Hackline Costing Exercise

CERMALAB CC
Material Testing Laboratory
"Nothing Beats Experience!"

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Preface

The majority of South African Clay Brick Makers (approximately 68%) make use of hackline drying for drying freshly extruded wet green bricks. This method involves drying by natural means and is preferred mainly due to favourable weather conditions in South Africa. Since this method of drying utilizes the heat from the sun and the air-flow from the wind to perform the drying action, it is free from any fuel costs but involves large expenses in other areas. Although individual factories are aware of these costs, it is not normally summarized to demonstrate the costs incurred in specific parts of the operation.

Such information is required to support future development of programs required to overcome hurdles and to improve the clay brick makers' operational, technical and quality performance.

Cermalab was commissioned by Swisscontact in August 2015 to conduct a field research and to produce an overview of the costs involved when utilizing hackline drying. This involved interviewing factory personnel and obtaining specific cost items from four different factories in the Gauteng and Limpopo areas.

The survey identifies typical costs related to the hackline drying process.

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1. Introduction

Hackline drying utilizes natural elements such as the sun and wind to dry the clay bricks, and therefore there is no need for additional energy or complicated machinery such as fans and PLC systems. There are however a number of objections to this method of operation:

a) Hackline drying requires large level areas for packing the wet green bricks. These areas needs to be maintained and kept dust-free on a continuous basis. This is achieved by having to operate expensive vehicles such as graders, loaders, dumper trucks and water trucks continuously in these areas.
b) A lot of handling by vehicle and labour is required during the loading and unloading hackline processes. For these processes vehicles such as forklift trucks and tractor-trailer combinations are required which usually results in large amounts of handling waste.
c) A large labour force consisting of vehicle operators, operator assistants, hackline labour, labour to maintain pallets and plastic covering etc. are required for the operation.
d) Large amounts of consumable items such as pallets, plastic sheeting and plastic netting are required which needs to be replaced on a regular basis.
e) Natural drying is a slow drying process and therefore large numbers of green bricks need to be stacked in the hacklines at any one time. The bricks can be in the hacklines for periods up to four weeks or longer, which involve large capital investment and is a great risk to damage by adverse weather conditions.
f) The moisture contents in dry bricks after natural drying is relatively high (normally in excess of 3 % compared to less than 1 % for most fixed dryers). This often results in higher fired waste caused by the shattering of the bricks in the kilns.

The above mentioned objections to hackline operations have huge cost implications. Although there are no fuel costs involved with the hackline operation, the vehicle operating and capital costs, labour costs, pallets and plastic covering consumable costs, additional waste costs, must be weighed up against the fuel saving costs.

2. Methodology of data collection

Data was collected for the report by means of field research at the four factories and followed the following steps:

- A questionnaire was compiled and used as a template for gathering all the relevant information from the four factories. The template consist of questions regarding all the expenses incurred in the hackline operations.
- The factories supplied the financial data from their financial systems.
- The factories were visited by appointment to see first-hand the operations in action and to verify the information supplied.
- The results were compiled into tables and given back to the factories to verify.

During the collection of data, the following challenges were presented:

- Most of the factories that were approached originally for the hackline costing exercise were not willing to provide financial data. The four factories chosen were willing participants.
- Some of the four factories prefer to keep costing items such as individual labour wage rates and price agreements with suppliers etc. confidential and therefore not all the tables will show all the individual quantities and rates, but only totals.
- The factories do not want to be identified and therefore will be refer to as Factory-A, Factory-B, Factory-C and Factory-D for this exercise.
- The factories operate different financial systems. Trying to standardize the data tables meant that some factories needed a lot more time and effort to produce specific individual cost items.
- It was agreed with the four participating factories that pictures of the factory and the operation processes will not be included in the report in order to protect their identity.
- Labour costs includes from supervisor level down and does not include higher management levels.
- The capital costs for vehicles and equipment are not included in the costs. Consumables such as pallets, plastic covers and plastic netting are included in the expenses.

