Ahead of schedule	2nd period	158	138	0	0	0	0	138	0	0	0	0	138
67	SYR	Energy	3	2 planned periods remaining	Ahead of schedule	2nd period	15	11	0	0	0	0	11	0	0	0	0	11

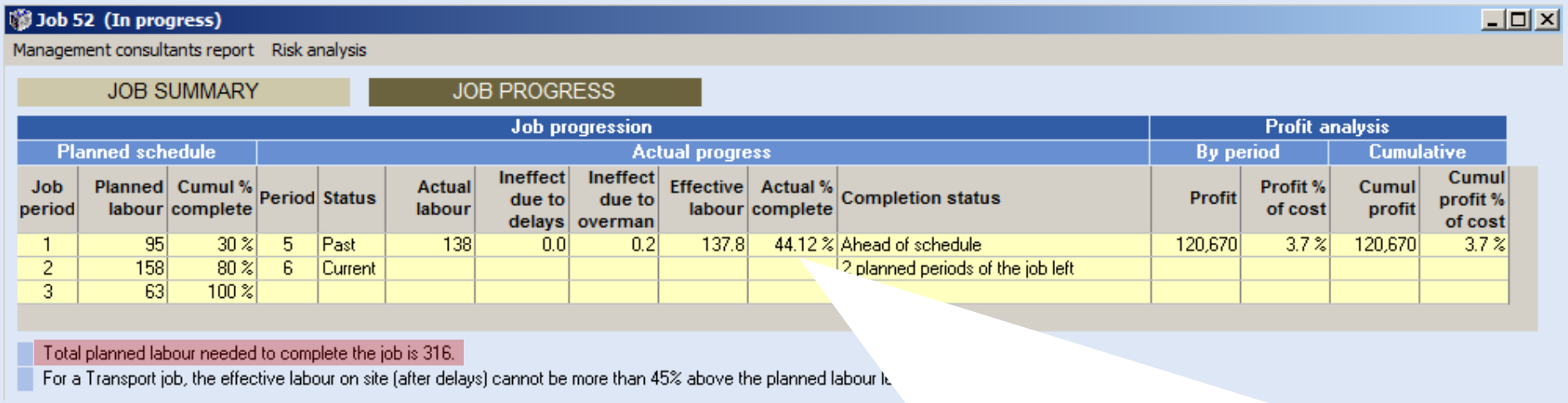
Display details for job 52

At the start of period 6, as a result of the overmanning the previous period, job 52 is now ahead of schedule, and on course to complete in 2 periods, a period earlier than the planned.

The question is, what level of labour is now needed to try and complete the job in its second period, and hence complete a period early and earn a bonus from the client ?

We can use the **Display details for job 52** option to investigate further.

Completing Jobs Early


Job 52 (In progress)

Management consultants report Risk analysis

JOB SUMMARY JOB PROGRESS

Job progression											Profit analysis			
Planned schedule			Actual progress								By period		Cumulative	
Job period	Planned labour	Cumul % complete	Period	Status	Actual labour	Ineffect due to delays	Ineffect due to overman	Effective labour	Actual % complete	Completion status	Profit	Profit % of cost	Cumul profit	Cumul profit % of cost
1	95	30 %	5	Past	138	0.0	0.2	137.8	44.12 %	Ahead of schedule	120,670	3.7 %	120,670	3.7 %
2	158	80 %	6	Current						2 planned periods of the job left				
3	63	100 %												

Total planned labour needed to complete the job is 316.

For a Transport job, the effective labour on site (after delays) cannot be more than 45% above the planned labour l

The **Job progress** for the job shows that the job was 44.12% complete at the end of the last period, and well ahead of the planned schedule of 30%. There is just **55.88%** of the job left to complete.

The **total planned labour required to complete the job is 316 man periods**. Since there is 55.88% of the job left to complete, in manpower terms this is 55.88% of the total labour of 316, or 176.58 labourers.

