

Confidential

Final Evaluation Report
Of
Evaluation Study
AT
Karnataka Vidyuth Karkhane Limited
(KAVIKA), Mysore Road, Bangalore
BY



NATIONAL PRODUCTIVITY COUNCIL
(Under Ministry of Commerce & Industry, Govt. of India)
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We express our sincere thanks to **The Managing Director** and **The Executive Director of KAVIKA** for providing valuable inputs and timely coordination during the study.

We acknowledge the valuable time & effort spared and the timely provision of the information & data, by all the Officers and Staff of KAVIKA during the study.

We also credit all the employees for their cooperation to the NPC team during the study.

Bangalore
7th July 2014

C. Narendra
Deputy Director & Head (RPMG)

1.0 Introduction to Company

- 1.1 The Company was established in 1933 as a Government Electric Factory for manufacturing of Electrical Accessories.
- 1.2 Converted into a Government PSU in 1976 with Rs. 6 cr as Authorised Share Capital and Paid up capital of Rs.561.92 lakhs. All the shares are with Govt. of Karnataka.
- 1.3 Installed Capacity of the Plant is 1300 MVA per annum. The present annual output is around 22,000 numbers of transformers aggregating to 1116 MVA. The Production achieved by the Company for the past 5 years are given below. The Company has been steadily increasing its production with a marked increase in 2011-12.

S. No	Year	Qty. (Nos.)	MVA
1	2008-09	10376	671
2	2009-10	14461	698
3	2010-11	14122	747
4	2011-12	20067	1009
5	2012-13	21877	1116

The company produces transformers of different capacities of both conventional and star rated categories which are detailed below.

1. 25 KVA- Conventional and Star
2. 63 KVA - Conventional and Star
3. 100 KVA - Conventional and Star
4. 250 KVA- Conventional
5. 500 KVA-Conventional

- 1.4 The turnover of the Company during the year 2012-13 is Rs.133.99 Crores with Profit of Rs.3.49 Crores. The Financial performance of the Company for the past 5 years is detailed below

S. No.	Year	Sales (No. of Transformers)	Turn Over (Rs. in lakhs)	Profit (Rs. lakhs)
1	2008-09	10800	7606	538.62
2	2009-10	13794	7120	59.00
3	2010-11	14610	7622	152.20
4	2011-12	19975	10524	270.11
5	2012-13	22053	13399	349.88

1.5 The main customers are ESCOMs in Karnataka. The company sells approximately 95% of their products to 5 ESCOMs. Being a State PSU, KAVIKA has an advantage of being considered on priority given their quality and delivery performance in the past.

1.6 The company has 192 permanent employees as on January 2014. In addition trainees/contract workman assists in both shop floor and office activities. The security and housekeeping activities have been out sourced.

1.7 The Company has obtained Approval/Certification from Bureau of Energy Efficiency (BEE) for manufacture of Star Rated Transformers. In the financial year 2012-13, the company sold 22053 transformers against 19975 transformers in the year 2011-12. The break-up of the category of the transformer sold are:

S. No.	Name	Year 2012-13		Year 2011-12	
		Sales (Nos.)	Sales (%)	Sales (Nos.)	Sales (%)
1	25 KVA Star	6504	29.49%	2201	11.02%
2	25 KVA Conv.	5817	26.38%	9037	45.24%
3	63 KVA Star	3236	14.67%	659	3.30%
4	63 KVA Conv	3577	16.22%	5852	29.30%
5	100 KVA Star	1385	6.28%	117	0.59%
6	100 KVA Conv	1042	4.72%	1630	8.16%
7	250 KVA Conv	313	1.42%	224	1.12%
8	500 KVA Conv	30	0.14%	20	0.10%
9	Others	149	0.68%	235	1.18%
Total		22053	100.00	19975	100.00

- 1.8** The company is shifting its focus from producing the conventional transformers to the star rated category of transformers of different capacities. The following table depicts the sale of transformers (in percentage) of star and conventional category in the last two years:

S. No.	Category	2012-13	2011-12
1	Star	50.45%	14.90%
2	Conventional	49.55%	85.10%
Total		100.00%	100.00%

- 1.9** The company is certified to ISO 9001:2008.

2.0 Summary of Evaluation

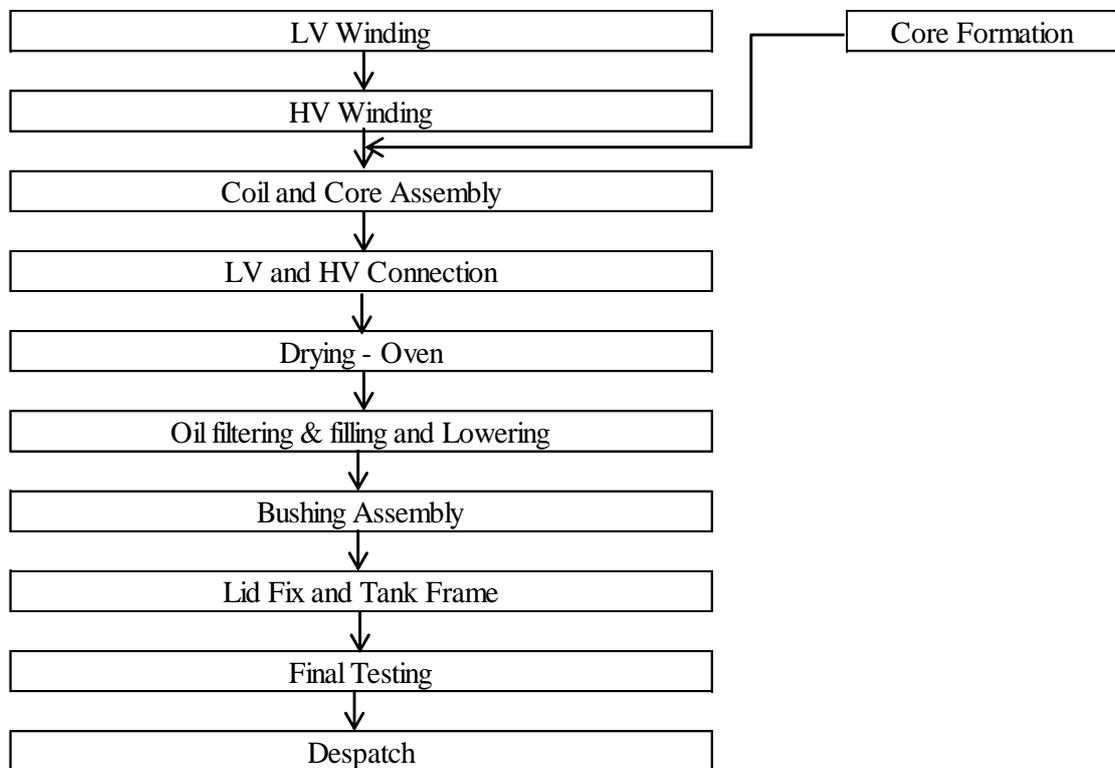
- *Increase the throughput by*
 - *Changing the oven capacity / installing new oven.*
 - *Install new equipment to balance the line. Replace equipments in the winding, testing, despatch etc to balance the manufacturing line.*
 - *Renegotiate with the union for increased outputs per day. It is recommended that a detailed 'Production norms & Manpower assessment' study may be undertaken by the company to ascertain and finalize the production capacity at all the work centers.*
 - *Getting assured orders from the ESCOMS every year.*
- *Start implementation of 'Lean Management'.*
- *Set up cross functional team for the identification of new technologies and procurement / implementation of the same.*
- *The production team also to focus on process improvements.*
- *Recruit personnel in the Officers and the Workmen cadre to fill up vacancies arising out of the retirements of the personnel, if the present pattern of work is continued.*
- *HOD's recruited in the particular departments should be domain specialists in that area of work.*
- *Perform detailed planning to create a corpus amount to take care of the fluctuations in the receipts.*