3. THE SURVEY

3.1 Summary of the annual hackline costs of the four factories

Item No.	Item	Factory-A Annual Cost (Rands)	Factory-B Annual Cost (Rands)	Factory-C Annual Cost (Rands)	Factory-D Annual Cost (Rands)
1	Pallets	1,942,356.00	5,240,000.00	616,785.00	3,128,825.00
2	Brick Covers and straps	1,272,134.00	2,133,461.00	372,873.00	1,807,500.00
3	Pallet netting	39,950.00	n/a	n/a	n/a
4	Block Poles	980.00	n/a	n/a	10,000.00
5	Bricks - Handling Waste	330,000.00	193,984.00	176,000.00	1,206,000.00
6	Total Vehicle Cost	1,867,969.00	442,556.00	971,199.00	346,173.00
7	Hackline Labour Cost	742,173.00	2,912,027.00	220,098.00	1,866,368.00
8	Other Costs	42,900.00	18,000.00	23,400.00	0.00
Total Annual Hackline Costs		**6,238,462.00**	**10,940,028.00**	**2,380,355.00**	**8,364,866.00**
Hackline costs per 1000 saleable bricks		R 113.42	R 91.00	R 68.00	R 61.00
Green brick value in hacklines		R 2,625,000.00	R 1,357,361.00	R 2,400,000.00	R 8,375,000.00
Number of bricks in hacklines		7,5 million	14 million	2,4 million	12,5 million
Annual saleable production volume		55 million	120 million	35 million	150 million

3.2 Findings

3.2.1 The hackline costs per 1000 saleable bricks for the four factories compiledj, ranges between R 61.00, being exceptionally good and R 113.42, being on the higher end of the range. It is expected that the average hackline operation costs in South Africa ranges between that of Factory-C and Factory-A i.e. R 91.00 to R113.00.

3.2.2 The value of the green bricks in the hacklines are work in progress and depends on the individual factory's raw material mix. For example, some factories uses a relatively cheap body fuel source such as ash whilst others import high quality and expensive coal duff. Some factories uses various quantities of imported clays in their mix which increases the value of their green bricks.

3.2.2 The labour rates varies greatly between factories.

3.3 Hackline Operating Cost – Factory-A

Overview of Factory-A

Factory-A is a clay brick manufacturing operation utilizing hackline drying technology to produce on average 55 million saleable bricks per annum. The hacklines consist of 21 blocks which covers a total area of 121,680 square metres. A total of 7,5 million bricks in process to be dried, are stocked in the hacklines at any one time. Distances ranging from 40 metres (shortest) to 700 metres (longest) from off-setting to the hacklines and 50 metres to 150 metres from the hacklines to the clamp kilns.

Hackline production flow process:

1. Green bricks are off-set onto wooden pallets – (500 green bricks per pallet).
2. Two layers of netting are placed in a pack to ensure the stability during transport.
3. The full pallet is picked up and loaded onto a tractor-trailer combination by forklift truck.
4. 12 pallets are loaded per tractor–trailer combination and is then transported to the hacklines.
5. A forklift truck removes the pallet from the tractor-trailer combination and then packed into the hacklines.
6. The pallets are closed by plastic sheeting as and when required either during the initial stages of drying or during adverse weather conditions.
7. The green bricks are kept in the hacklines to dry naturally in air for a period of 4 weeks.
8. The dry bricks on pallets are removed from the hacklines and packed on the tractor-trailer combination.
9. The tractor-trailer combination transports the pallets with dry bricks to the clamp kilns.
10. A forklift removes the pallet with dry bricks from the tractor-trailer combination and pack it next to the clamp.
11. The empty pallets from the clamps are lifted by forklift truck onto the tractor-trailer combination and transported to the off-set belt where they are checked for damage, stacked and awaiting re-setting.

The hacklines are regularly scraped by grader to ensure level and dust free surfaces. The hacklines are constantly watered for dust suppression with the water car operating about 75% of its time in the hacklines. Handling waste i.e. waste generated between the off-set belt and the clamp kilns, is removed on a daily basis using the front-end loader and dumper trucks. The hackline attendants and hackline cleaners maintain damaged packed bricks on pallets on a continuous basis.

Summary of the annual Hackline Costs for factory-A

Item No.	Item	Annual Cost (Rands)
1	Pallets	1,942,356.00
2	Brick Covers and straps	1,272,134.00
3	Pallet netting	39,950.00
4	Block Poles	980.00
5	Bricks - Handling Waste	330,000.00
6	Total Vehicle Cost	1,867,969.00
7	Hackline Labour Cost	742,173.00
8	Petrol for W/Car Pump	42,900.00
Total Annual Hackline Costs		**6,238,462.00**
Green brick value in hacklines		2,625,000.00

The cost of drying in hacklines for factory-A amounts to R 113.42 per 1000 saleable bricks produced.