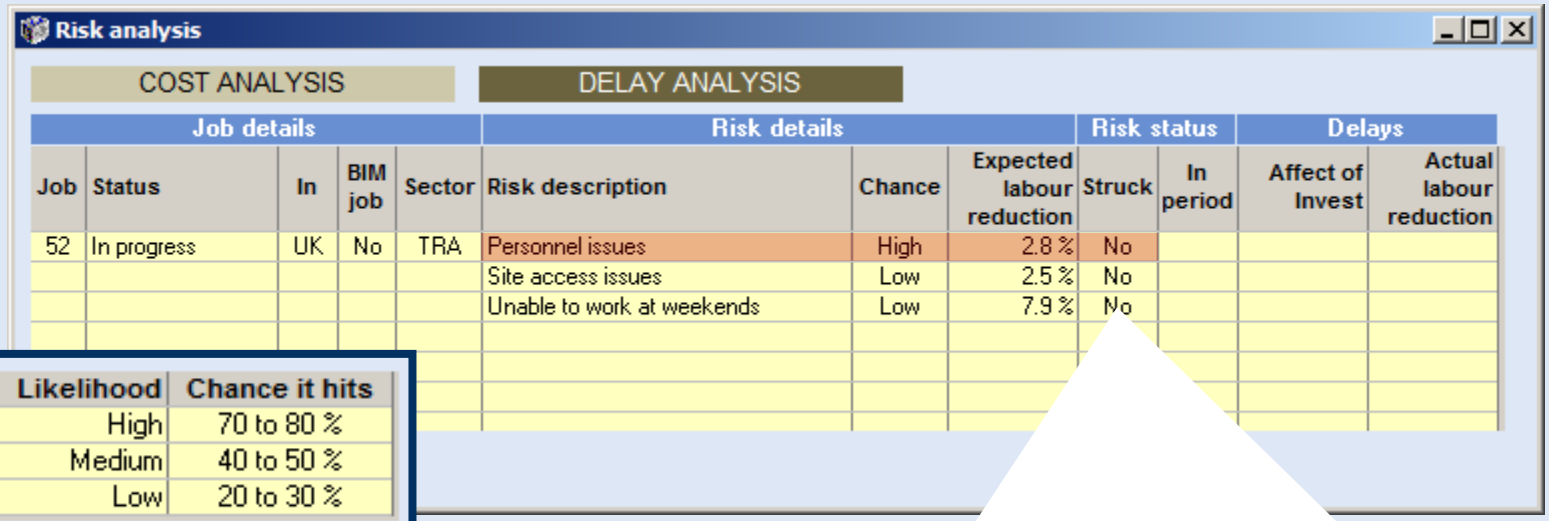
176.58 labourers should be sufficient for the job to complete, **BUT there is a key factor that could prevent this from happening, and that is delays caused by risks striking.**

To determine if any risks may delay job the job in its final period we can use the **Risk analysis** option at the top of the screen.

KEY POINTS

In the original completion strategy 178 labourers were needed to complete the job in its second period, but only 177 are now (before risk adjustment). This is because the job is slightly further ahead of schedule than expected due to the company employing an excellent project manager who improve the productivity of the labour on site.

Completing Jobs Early



Job details					Risk details			Risk status		Delays	
Job	Status	In	BIM job	Sector	Risk description	Chance	Expected labour reduction	Struck	In period	Affect of Invest	Actual labour reduction
52	In progress	UK	No	TRA	Personnel issues	High	2.8 %	No			
					Site access issues	Low	2.5 %	No			
					Unable to work at weekends	Low	7.9 %	No			

RISK	Likelihood	Chance it hits
	High	70 to 80 %
	Medium	40 to 50 %
	Low	20 to 30 %

The **Risk analysis** for job 52 reveals that there are 3 risks that have not yet struck, and which could delay the job if they were to strike, the delay causing a reduction in the labour on site :-

- 'Personnel issues', which has a **'high'** chance of occurring, and an expected labour reduction of 2.8%
- 'Site access issues', which has a **'low'** chance of occurring, and an expected labour reduction of 2.5%
- 'Unable to work at weekends', which has a **'low'** chance of occurring, and an expected labour reduction of 7.9%

The **Industry parameters** show the chance a risk may strike for each likelihood level.

Although all the risks could strike, and potentially delay the job, **the 'Medium' and 'High' risks are most likely**, and the Construction Manager decides to take action in case this happens.

Since a 2.8% delay is expected if the 'high' risk strikes, the required labour level of 176.58 is adjusted in case of the 2.8% delay, giving a revised labour level of 181.66 labourers (176.58 / 0.972). **Since we cannot have fractions of people, the labour level is adjusted upwards to 182 labourers.**

Completing Jobs Early

MAKING Job progression decisions (Labour) for period 6 in the Early Years

Change period Key information Help

IDLE LABOUR POOL

START OF THE PERIOD

Number in the idle pool: 39

Number to layoff: 0

Number available for jobs in progress: 39

AFTER DECISIONS

Net transfers: -39

Number left in the idle pool: 0

JOBS IN PROGRESS

						This period	Own Labour						Subcontract Labour				
								To site		From site							
Job	Country	Sector	Plan Dur	Remaining planned periods	Progress so far	Status	Plan lab	Last per	From ILP	New	To ILP	Paid off	On site	End last	Take on	Lay off	On site	Total
34	UK	Energy	3	FINAL planned period	Ahead of schedule	3rd period	19	57	0	0	14	37	6	0	0	0	0	6
49	UK	Water & Sewage	2	FINAL planned period	Ahead of schedule	2nd period	17	14	2	0	0	0	16	0	0	0	0	16
52	UK	Transport	3	2 planned periods remaining	Ahead of schedule	2nd period	158	138	44	0	0	0	182	0	0	0	0	182
67	SYR	Energy	3	2 planned periods remaining	Ahead of schedule	2nd period	15	11	7	0	0	0	18	0	0	0	0	18