3.0 Evaluation Issue - 1 - Identification of areas for Automation / Mechanisation for reducing manufacturing Lead Time and Resources.

3.1 The process of manufacturing of the transformers involves winding of coils and assembly of core. Except winding of the coil which is a semi-automated process all other activities currently performed are manual. Hence it is a labour intensive manufacturing process.

The shop floor activities in the plant were observed in detail and areas for improvements in terms of Automation / Mechanisation were shortlisted. For evaluation of the various possibilities detailed discussions were held with the management personnel of KAVIKA and select subject matter specialists in the field. A detailed discussion was conducted with the top management of the company to arrive at the best possible options keeping in view of the company's strategy in the coming years.

3.2 Flow Process for manufacturing of transformers



3.3 Areas for automation

1	Winding area
1.1	<p>Present method:</p> <p>The LV core is wound using semi-automated winding machine. In this process, on a die for a specific coil size, wire is wound for one layer. Then insulation paper and side strips are pasted over the layer. The next layer of wire is wound on the insulation paper. Then again insulation paper and side strips are placed. The next layer of wire is wound over the insulation paper. This process is continued till a specified length of wire is wound. The present manning is two persons per machine and there are a total of 10 machines in the shop floor. Eight machines are utilized for the production.</p> <p>In case of HV winding, first the LV wound core is kept on the Winding machine. One layer on wire is wound over the HV coil. Then insulation paper and side strips are pasted over the layer. The next layer of wire is wound on the insulation paper. This process is continued till a specified length of wire is wound. The present manning is one person per machine and there are a total of 32 machines in the shop floor.</p>
1.2	<p>Evaluation & Analysis:</p> <p>1.2.1 With a focus on the improvement in quality, reduction in the cycle time and optimization of the resources NPC met up with the manufacturer of the automatic winding machines located in Electronic City, Bangalore.</p> <p>Presently this operation of LV winding is performed with a staffing of two persons per machine and the HV winding is performed with a manning of one person per machine. The discussions with the manufacturer have revealed that the company may either go in for a semi automatic machine or fully automatic machine. In the semi automatic machine, the manpower per machine will be one per machine and in the automatic machines the manpower is one person for 2 machines. The manufacturer has provided a list of parameters to be filled (Annexure 1) by the company after which he will be able to make suggestions about the kind of machine to be installed.</p> <p>The process cycle time presently ranges from 20 minutes for 25 KVA transformer to 50 minutes for 100 KVA transformer (LV winding) and process cycle time presently ranges from 75 minutes for 25 KVA transformer to 113 minutes for 100 KVA transformer (HV winding). This will also be optimized in the new machines. For the calculation of the</p>

	<p>exact cycle time, a format has been issued by the manufacturer (Annexure - 1). Once the format is filled up and the manufacturer inspects the shop floor, the machine which is suitable for KAVIKA will be suggested. As already emphasized, the focus has been the reduction of cycle time, improvement in quality and optimization of resources.</p> <p>Presently 10 machines are available in the shop floor for LV winding and 32 machines for HV winding. So the company may decide the optimum number of the new type of machines based on the production target planned for the coming years.</p>
1.3	<p>Recommendation:</p> <p>The company may procure either semi automatic / fully automatic machines based on the strategy for the coming years.</p>

2	Drying Oven
2.1	<p>Present method:</p> <p>A "heating cum vacuum chamber" is used for drying and removing excess moisture of the transformers. Transformers are dried overnight in the vacuum chamber. The next day morning the transformers are unloaded using hoist and again new transformers are loaded and kept inside the chamber for drying. The process is repeated everyday.</p>
2.2	<p>Evaluation & Analysis:</p>
2.2.1	<p>Presently processed transformers are being unloaded and to be processed transformers are loaded into the oven in 2 hours time. The process cycle time in the oven is 22 hours. Hence the total time is 24 hours for the batch of transformers.</p> <p>Detailed discussions with consultants and experts in the Transformers Industry have revealed that most of the industries do not use vacuum in the manufacturing process of the transformers of capacities 25 KVA, 63 KVA etc. This has also been validated in our discussions with Swaraj Kumar Das, HOD / Joint Director, CPRI Bangalore. The company will have to decide whether the use of vacuum is necessary in the manufacturing process.</p>