A total of 7,5 million green and dried bricks valued at R 2,625,000.00 are held in the hacklines at any one time.

Factory-A: Hackline Cost Breakdown

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
1	Pallets	Pallets	15,600	R 95.00	1,482,000.00
		Replacement pallets p/a	4,000	R 95.00	380,000.00
		Replacement slats p/a	5,000	R 13.22	66,100.00
		Nails 25kg/box p/a	44	R 324.00	14,256.00
				TOTAL PALLET COST	**1,942,356.00**

1.1. 15,600 wooden pallets for drying is required at any one time in the hackline.
1.2. The price of a wooden pallet is R95.00.
1.3. 4000 wooden pallets are replaced during a twelfth month period.
1.4. 5000 wooden slats are needed per year to maintain the pallets. 44 x 25 kg. boxes of nails are required per year to maintain the pallets.

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
2	Brick Covers	30x3m plastic sheets	1,364	R 482.10	657,584.40
		Replacement sheets p/a	1,100	R 482.10	530,310.00
	straps	Used conveyor strips	15,000	R 5.00	75,000.00
		Repair rope p/a	40	R 231.00	9,240.00
				TOTAL BRICK COVER COST	**1,272,134.40**

2.1. 1,364 rolls of plastic sheeting is required at any one time in the hackline.
2.2. The price per roll is R482.10. 1,100 rolls are replaced during the year.
2.3. 15,000 tie-down straps at R5.00 each are used per year.
2.4. 40 rolls of repair rope at R231.00 per roll are used per year for maintaining the straps.

Factory-A

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
3	Pallet netting	Pallet netting	39	R 425.00	16,575.00
		Replacement netting	55	R 425.00	23,375.00
			TOTAL PALLET NETTING COST		**39,950.00**

3.1. 39 Rolls of pallet netting are required for the entire hack yard at any one time.
3.2. The price per roll is R425.00.
3.3. 55 Rolls of pallet netting are required per year as replacement.

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
4	Block Poles	Y standard droppers	20	R 49.00	980.00
			TOTAL BLOCK POLE COST		**980.00**

4.1. 20 Replacement block poles at R 49.00 per pole are required per annum.

Item No	Item	Description	Quantity/day	Cost / item	Days/annum	Annual Cost (Rands)
5	Bricks	handling waste	3,000	R 0.50	220	330,000.00
			TOTAL COST OF HANDLING WASTE IN HACKLINES			**330,000.00**

5.1. 3,000 green and dry bricks per day are damaged due to handling in the hacklines i.e. from the off-set belt to the clamp kiln.

Factory-A

Item No	Item	Description	No. of vehicles	Hours per day	Average Consumption per day	Cost per day	Days per annum	Annual Cost (Rands)
6	Vehicle	Forklift Prod	2	24	75	1,773.00	220	390,060.00
	Diesel cost	Forklift Kiln	4	10	40	1,891.20	220	416,064.00
		Tractors Prod	1	24	35	413.70	220	91,014.00
		Tractors Kiln	3	10	13	460.98	220	101,415.60
		Tractor H/Keeping	1	9	13	153.66	220	33,805.20
		Grader	1	9	38	449.16	221	99,264.36
		Loader	1	9	80	945.60	27	25,531.20
		Dumpers	2	9	60	1,418.40	27	38,296.80
		Watercart	1	20	45	531.90	220	117,018.00
							TOTAL VEHICLE DIESEL COST	**1,312,469.00**
7	Vehicle maintenance cost						**TOTAL VEHICLE MAINTENANCE COST**	**429,000.00**
8	Vehicle hydraulic oil cost						**TOTAL VEHICLE HYDROLIC OIL COST**	**82,775.00**
9	Vehicle engine oil cost						**TOTAL VEHICLE ENGINE OIL COST**	**43,725.00**
							TOTAL VEHICLE COST	**1,867,969.00**

6.1. Diesel rate is R11.82 per litre
7.1. The hackline vehicle maintenance cost is 65% of R60,000 per month for 11 months of the year.
8.1. Hydraulic oil costs for the hacklines are 350 litres per month, for 11 months per year at a rate of R 21.50 per litre.
9.1 Engine oil costs for the hacklines are 150 litres per month, for 11 months per year at a rate of R 26.50 per litre.