Display details for job 52

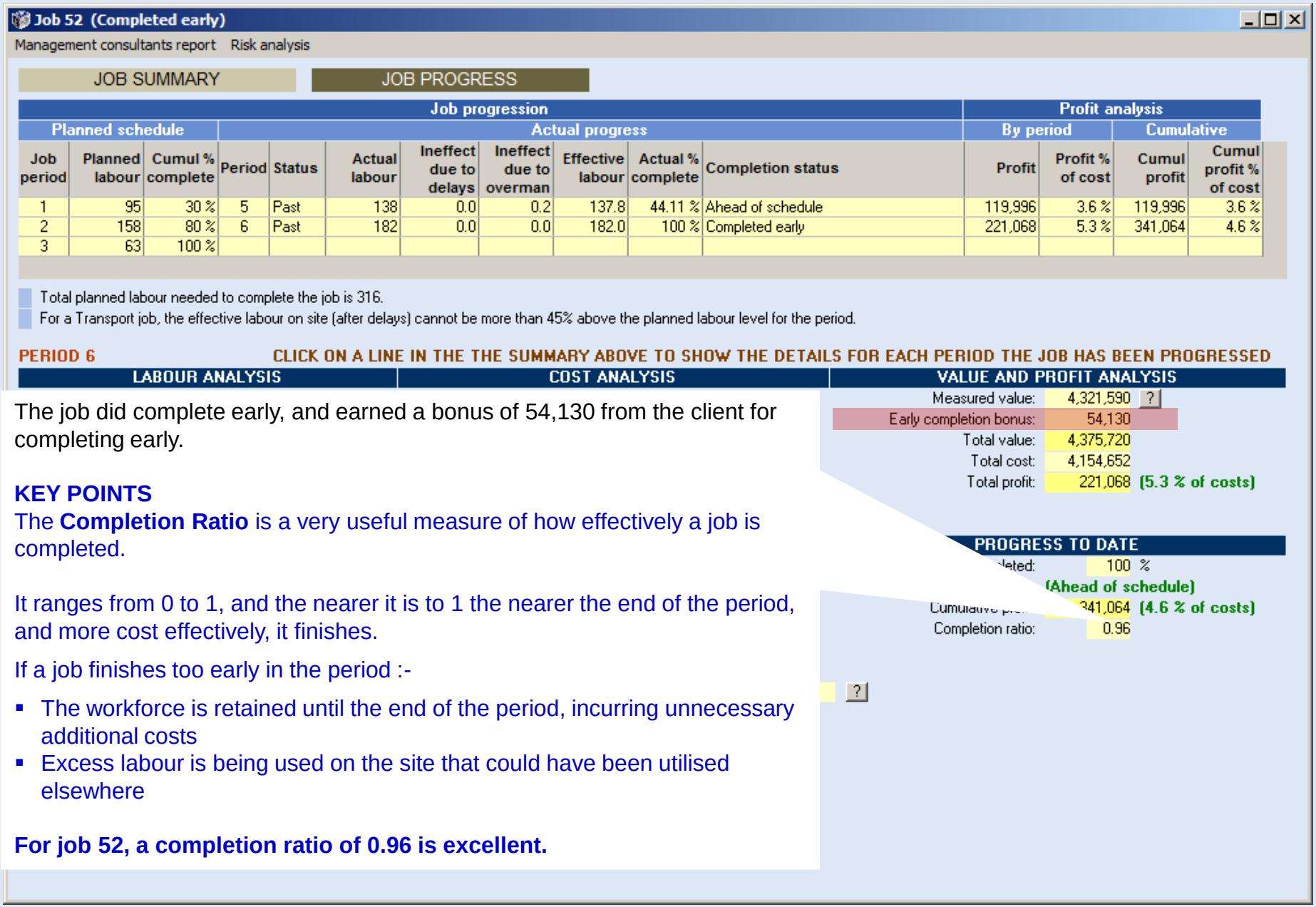
The planned level of 158 would not have been sufficient to complete the job, but the 182 allocated should.

Crucially the 182 labourers is also within the overmanning limit for the period i.e., planned labour x overmanning %, or 158 x 1.45 = 229.

If this had not been the case, the job could not finish early.

Did the job go on to complete early ?

Completing Jobs Early



The job did complete early, and earned a bonus of 54,130 from the client for completing early.

KEY POINTS

The **Completion Ratio** is a very useful measure of how effectively a job is completed.

It ranges from 0 to 1, and the nearer it is to 1 the nearer the end of the period, and more cost effectively, it finishes.

If a job finishes too early in the period :-

- The workforce is retained until the end of the period, incurring unnecessary additional costs
- Excess labour is being used on the site that could have been utilised elsewhere

For job 52, a completion ratio of 0.96 is excellent.