	<p>Secondly, as the oven is the bottleneck operation, the company will have to find out means to increase the throughput through this workcenter. In order to facilitate this, NPC met a manufacturer of the ovens located in Jalahalli, Bangalore.</p> <p>NPC facilitated the visit of the company personnel to KAVIKA for interactions with the management team of KAVIKA. After detailed discussions, the company has asked for detailed proposals for</p> <ul style="list-style-type: none"> • Existing machine – installation of one additional platform to accommodate another batch of transformers and without using vacuum. • New heating oven with 2 platforms <p>Based on the information provided by the company, the detailed proposals will be submitted by the company personnel.</p>
2.3	<p>Recommendation:</p> <p>The company may adopt the appropriate model for the increase in the throughput.</p>

3	Testing
3.1	<p>Present method:</p> <p>After drying, coils are checked for Megger value. If the Megger value is above the specified level, then they are passed for Final Assembly.</p> <p>After Final Assembly the following Tests are performed:</p> <ol style="list-style-type: none"> 1. Resistance Test. 2. Short Circuit Test. 3. Open Circuit Test. 4. High Voltage Test. 5. Induce Test. <p>In each of the tests wires are connected to a transformer and tests are performed for a specific time. The readings are noted manually.</p>
3.2	<p>Evaluation & Analysis:</p> <p>3.2.1 Presently all the machines used for the testing of transformers are manual in nature and the results are also to be manually recorded. In order to improve the quality of the output, data recording and satisfaction level of the customer in the products manufactured by KAVIKA, the company</p>

may shift to automatic / computerised testing machines.

In this regard NPC team conducted detailed discussions with the following CPRI personnel:

1. Shri Siddhartha Bhatt
Additional Director
Functional Head (EATD, Library, Information Center, Purchase & Training)
Central Power Research Institute
New BEL Road
Sadashivanagar P.O
Bangalore – 560 073
2. Shri Swaraj Kumar Das
HOD / Joint Director
SC Laboratory
Central Power Research Institute
New BEL Road
Sadashivanagar P.O
Bangalore – 560 073

They have also validated the NPC viewpoint that testing of transformers being a critical process, accuracy of the output & its recording and consistency of the test results being important parameters, it would be prudent to go in for the installation of automatic / computerised testing machines and a reliable supplier of such products in the transformer industry is

Prolific Systems & Technologies Private Limited
Plot No A 267, Wagle Industrial Estate,
Road No 16 A,
Near ESIS Hospital
Thane (West) – 400 604
Email: testingsolutions@prolificindia.com

The Bangalore offices are located at
324 /1, Hosur Road
Madiwala
Bangalore – 560068 And

	<p>1st Floor, No 15 12th Block, 5th Main, Kumara Park (W) Behind BDA Building Bangalore – 560 020</p> <p>The company may intimate the exact requirements to the above company and they will be able to suggest the concerned machine for the company.</p> <p>After the completion of the final testing today, ESCOM is informed about the same on the next day. ESCOMS take 4 days to respond and 2 days are taken up for the arrangement of the lorry for despatch. Totally it takes about 7 days from the completion of the final testing till the despatch of the transformers. In case of automatic testing, ESCOMS would develop the confidence in the testing process and the testing by ESCOMS will not be required.</p>
<p>3.3</p>	<p>Recommendation: Automatic / Computerised testing machines may be procured and installed to improve the quality of testing, documentation, maintain consistency in the test results and reduce cycle time.</p>

<p>4</p>	<p>Carpentry</p>
<p>4.1</p>	<p>Present method: Pressboards, that come in the form of sheets, are cut into small strips using cutting machine. In the process of cutting, 1 sheet at a time is kept and slowly pressed from one end, while the other end the pressboards are cut in the form of small strips.</p>
<p>4.2 4.2.1</p>	<p>Evaluation & Analysis: Cutting one sheet at a time is time consuming. Fixing a sharper cutter and motor with a higher capacity would assist in cutting more sheets at the same time. This would reduce the cycle time & also improve utilisation of manpower</p>
<p>4.3</p>	<p>Recommendation It is proposed to fix a sharper cutter and motor with high HP so that instead cutting 1 sheet at a time, more numnbers of sheet can be cut at a time.</p>

5	Core Winding
5.1	Present method: The kraftpaper(insulation paper) are pasted on each layer of the coil using gum
5.2	Evaluation & Analysis:
5.2.1	Using gum necessitates the removal of the moisture from the product. Hence it is proposed that the gum be replaced by cello tape.
5.3	Recommendation: Use cello tape instead of gum.

6	Oil Filtering and Oil Filling
6.1	Present method: The oil is filtered & heated and then the hot oil is poured into the Tank. Testing is done on the next day once the oil gets cooled as hot oil does not give accurate result. This results in the loss of one day for the processing.
6.2	Evaluation & Analysis:
6.2.1	To reduce the cycle time by one day, it is proposed to install one storage tank of 10,000 L, in which the filtered and hot oil will be stored. The oil once cooled can be directly filled in the Tank & Testing can be done immediately after completing the final assembly. During our discussions with consultants from transformer industry it has been brought to our notice that if the company is able to procure oil with BDV value of 35-40 in cold condition, then heating may be dispensed with.
6.3	Recommendation: In order to bring about the process improvement, the company can go in for <ul style="list-style-type: none">• Procuring oil with BDV value 35-40 in cold condition or• Install one storage tank with capacity 10000 liters in which filtered and hot oil will be stored.

4.0 Evaluation Issue - 2 : HR Planning for the next 5 years in view of reduction in Manpower arising out of Retirement. HR Planning will focus on key positions to be kept on the Company rolls and jobs which can be out-sourced or executed through alternate means.

4.1 The company has 192 permanent employees as on January 2014. In addition Trainees / Consultant / Apprentice assist in the shop floor as well as the office activities. The Security and the House Keeping activities have been outsourced. Due to stoppage in the recruitment process in the past years, the number of employees both in the managerial and workman category will be reduced because of the retirement in the coming years. In the next five years (Till 31st December 2018) 43 personnel will be retiring from KAVIKA. This includes 7 personnel from the Officer Cadre and 36 personnel from the Workman Cadre. The following table details the number of personnel of both Officer and Workman Cadre retiring each year till 2018.