Factory-A

Item No	Item	Description	Quantity	Hours per day	Rate/hour	Cost per day	Days per annum	Annual Cost (Rands)
10	Hackline	Forklift operators - prod	4	12	R 14.44	R 693.12	220	152,486.40
	Labour cost	Forklift operators - hack	4	10	R 14.44	R 577.60	220	127,072.00
		Tractor operators - Prod	2	12	R 10.11	R 242.64	220	53,380.80
		Tractor operators - hack	3	10	R 10.11	R 303.30	220	66,726.00
		Tractor operator – H/keeping	1	9	R 10.11	R 90.99	220	20,017.80
		Grader operator	1	9	R 13.00	R 117.00	220	25,740.00
		Line attendants	4	12	R 9.75	R 468.00	220	102,960.00
		Hack cleaners	4	12	R 9.50	R 456.00	220	100,320.00
		Strap maker	1	9	R 7.77	R 69.93	220	15,384.60
		Loader operator	1	9	R 14.44	R 129.96	27	3,508.92
		Dumper operators	2	9	R 16.44	R 295.92	27	7,989.84
		Water car operator	2	9	R 13.33	R 239.94	220	52,786.80
	Weekend Rain Team	Rain team labour	10	4	R 11.50	R 460.00	30	13,800.00
						TOTAL HACKLINE LABOUR COST		**742,173.00**

10.1 Production forklift drivers load the production tractor-trailer combination at the off-set belt.

10.2 The hackline forklift driver's un-load the production tractor-trailer combination and load the hackline tractor-trailer combination in the hacklines.

10.3 Four permanent hackline attendants and four hackline cleaners are employed.

10.4 A permanent strap maker is employed to make and repair the tie-down straps for the plastic sheeting.

10.5 A loader operator and two dumper truck operators work 75% of the time in the hacklines.

10.6 A water car operator work 75% of the time in the hacklines.

10.7 A team of ten workers are employed as a "rain team" to close and open hacklines over an average of 30 weekends.

Factory-A

Item No	Item	Description	Quantity	Hours per day	Rate/hour	Cost per day	Days per annum	Annual Cost (Rands)
11	Other costs	Petrol for W/Car pump	1	15	R 13.00	R 195.00	220	42,900.00
						TOTAL WATER CAR PUMP COST		**42,900.00**
11.1 The cost of petrol used by the water car pump is a separate cost item and is not included under the vehicle costs.								

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
12	Bricks	Green bricks drying	7,500,000	R 0.35	2,625,000.00
		TOTAL VALUE OF THE GREEN AND DRY BRICKS IN THE HACK YARD			**2,625,000.00**
12.1 7,5 million green bricks are in the hacklines at any one time at a value of R 0,35 per brick.					

3.4 Hackline Operating Cost – Factory-B

Overview of Factory-B

Factory-B is a clay brick manufacturing operation utilizing hackline drying technology to produce on average 120 million saleable bricks per annum. The hacklines consist of 16 blocks which covers a total area of 162,685 square metres. A total of 14 million bricks in process to be dried, are stocked in the hacklines at any one time. Distances ranging from 75 metres (shortest) to 1000 metres (longest) from off-setting to the hacklines and 5 metres to 160 metres from the hacklines to the clamp kilns.

Hackline production flow process:

1. Green bricks are off-set onto wooden pallets – (500 green bricks per pallet)
2. The full pallet is picked up and loaded onto a tractor-trailer combination by forklift truck.
3. Ten pallets are loaded per tractor–trailer combination and is then transported to the hacklines.
4. A forklift truck removes the pallet from the tractor-trailer combination and then packed into the hacklines.
5. The pallets are closed by plastic sleeves as and when required either during the initial stages of drying or during adverse weather conditions.
6. The green bricks are kept in the hacklines to dry naturally in air for a period of 4 weeks.
7. The dry bricks on pallets are removed from the hacklines by forklift truck and packed on the tractor-trailer combination.
8. The tractor-trailer combination transports the pallets with dry bricks to the clamp kilns.
9. A forklift removes the pallet with dry bricks from the tractor-trailer combination and pack it next to the clamp.
10. The empty pallets from the clamps are lifted by forklift truck onto the tractor-trailer combination and transported to the off-set belt where they are checked for damage, stacked and awaiting re-setting.