Table 4.1.1 : Retirement in Next 5 Years			
S. No.	Year	Officers	Workmen
1	2014	1	4
2	2015	3	11
3	2016	0	6
4	2017	2	9
5	2018	1	6
	Total	7	36

4.2 Grade wise the retirees can be classified as per the following table

S. No.	Grades	Nos
1	Officer	7
2	Commercial Superintendent	4
3	Charge man	5
4	Senior Highly Skilled	19
5	Grade A,B, C, D	6
6	Others	2
	Total	43

4.3 Officers

4.3.1 It is observed that the total strength of Officer Cadre personnel is 11 (Excluding MD, ED and Asstt. Engineer (KPTCL) who are on deputation basis) as on January 2014. The number of Officer personnel retiring by 2018 is 7. They include 1 GM, 4 DGMs and 2 Dy. Managers. The details are provided in the below mentioned table. Hence, by 2018 the number of Officer personnel will be reduced by 63%. All Four HOD's will be retiring by the end of 2015.

S. No	Name	Designation	Department	Retirement Date
1	Gopalakrishna N.R.	DGM	Production & P&A.	31-12-2014
2	Ananda G.S.	GM	Finance	31-05-2015
3	Jagadeesan T.D.	DGM	QC & Designs	30-09-2015
4	Jagadish Kumar G.	DGM	Purchase & Stores	30-09-2015
5	Prabhakara C.	DGM	Marketing	30-04-2017
6	Chandrasekhar R.	Dy. Manager	Maintenance	30-06-2017
7	Munirama V.	Dy. Manager	Transport, Security & Housekeeping	30-06-2018

4.3.2 All these personnel have been employees of KAVIKA for more than 30 years. With their retirements, KAVIKA will be losing the managerial &

decision making personnel and also the knowledge base developed by them over the years. For the continuity of any organization, human resources form a very integral component and more so in the managerial cadre. In order to maintain its competitiveness in the market as well as in the manufacturing arena, it is recommended that the organization make plans for the filling up of the positions of the retirees at the earliest. *Detailed job descriptions of the personnel to fill up the positions are to be prepared and approval obtained from the appropriate authorities for recruitment of the personnel. It is also stressed here that the HOD's recruited in the particular departments should be domain specialists in that area of work.*

4.4 Workmen

4.4.1 Out of 181 workmen, 36 workmen are going to retire in the next 5 years. 20 % reduction in the strength is expected in the next 5 years. If the present pattern of working is continued in the next 5 years, then the organization will have to recruit and replace the personnel who retire from the company. The change in the specific departments is depicted in the following tables. In order to maintain its competitiveness in the market as well as in the manufacturing arena, it is recommended that the organization make plans for the filling up of the positions of the retirees at the earliest. *Detailed job descriptions of the personnel to fill up the positions are to be prepared and approval obtained from the appropriate authorities for recruitment of the personnel.*

Table 4.4.1: Chage of Manpower in Specific Departments due to retirement till 2018					
Department: Accounts					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Com. Supdt.	3	Com. Supdt.	2	2015
2	Com. Supervisor	1	Com. Supervisor	1	-
3	Receptionist	1	Receptionist	1	-
4	Sr Assistant	1	Sr Assistant	1	-
	Total	6	Total	5	-
Department: Canteen					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Cook	1	Cook	1	-
2	Grade D	4	Grade D	4	-
	Total	5	Total	5	-
Department: Personnel					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Com. Supdt.	2	Com. Supdt.	2	-
2	Typist	1	Typist	0	2015
3	Staff Nurse	1	Staff Nurse	1	-
4	Personnel Sec. (MD)	1	Personnel Sec. (MD)	1	-
5	Group-D	2	Group-D	2	-
	Total	7	Total	6	-
Department: Security					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Com. Supdt.	1	Com. Supdt.	0	2016
2	Security Supervisor	1	Security Supervisor	1	-
3	Security Assistant	1	Security Assistant	1	-
4	Sr. Highly Skilled	2	Sr. Highly Skilled	0	2015, 2018
5	Grade C	1	Grade C	1	-
	Total	6	Total	3	-
Department: Purchase					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Com. Supdt.	1	Com. Supdt.	0	2014
2	Grade A, B	2	Grade A, B	2	-
	Total	3	Total	2	-

Table 4.4.1: Chage of Manpower in Specific Departments due to retirement till 2018					
Department: Sales					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Com. Supdt.	1	Com. Supdt.	0	2015
2	Com. Supervisor	1	Com. Supervisor	1	-
3	PA	1	PA	0	2018
	Total	3	Total	1	-
Department: Stores					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Jr. Engineer	1	Jr. Engineer	1	-
2	Jr. Chageman	1	Jr. Chageman	0	2017
3	Sr. Highly Skilled	1	Sr. Highly Skilled	0	2015
4	Grade C,D	2	Grade C,D	1	2018
	Total	5	Total	2	-
Department: Designs, Quality and Transport					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Sr. Draughtsman	5	Sr. Draughtsman	1	2015, 2016, 2017 (2)
2	Jr. Engineer	5	Jr. Engineer	5	-
3	Sr. / Highly Skilled	3	Sr. / Highly Skilled	1	2016, 2017
4	Grade A,B	2	Grade A,B	2	-
5	Driver	1	Driver	1	-
	Total	16	Total	10	-
Department: Carpentry					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Sr. Chageman	1	Sr. Chageman	0	2015
2	Sr. Highly Skilled	3	Sr. Highly Skilled	1	2015, 2018
3	Grade C,D	4	Grade C,D	4	-
	Total	8	Total	5	-
Department: Winding					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Jr. Engineer	1	Jr. Engineer	1	-
2	Jr. Chageman	2	Jr. Chageman	1	2016
3	Sr. / Highly Skilled	7	Sr. / Highly Skilled	5	2016, 2017
4	Grade A, B, C, D	44	Grade A, B, C, D	44	-
	Total	54	Total	51	-

Table 4.4.1: Chage of Manpower in Specific Departments due to retirement till 2018					
Department: Core Formation					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Grade A, B, C, D	13	Grade A, B, C, D	11	2017, 2018
	Total	13	Total	11	-
Department: Core Coil Assembly					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Sr. Chageman	1	Sr. Chageman	0	2018
2	Sr. Highly Skilled	1	Sr. Highly Skilled	1	-
3	Grade A, B, C, D	9	Grade A, B, C, D	8	2014
	Total	11	Total	9	-
Department: LV/ HV Connection and Lowering					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Sr. / Highly Skilled	2	Sr. / Highly Skilled	1	2017
2	Grade A, B, C, D	5	Grade A, B, C, D	4	2014
	Total	7	Total	5	-
Department: Chamber, Maintenance and Repair					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Jr. Assistant	1	Jr. Assistant	1	-
2	Sr. / Highly Skilled	5	Sr. / Highly Skilled	3	2015 (2), 2018
3	Grade C	1	Grade C	1	-
	Total	7	Total	5	-
Department: TPS					Retirement Year
S. No.	Present		After 2018		
	Designation	Strength	Cadre	Strength	
1	Jr. Engineer	2	Jr. Engineer	2	-
2	Sr. Chageman	1	Sr. Chageman	0	2014
3	Sr. Highly Skilled	5	Sr. Highly Skilled	2	2015, 2016, 2017
4	Com. Supdt.	1	Com. Supdt.	1	-
5	Driver	1	Driver	1	-
6	Assistant	1	Assistant	1	-
7	Grade A, B, C, D	19	Grade A, B, C, D	18	2017
	Total	30	Total	25	-

5.0 Evaluation Issue – 3: Re-engineering of Bills Receivable Process between KAVIKA and ESCOMs and analysis of Revenue Stream.

5.1 Re-engineering of Bills Receivable Process between KAVIKA and ESCOMs

5.1.1 The company sells nearly 95% of their products to 5 ESCOMs. They are BESCOM (Bangalore), HESCOM (Hubli), MESCOM (Mangalore), GESCOM (Gulbarga) and CESC (Mysore). Whenever goods (Transformers) are sent to the ESCOMs, one copy of the Invoice is sent to the party along with the transporter. Also on the very next day another copy of the Invoice is sent through courier. The detailed process flow is depicted below. It is observed that out of the total cycle time of 69.05 days 67 days are spent in the ESCOMs and 2.05 days are spent in KAVIKA. The salient features of the process are

- the % of the time spent in KAVIKA is 3 % and the rest 97 % is spent in the ESCOMs
- the follow up component is averaging 65 days in the process cycle time

Reengineering is a major change initiative and is defined as

The fundamental rethinking and radical redesign of business processes to achieve dramatic improvement in critical, contemporary measures of performance such as

- **Cost**
- **Quality**
- **Service**
- **Speed**

Significant gains cannot be accrued by reengineering the process inside KAVIKA.

Flow Process Chart (From Raising Invoice to Receipt of Payment)										
S. No.	Activity		Avg. Time (in Days)	Day	Marketing Dept			Finance Dept		
					Manager	Comrcl. Supdt.	Comrcl. Asstt.	Manager	Comrcl. Supdt.	Comrcl. Asstt.
1	Raise Invoice		0.02	1						
2	Verify and sign by the Manager		0.01	1						
3	Send Courier to concerned party		1	2						
4	Send 2 copies of Invoice to the Finance Dept.		1	2						
5	File 1 copy in the concerned file		0.01	2						
6	File 1 copy in the concerned file		0.01	2						
7	Enter the details of the Invoice in the		0.02	2						
8	Follow up with the Parties for payment		-	-						
9	Receive payment through RTGS	BESCOM	69	71						
10		CESC	66	68						
11		GESCOM	61	63						
12		HESCOM	72	74						
13		MESCOM	45	47						
	After Pavent			65						
14	Follow up / Receive the details of the payment		3	68						
15	Send the receipt of payment to the party		1	69						
16	Enter details in the Card		0.04	69.04						
17	File receipt in the Payment Collection File		0.01	69.05						
18	Total Elaspse Days			69.05						
19	Total Days Inside KAVIKA		2.05							
20	Total Days Outside KAVIKA		67							

5.2 Analysis of Revenue Stream

5.2.1 The tables 5.2.1 & 5.2.2 detail the monthly sales and monthly received amount of the various ESCOMs during the Financial Year 2012-13. The receipts are varying from a low of **Rs. 8,57,30,226.00** to a high of **Rs. 18,13,63,053.00 in the year 2012 - 2013**. The receipts are varying from a low of **Rs.7,89,52,362.00** to a high of **Rs. 18,13,42,457.00 in 2013 – 2014 till December 2013**. The average receipts are Rs. 13,10,83,671.84 and the spread is 2 sigma from the average. The spread will be reduced if the lead time in the bill processing by the ESCOMS is reduced. For this changes have to be performed in the process followed in the ESCOMS for their bill processing. The variation may be brought down to one sigma or less. Secondly the company may build up a corpus fund from the profits made every year to take care of the fluctuations in the receipts. Similarly the average receipts per month for 2013 – 2014 are Rs. 12,45,38,168.29 and the spread is 2 sigma from the average.

5.2.2 The average monthly cost is Rs.11,85,29,359.17 for 2013 – 14. The details are provided in tables 5.2.3 & 5.2.4 respectively. As the receipts are varying month to month, with a minimum of Rs. 8,57,30,226.00 in 2012-13 and Rs.7,89,52,362.00 in 2013-14. The difference between the average monthly cost and the minimum receipts for a period of three months may be maintained as a corpus fund.