The hacklines are regularly scraped by grader to ensure level and dust free surfaces. The hacklines are constantly watered for dust suppression with the water car operating about 3 hours per day in the hacklines. Handling waste i.e. waste generated between the off-set belt and the clamp kilns, is removed on a daily basis using a grader. The hackline attendants maintain damaged packed bricks on pallets on a continuous basis.

Summary of the annual Hackline Costs for factory-B.

Item No.	Item	Annual Cost (Rands)
1	Pallets	5,240,000.00
2	Brick Covers and straps	2,133,461.00
3	Bricks - Handling Waste	193,984.00
4	Hackline Labour Cost	2,912,027.00
5	Vehicle Cost	442,556.00
6	Other Costs	18,000.00
Total Annual Hackline Costs		**10,940,028.00**
Green brick value in hacklines		1,357,361.00

The cost of drying in hacklines for factory-B amounts to R 91.17 per 1000 saleable bricks produced.

A total of 14 million green and dried bricks valued at R 1,357,361.00 are held in the hacklines at any one time.

Factory-B: Hackline Cost Breakdown

Item No.	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
1	Pallets	Pallets	30,000	R 128.00	3,840,000.00
		Replacement pallets, slats p/a			1,400,000.00
				TOTAL PALLET COST	**5,240,000.00**

1.1. 30,000 wooden pallets for drying is required at any one time in the hackline.
1.2. The price of a wooden pallet is R128.00.

Item No.	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
2	Brick Covers	plastic envelopes	30,000	R 44.53	1,335,900.00
		Replacement sheets p/a			797,561.00
				TOTAL BRICK COVER COST	**2,133,461.00**

2.1. 30000 plastic envelopes is required at any one time in the hackline.
2.2. The price per envelope is R44.53

Item No.	Item	Description	Quantity/day	Cost / item	Days/annum	Annual Cost (Rands)
3	Bricks	handling waste				193,984.00
			TOTAL COST OF HANDLING WASTE IN HACKLINES			**193,984.00**

Factory-B

Item No.	Item	Description	Quantity	Hours per day	Rate/hour	Cost per day	Days per annum	Annual Cost (Rands)
4	Hackline	Forklift operators - prod	6					493,535.00
	Labour cost	Forklift operators - hack	3					160,148.00
		Tractor operators - Prod	6					422,496.00
		Prod Tractor Attendants	6					373,890.00
		Tractor operator - hack	3					138,506.00
		Hack Tractor Attendants	4					95,223.00
		Grader operator	1	2				18,078.00
		Line attendants	20					520,662.00
		Supervisor	3					143,979.00
		Water car operator	1	3				22,290.00
		Rain team labour	30					145,188.00
		Pallet maintenance	5					307,503.00
		Strap makers	5					16,252.00
		Plastic Cover Replacers	3					54,277.00
						TOTAL HACKLINE LABOUR COST		**2,912,027.00**

4.1 Production forklift drivers load the production tractor-trailer combination at the off-set belt.
4.2 The hackline forklift driver's un-load the production tractor-trailer combination and load the hackline tractor-trailer combination in the hacklines.
4.3 Twenty permanent hackline attendants are employed.
4.4 Five strap makers make, replace and repair the tie-down straps for the plastic covering.
4.5 Ten tractor attendants assist the loading and off-loading of the tractor-trailer combination.
4.6 A water car operator work 3 hours per day watering the hacklines.
4.7 A team of 30 workers are employed as a "rain team" to close and open hacklines for an average of 24 weeks per year.
4.8 Three supervisors spend on average three hours per day in the hacklines.
4.9 Five workers assist with the recovery and maintenance of wooden pallets.
4.10 Three employees repair, replace and maintain the plastic covering in the hacklines.

Factory-B

Item No.	Item	Description	No. of vehicles	Hours per day	Consumption per hour	Cost per day	Days per annum	Annual Cost (Rands)
5	Vehicle Cost	Forklifts Prod	2					267,966.02
	Diesel, oil and	Forklifts Hack	2					75,365.44
	maintenance	Tractors	2					75,365.44
		Grader	1					9,544.33
		Water truck	1					14,316.50
							TOTAL VEHICLE COST	**442,556.00**

Item No.	Item	Description	Quantity	Hours per day	Rate/hour	Cost per day	Days per annum	Annual Cost (Rands)
6	Other costs	Land Surveyor cost						18,000.00
							TOTAL SURVEYING COST	**18,000.00**
6.1 The cost of surveying the hackline yards.								