Table 5.2.1 : Sales value and amounts received for the year 2012 - 2013				
Party	Month	Total Sales Value (Rs.)	Total Received Amount (Rs.)	Total Monthly receipt
BESCOM	Apr-12	61074500.51	53875552.00	Rs. 10,21,76,385
CESC	Apr-12	17532205.70	7581774.00	
GESCOM	Apr-12	6838483.00	14311859.00	
HESCOM	Apr-12	11807303.76	12975001.00	
MESCOM	Apr-12	9362198.70	13432199.00	
BESCOM	May-12	52000926.96	35012604.00	Rs. 8,57,30,226
CESC	May-12	13225399.24	34215124.00	
GESCOM	May-12	16855702.56	4455688.00	
HESCOM	May-12	11890180.62	5336305.00	
MESCOM	May-12	1378088.86	6710505.00	
BESCOM	Jun-12	70088478.51	63643343.00	Rs. 11,69,50,025
CESC	Jun-12	13122929.43	7176808.00	
GESCOM	Jun-12	21825271.51	15409380.00	
HESCOM	Jun-12	16653959.04	17065772.00	
MESCOM	Jun-12	16091434.02	13654722.00	
BESCOM	Jul-12	86926430.88	26183490.00	Rs. 9,75,09,581
CESC	Jul-12	17533519.66	28854956.00	
GESCOM	Jul-12	14958081.36	24634545.00	
HESCOM	Jul-12	22777263.84	6812100.00	
MESCOM	Jul-12	20744397.60	11024490.00	
BESCOM	Aug-12	65807847.00	70159779.00	Rs. 14,77,01,058.69
CESC	Aug-12	39074196.83	8906046.00	
GESCOM	Aug-12	17272223.12	28216630.69	
HESCOM	Aug-12	25448196.52	6668156.00	
MESCOM	Aug-12	22478286.30	33750447.00	
BESCOM	Sep-12	47877281.39	86315698.00	Rs. 11,80,19,692
CESC	Sep-12	24610168.99	2936628.00	
GESCOM	Sep-12	18712116.11	5527721.00	
HESCOM	Sep-12	34604463.00	13405607.00	
MESCOM	Sep-12	5460839.37	9834038.00	
BESCOM	Oct-12	33542744.90	53691155.00	Rs. 11,09,71,855
CESC	Oct-12	4590163.05	3151217.00	
GESCOM	Oct-12	20923193.83	8870521.00	
HESCOM	Oct-12	11000303.50	30858086.00	
MESCOM	Oct-12	20723423.80	14400876.00	
BESCOM	Nov-12	76945984.95	73176663.00	Rs. 13,93,11,845
CESC	Nov-12	7685071.72	17692127.00	
GESCOM	Nov-12	26520367.71	25267065.00	
HESCOM	Nov-12	22422375.82	3780928.00	
MESCOM	Nov-12	21843357.48	19395062.00	

Table 5.2.1 : Sales value and amounts received for the year 2012 - 2013				
Party	Month	Total Sales Value (Rs.)	Total Received Amount (Rs.)	Total Monthly receipt
BESCOM	Dec-12	93621757.08	69040221.00	Rs.15,98,33,063
CESC	Dec-12	2861195.32	24086600.00	
GESCOM	Dec-12	22620080.55	16161850.00	
HESCOM	Dec-12	19286565.00	34022684.00	
MESCOM	Dec-12	23325430.59	16521708.00	
BESCOM	Jan-13	84468400.87	6,66,86,015.00	Rs. 16,93,99,195
CESC	Jan-13	12722292.00	2,65,18,891.00	
GESCOM	Jan-13	18659127.79	3,19,31,756.00	
HESCOM	Jan-13	25978416.84	2,64,97,389.00	
MESCOM	Jan-13	32256571.21	1,77,65,144.00	
BESCOM	Feb-13	71722368.53	5,99,06,973.00	Rs. 12,95,84,440
CESC	Feb-13	18488662.02	1,89,30,619.00	
GESCOM	Feb-13	24356820.06	1,70,18,567.00	
HESCOM	Feb-13	17872548.80	46,18,852.00	
MESCOM	Feb-13	29992588.13	2,91,09,429.00	
BESCOM	Mar-13	58381259.40	9,41,63,692.00	Rs. 18,13,63,053
CESC	Mar-13	21814713.37	9,61,844.00	
GESCOM	Mar-13	25906223.88	78,71,901.00	
HESCOM	Mar-13	16140450.00	4,41,71,225.00	
MESCOM	Mar-13	34670341.93	3,41,94,391.00	

Table 5.2.1 : Sales value and amounts received for the year 2012 - 2013			
Party	Total Sales Value (Rs.)	Total Received Amount (Rs.)	Total Monthly receipt
Total Receipt for the year			Percentage
<i>BESCOM</i>	<i>Rs. 80,24,57,980.98</i>	<i>Rs.75,18,55,185.00</i>	48.24%
<i>CESC</i>	<i>Rs. 19,32,60,517.33</i>	<i>Rs.18,10,12,634.00</i>	11.61%
<i>GESCOM</i>	<i>Rs. 23,54,47,691.48</i>	<i>Rs.19,96,77,483.69</i>	12.81%
<i>HESCOM</i>	<i>Rs. 23,58,82,026.74</i>	<i>Rs.20,62,12,105.00</i>	13.23%
<i>MESCOM</i>	<i>Rs. 23,83,26,957.99</i>	<i>Rs.21,97,93,011.00</i>	14.10%
Total for the year	<u>Rs1,70,53,75,174.52</u>	<u>Rs.1,55,85,50,418.69</u>	100.00%

Table 5.2.2 : Sales value and amounts received for the year 2013 – 2014 (upto December 2013)				
Party	Month	Total Sales Value (Rs.)	Total Received Amount (Rs.)	Total Monthly receipt
BESCOM	Apr-13	62581560.78	3402134.00	Rs. 9,73,54,349
CESC	Apr-13	19411796.00	27044237.00	
GESCOM	Apr-13	16529369.14	28441889.00	
HESCOM	Apr-13	27020601.95	20307285.00	
MESCOM	Apr-13	22280984.46	18158804.00	
BESCOM	May-13	52856918.47	26754081.00	Rs. 10,62,87,723
CESC	May-13	20545937.53	52944.00	
GESCOM	May-13	23834565.76	21896697.00	
HESCOM	May-13	17703305.86	21080244.00	
MESCOM	May-13	26349228.49	36503757.00	
BESCOM	Jun-13	77609158.17	84450415.00	Rs. 10,50,82,778
CESC	Jun-13	19119920.51	914978.00	
GESCOM	Jun-13	12627025.70	5536739.00	
HESCOM	Jun-13	15561414.74	3299265.00	
MESCOM	Jun-13	32618490.28	10881381.00	
BESCOM	Jul-13	112043089.38	20054896.00	Rs. 11,10,78,367
CESC	Jul-13	22729535.73	31836441.00	
GESCOM	Jul-13	2820107.00	23051144.00	
HESCOM	Jul-13	15227513.41	19667534.00	
MESCOM	Jul-13	22249895.34	16468352.00	
BESCOM	Aug-13	63681602.42	111378223.00	Rs. 18,13,42,457
CESC	Aug-13	29662862.46	15514154.00	
GESCOM	Aug-13	11721376.00	1863193.00	
HESCOM	Aug-13	35796555.94	33795842.00	
MESCOM	Aug-13	5112690.66	18791045.00	
BESCOM	Sep-13	79956376.47	83510160.00	Rs. 14,87,61,098
CESC	Sep-13	16569373.84	16646633.00	
GESCOM	Sep-13	25075447.40	13880639.00	
HESCOM	Sep-13	33615022.35	16008402.00	
MESCOM	Sep-13	19635160.86	18715264.00	
BESCOM	Oct-13	63662456.26	48195037.00	Rs. 13,87,52,406
CESC	Oct-13	10188954.94	48025359.00	
GESCOM	Oct-13	25477984.73	8109944.00	
HESCOM	Oct-13	31872886.50	24106098.00	
MESCOM	Oct-13	13955735.25	10315968.00	
CESC	Nov-13	3354463.06	1439609.00	Rs. 13,96,40,065
GESCOM	Nov-13	15480086.28	35612688.00	
HESCOM	Nov-13	30116532.08	0.00	
MESCOM	Nov-13	12801424.12	15805049.00	
BESCOM	Dec-13	72933330.90	54032323.00	
CESC	Dec-13	11414742.65	21627211.00	Rs. 13,96,40,065
GESCOM	Dec-13	3623444.11	30986404.00	
HESCOM	Dec-13	38913880.69	16831270.00	
MESCOM	Dec-13	21541372.77	16162857.00	

Party	Total Sales Value (Rs.)	Total Received Amount (Rs.)	Total Monthly receipt
Total Receipt for the year			Percentage
<i>BESCOM</i>	<i>Rs.63,68,73,364.27</i>	<i>Rs.45,78,72,285.00</i>	41.35%
<i>CESC</i>	<i>Rs.15,29,97,586.72</i>	<i>Rs.16,31,01,566.00</i>	14.73%
<i>GESCOM</i>	<i>Rs.13,71,89,406.12</i>	<i>Rs.16,93,79,337.00</i>	15.30%
<i>HESCOM</i>	<i>Rs.24,58,27,713.52</i>	<i>Rs.15,50,95,940.00</i>	14.01%
<i>MESCOM</i>	<i>Rs.17,65,44,982.23</i>	<i>Rs.16,18,02,477.00</i>	14.61%
Total for the year	<u>Rs. 1,34,94,33,052.86</u>	<u>Rs.1,10,72,51,605.00</u>	100.00%

Sl. No.	Category	April to September 2013	Monthly Expense (From Last 2 Quarters)
1	Cost of R/M and FG & WIP	Rs. 56,30,84,335.00	Rs. 9,38,47,389.17
2	Wages	Rs. 2,68,90,886.00	Rs. 44,81,814.33
3	Sumptuary Allowance	Rs. 36,78,833.00	Rs. 6,13,138.83
4	Other Employee Benefits	Rs. 3,51,36,908.00	Rs. 58,56,151.33
5	Finance Cost	Rs. 46,30,061.00	Rs. 7,71,676.83
6	Penalty for delay in supply	Rs. 5,28,33,107.00	Rs. 88,05,517.83
7	Entry Tax	Rs. 49,03,387.00	Rs. 8,17,231.17
8	Service Contract	Rs. 48,35,792.00	Rs. 8,05,965.33
9	Other Expenses	Rs. 1,42,51,871.00	Rs. 23,75,311.83
10	Depreciation & Amortisation	Rs. 9,30,975.00	Rs. 1,55,162.50
Total Monthly Expense			Rs. 11,85,29,359.17

Sl. No.	Cost Category	Year- 2012-13	Year- 2011-12
		Total Yearly Cost	Total Yearly Cost
1	Cost of R/M and FG & WIP	Rs. 1,02,84,66,741.00	Rs. 84,03,56,227.00
2	Wages	Rs. 4,74,85,665.00	Rs. 3,83,16,623.00
3	Sumptuary Allowance	Rs. 1,09,04,222.00	Rs. 48,38,992.00
4	Salary and other Employee Benefits	Rs. 6,17,18,179.00	Rs. 5,07,48,552.00
5	Finance Cost	Rs. 92,98,022.00	Rs. 3,79,49,186.00
6	Penalty for delay in supply	Rs. 8,88,37,199.00	Rs. 1,96,17,205.00
7	Entry Tax	Rs. 97,10,084.00	Rs. 89,21,012.00
8	Service Contract	Rs. 88,81,875.00	Rs. 67,69,375.00
9	Other Expenses	Rs. 3,08,84,162.00	Rs. 4,17,57,420.00
10	Depreciation & Amortisation	Rs. 17,91,941.00	Rs. 17,19,545.00
Total Monthly Expense		Rs. 10,81,64,840.83	Rs. 8,75,82,844.75

6.0 Evaluation Issue - 4: Business Forecast and strategy for next 5 years.

- 6.1** The company is operating in a protected market where 95% of the sales are for the ESCOMs. As on November 2013, the company has a pending order of 21970 numbers of transformers from various ESCOMs. Out of 21970 pending transformers, for around 13000 transformers the delivery period is already over. As on January 1, 2014 the pending orders for the transformers are 18465 numbers valued at Rs. 117 Crores. The numbers for which the delivery period is over is 13454.
- 6.2** To chalk out the business strategy for the next 5 years, SWOT analysis of the present business environment was carried out by the NPC team and the management team of KAVIKA.

SWOT analysis is a tool that identifies the strengths, weaknesses, opportunities and threats of an organization. Specifically, SWOT is a basic, straightforward model that assesses what an organization can and cannot do as well as its potential opportunities and threats. The method of SWOT analysis is to take the information from an environmental analysis and separate it into internal (strengths and weaknesses) and external issues (opportunities and threats). Once this is completed, SWOT analysis determines what may assist the firm in accomplishing its objectives, and what obstacles must be overcome or minimized to achieve desired results. The results of the SWOT analysis are depicted in the table below.