Item No.	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
7	Bricks	Green bricks drying	14,000,000		1,357,361.00
		TOTAL VALUE OF THE GREEN AND DRY BRICKS IN THE HACK YARD			**1,357,361.00**
7.1 14 million green bricks are in the hacklines at any one time.					

3.5 Hackline Operating Cost – Factory-C

Overview of Factory-C

Factory-C is a clay brick manufacturing operation utilizing hackline drying technology to produce on average 35 million saleable bricks per annum. The hacklines consist of 7 blocks which covers a total area of 44,000 square metres. A total of 2,4 million bricks in process to be dried, are stocked in the hacklines at any one time. Distances ranging from 50 metres (shortest) to 420 metres (longest) from off-setting to the hacklines and 15 metres (shortest) to 215 metres (longest) from the hacklines to the clamp kilns.

Hackline production flow process:

1. Green bricks are off-set onto wooden pallets – (500 green bricks per pallet)
2. Pallets are picked up by forklift truck at off-setting and then transported to the hacklines with the forklift.
3. The green brick packs are then packed into the hacklines by the same forklift.
4. The pallets are closed by plastic sheeting as and when required either during the initial stages of drying or during adverse weather conditions.
5. The green bricks are kept in the hacklines to dry naturally in air for a period of ±4 weeks.
6. The dry bricks on pallets are removed from the hacklines by forklift truck.
7. The forklift truck transports the pallets with dry bricks to the clamp kilns.
8. The empty pallets from the clamps are transported back to the off-set belt by forklift truck where they are checked for damage, stacked and awaiting re-setting.

The hacklines are regularly scraped by grader to ensure level and dust free surfaces. The hacklines are constantly watered for dust suppression with the water car operating about 75 % of its time in the hacklines. Handling waste i.e. waste generated between the off-set belt and the clamp kilns, is removed on a daily basis using the frontend loader. The hackline attendants maintain damaged packed bricks on pallets on a continuous basis.

Summary of the annual Hackline Costs for factory-C.

Item No	Item	Annual Cost (Rands)
1	Pallets	616,785.00
2	Brick Covers and straps	372,873.00
3	Pallet netting	0.00
4	Block Poles	0.00
5	Bricks - Handling Waste	176,000.00
6	Total Vehicle Cost	971,199.00
7	Hackline Labour Cost	220,098.00
8	Other Costs	23,400.00
Total Annual Hackline Costs		**2,380,355.00**
Green brick value in hacklines		2,400,000.00

The cost of drying in hacklines for factory-C amounts to R 68.00 for every 1000 saleable bricks produced.

A total of 2,4 million green and dried bricks valued at R 2,400,000.00 are held in the hacklines at any one time.

Factory-C: Hackline Cost breakdown

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
1	Pallets	Pallets	6400	R89	569,600.00
		Replacement pallets p/a	0	0	0.00
		Replacement slats p/a	7929	R4.88	38,693.52
		Nails 25kg/box p/a	24	R478.80	11,491.20
				TOTAL PALLET COST	**616,784.72**

1.1. 6400 wooden pallets for drying is required at any one time in the hackline.
1.2. The price of a wooden pallet is R89.
1.3. 7929 wooden slats are needed per year to maintain the pallets. 24 x 25 kg. boxes of nails are required per year to maintain the pallets.

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
2	Brick Covers	500 x 2970 x 1510	4800	R44.30	212,640.00
		Replacement sheets p/a	3500	R44.30	155,050.00
	straps	Used conveyor strips	00		00.00
		Repair rope p/a	12	R431.93	5,183.16
				TOTAL BRICK COVER COST	**372,873.16**

2.1. 4800 rolls of plastic sheeting is required at any one time in the hackline.
2.2. The price per roll is R44.30. 3500 rolls are replaced during the year.
2.3. 12 rolls of repair rope at R431.93 per roll are used per year for maintaining the straps.

Factory-C

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
3	Pallet netting	Pallet netting	N/A		0.00
		Replacement netting			
			TOTAL PALLET NETTING COST		**0.00**
3.4.					

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
4	Block Poles	Y standard droppers	N/A		0.00
			TOTAL BLOCK POLE COST		**0.00**
4.2.					

Item No	Item	Description	Quantity/day	Cost / item	Days/annum	Annual Cost (Rands)
5	Bricks	handling waste	800	R1.00	220	176,000.00
			TOTAL COST OF HANDLING WASTE IN HACKLINES			**176,000.00**
5.1. On average 800 green and dry bricks per day are damaged due to handling in the hacklines.						

Factory-C

Item No	Item	Description	No. of vehicles	Hours per day	Consumption per hour	Cost per day	Days per annum	Annual Cost (Rands)
6	Vehicle	Forklift Prod	1	14	4.5	679.14	242	164,351.88
	Diesel cost	Forklift Kiln	1	14	6	905.52	242	219,135.84
		Tractors Prod	0	0	0	0	0	0
		Tractors Kiln	0	0	0	0	0	0
		Tractor H/Keeping	0	0	0	0	0	0
		Grader	1	4	10.9	470.00	55	25,850.00
		Loader	1	9	9	873.18	242	211,309.56
		Dumpers	0	0	0	0	0	0
		Watercart	1	14	1.8	271.65	242	65,739.30
							TOTAL VEHICLE DIESEL COST	**686,386.58**
7	Vehicle maintenance cost						**TOTAL VEHICLE MAINTENANCE COST**	**172,808.30**
8	Vehicle hydraulic oil cost						**TOTAL VEHICLE HYDROLIC OIL COST**	**95,946.00**
9	Vehicle engine oil cost						**TOTAL VEHICLE ENGINE OIL COST**	**16,058.57**
							TOTAL HACKLINE VEHICLE COST	**971,199.45**
6.1. Diesel cost per litre R10.78								

Factory-C

Item No	Item	Description	Quantity	Hours per day	Rate/hour	Cost per day	Days per annum	Annual Cost (Rands)
10	Hackline	Forklift operators - prod	3	9	12.23	330.21	242	79,910.82
	Labour cost	Forklift operators - hack	0	0	0	0	0	0
		Tractor operators - Prod	0	0	0	0	0	0
		Tractor operators - hack	0	0	0	0	0	0
		Tractor operator – H/keeping	0	0	0	0	0	0
		Grader operator	1	9	14.87	133.83	220	29,442.60
		Line attendants	2	9	10.87	195.66	220	43,045.20
		Hack cleaners	0	0	0	0	0	0
		Strap maker	0	0	0	0	0	0
		Loader operator	1	9	14.87	133.83	220	29,442.60
		Dumper operators	0	0	0	0	0	0
		Water car operator	1	11	12.23	134.53	242	32,556.26
	Weekend Rain Team	Rain team labour	3	9	11.11	300.00	19	5,700.00
						TOTAL HACKLINE LABOUR COST		**220,097.50**

10.1 Production forklift drivers load the production tractor-trailer combination at the off-set belt.

10.2 The hackline forklift driver's un-load the production tractor-trailer combination and load the hackline tractor-trailer combination in the hacklines.

10.3 Two permanent hackline attendants are employed.

10.4 A loader operator work full time in the hacklines.

10.5 A water car operator work 75% of the time in the hacklines.

10.6 A team of three workers are employed as a "rain team" to close and open hacklines over an average of 10 weekends.

Factory-C

Item No	Item	Description	Quantity	Hours per day	Rate/hour	Cost per day	Days per annum	Annual Cost (Rands)
11	Other costs	Petrol for W/Car pump						23,400.00
							TOTAL WATER CAR PUMP COST	**23,400.00**
11.1 The cost of petrol used by the water car pump is a separate cost item and is not included under the vehicle costs.								

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
12	Bricks	Green bricks drying	2400000	R1.00	R2,400,000.00
		TOTAL VALUE OF THE GREEN AND DRY BRICKS IN THE HACK YARD			**R2,400,000.00**
12.2 2,4 million green bricks are in the hacklines at any one time at a value of R1.00 per brick.					

3.6 Hackline Operating Cost – Factory-D

Overview of Factory-D

Factory-D is a clay brick manufacturing operation utilizing hackline drying technology to produce on average 137 million saleable bricks per annum. The hacklines consist of 28 blocks which covers a total area of 151,200 square metres. A total of 12,5 million bricks in process to be dried, are stocked in the hacklines at any one time. Distances ranging from 60 metres (shortest) to 980 metres (longest) from off-setting to the hacklines and 30 metres to 150 metres from the hacklines to the clamp kilns.

Hackline production flow process:

1. Green bricks are off-set onto wooden pallets – (500 green bricks per pallet)
2. Two full pallets are picked up by forklift truck at off-setting and then transported to the hacklines with the fork lift.
3. The green brick packs are then packed into the hacklines by the same forklift.
4. The pallets are closed by plastic sheeting as and when required either during the initial stages of drying or during adverse weather conditions.
5. The green bricks are kept in the hacklines to dry naturally in air for a period of 4 weeks.
6. The dry bricks on pallets are removed from the hacklines by forklift truck.
7. The forklift truck transports the pallets with dry bricks to the clamp kilns.
8. The empty pallets from the clamps are transported back to the off-set belt by forklift truck where they are checked for damage, stacked and awaiting re-setting.

The hacklines are regularly scraped by grader to ensure level and dust free surfaces. The hacklines are constantly watered for dust suppression with the water car operating about 30 % of its time in the hacklines. Handling waste i.e. waste generated between the off-set belt and the clamp kilns, is removed on a daily basis using the frontend loader and dumper trucks. The hackline attendants and hackline cleaners maintain damaged packed bricks on pallets on a continuous basis.

Summary of the annual hackline costs for factory-D

Item No	Item	Annual Cost (Rands)
1	Pallets	3,128,825.00
2	Brick Covers and straps	1,807,500.00
3	Pallet netting	0.00.00
4	Block Poles	10,000.00
5	Bricks - Handling Waste	1,206,000.00
6	Total Vehicle Cost	346,173.00
7	Hackline Labour Cost	1,866,368.00
8	Other Costs	0.00
Total Annual Hackline Costs		**8,364,866.00**
Green brick value in hacklines		8,375,000.00

The cost of drying in hacklines for factory-D amounts to R 61.00 for every 1000 saleable bricks produced.

A total of 12,5 million green and dried bricks valued at R 8,375,000.00 are held in the hacklines at any one time.

Factory-D: Hackline Cost breakdown

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
1	Pallets	Pallets	25000	R 95.00	2,375,000.00
		Replacement pallets p/a	6250	R 95.00	593,750.00
		Replacement slats p/a	8000	R 12.50	100,000.00
		Replacement bearers p/a	2286	R 16.50	37,719.00
		Nails 25kg/box p/a	69	R 324.00	22,356.00
				TOTAL PALLET COST	**3,128,825.00**

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
2	Brick Covers	30x3m plastic sheets	2500	R 482.00	1,205,000.00
		Replacement sheets p/a	1250	R 482.00	602,500.00
				TOTAL BRICK COVER COST	**1,807,500.00**

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
3	Pallet netting	Pallet netting	00	0.00	0.00
		Replacement netting			0.00
				TOTAL PALLET NETTING COST	**0.00**

Factory-D

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
4	Block Poles	Y standard droppers			10,000.00
			TOTAL BLOCK POLE COST		**10,000.00**

Item No	Item	Description	Quantity	Cost / item	Days/annum	Annual Cost (Rands)
5	Bricks	handling waste	1800000	R 0.67		1,206,000.00
			TOTAL COST OF HANDLING WASTE IN HACKLINES			**1,206,000.00**

Item No	Item	Description	No. of vehicles	Hours per day	Consumption per hour	Cost per day	Days per annum	Annual Cost (Rands)
6	All hackline Vehicle costs per annum including diesel, oils, maintenance, Vehicle Safety related costs, etc.							346,173.00
					TOTAL VEHICLE COST			**346,173.00**

Factory-D

Item No	Item	Description	Quantity	Rate/day (Rands)	Days per annum	Annual Cost (Rands)
7	Hackline	Forklift operators - prod	8	167	312	416,832.00
	Labour cost	Forklift operators - hack	4	167	312	208,416.00
		Supervisor	2	190	312	118,560.00
		Grader operator	1	167	312	52,104.00
		Line attendants	10	155	312	482,600.00
		Pallet Maintenance	4	155	312	193,440.00
		Loader operator	1	167	312	52,104.00
		Dumper operators	2	167	312	104,208.00
		Water car operator	1	167	312	52,104.00
		Rain team labour	20	155	60	186,000.00
					TOTAL HACKLINE LABOUR COST	**1,866,368.00**

Item No	Item	Description	Quantity	Cost / item	Annual Cost (Rands)
8	Bricks	Green bricks drying	12,500,000	R 0.67	8,375,000.00
		TOTAL VALUE OF THE GREEN AND DRY BRICKS IN THE HACK YARD			**8,375,000.00**