SWOT Analysis Matrix							
Strength		Weakness		Opportunities		Threats	
1	Making profits since FY 2006-07	1	No recruitment of officer & workman Cadre personnel since 1992	1	2 % Market share in terms of Market Value	1	Pending Orders
2	Regular orders from the ESCOMs	2	75% of Department Heads retiring by 2015	2	New demand for distribution transformers in XII plan (2012-17)	2	Around 50% of the sales goes to one customer
3	Known for Quality of products	3	50 % of Officer Cadre Personnel retiring by 2018	3	Adopt new technologies	3	95% of the sales are to Govt. Organisation
4	Favourable Geographical Location	4	Machines are old. Especially critical ones such as vacuum chamber, testing.	4	Tap orders from EBs of different States	4	Large number of small private competitors.
5	Harmonious Management - Union Relationship	5	Work Norms need revision.	5	Tap customers from private organisations especially Housing Development Society/ Companies	5	Transformer over-capacity in the Indian market has led to immense pricing pressure scenario severely impacting the profitability of the market players
6	ISO Certified						
7	Availability of space						

6.3 Evaluation and Analysis

- 6.3.1 The retirements in the officer cadre personnel over the next 5 years need to be replaced so that the business continuity is maintained and the company is able to remain competitive in the market. Also the retirements in the workmen cadre over the next 5 years need to be replaced. This has to be factored with the weakness – ‘work norms need revision’. Presently the work norms agreed upon between the management and the union needs to be revised as we have observed that there is scope for increase in the production levels with same manpower and usage of equipment. *It is recommended that a detailed ‘Production norms & Manpower assessment’ study may be undertaken by the company to ascertain and finalize the production capacity in the plant.*
- 6.3.2 The ageing equipment in the critical stages of manufacturing is going to put pressure on the quality of the output and the throughput thus having a significant impact on the bottom-line. NPC has already introduced a vendor the refurbishment / new oven in Bangalore. *Similarly the company has procure equipments in the winding, testing, despatch etc. The areas which necessitate new equipment are detailed in the chapter 2.*
- 6.3.3 The market share of this company is about 2 % of the total market. If the company has to increase the market share then it has to reduce the costs or improve the customer satisfaction levels. The company will have to create a cross functional team inside for scouring for new technologies in the transformer industry, as the application of new technologies would drive the costs down and help in improving the cost competitiveness. *As technology for production is a game changer for the company, it may also explore options for networking with like minded organizations / academic institutions for assistance in this area.*

The production department will also have to continuously upgrade the production process to maintain competitiveness. *Taking a round in the company reveals that there is immense scope for the implementation of lean management in the company and the returns also will be significant. The company may get select personnel trained in lean management and start the implementation of lean management.*

6.3.4 Installed Capacity of the Plant is 1300 MVA per annum. The present annual output is around 22,000 numbers of transformers aggregating to 1116 MVA. The Production achieved by the Company for the past 5 years are given below. The Company has been steadily increasing its production with a marked increase in 2011-12.

Sl. No.	Year	Qty. (Nos.)	MVA
1	2008-09	10376	671
2	2009-10	14461	698
3	2010-11	14122	747
4	2011-12	20067	1009
5	2012-13	21877	1116

The orders received every year for the past three years from the ESCOMS are depicted below:

Date	Party	Nos
17-Jun-13	BESCOM	50
25-Jun-13	BESCOM	650
18-Jun-13	CESC	1700
18-Jun-13	HESCOM	2400
26-Jun-13	BESCOM	300
18-Jun-13	GESCOM	1300
18-Jun-13	MESCOM	650
Total		7050

Date	Party	Nos
10-May-12	GESCOM	727
06-Aug-12	HESCOM	800
03-Sep-12	MESCOM	3000
13-Sep-12	HESCOM	240
03-Oct-12	HESCOM	200
17-Nov-13	GESCOM	500
14-Feb-13	BESCOM	1770
12-Feb-13	HESCOM	2956
06-Mar-13	CESC	1050
Total		11243

Date	Party	Nos
29-Jun-11	HESCOM	1489
24-Jun-11	HESCOM	1370
05-Aug-11	CESC	116
09-Sep-11	CESC	1800
29-Sep-11	MESCOM	2700
20-Oct-11	HESCOM	30
20-Oct-11	CESC	1970
20-Dec-11	MESCOM	1000
02-Jan-12	BESCOM	11664
14-Dec-11	MESCOM	50
17-Mar-12	BESCOM	427
02-Mar-12	BESCOM	5990
Total		28606

The bottleneck operation for the plant is oven drying wherein around 80 numbers are dried every day. To remove this bottleneck the company has to expend its efforts. NPC has already networked with a manufacturer and based on the inputs of the company he will be able to suggest the changes required in the oven. After the change in the oven capacity, the company can increase the throughput of the plant.

The orders received every year are varying. From 7050 in 2013-14 to 28606 in 2011-12 (from ESCOMS). If the orders are varying in a limited range and the company is assured of confirmed orders then the company can go for restructuring of the production process to alter the capacity in the long run. The company should talk to the ESCOMS and get the minimum assured quantity to be supplied every year.

It is recommended that the company should make following efforts to increase the throughput

- *Change the oven capacity / install new oven*
- *Install new equipment to balance the line.*
- *Get assured orders from the ESCOMS every year.*
- *Renegotiate with the union for increased outputs per day.*

The pending orders to the tune of 18465 numbers will also be fulfilled by the company after the implementation of the above measures. Presently the company works in a single shift followed by 4 hrs of over time working every day. As the number of transformers processed per day in the oven is limited to 80 numbers, the company would not get any benefit by working another shift followed a over time of 4 hours as the constraint would be still existing.

Annexures

Data Requirement Matrix for Estimating Winding Machine Requirement

A. General Information of Company:

- Name of the Firm :
- Contact Person :
- Mobile:
- Email:

B. Winding Requirement:

Description	HV Coil			
	Coil 1	Coil 2	Coil 3	Coil 4
Conductor Shape (Round / Rectangular)				
Size of Conductor in mm (Dia)				
Conductor Insulation (Paper or Enamel)				
Conductor Type (Aluminum/ Copper /Others)				
Interlayer Paper insertion (Manual/ Automatic)				
Insulation Paper Thickness				
Insulation Paper Width				
End filling width				
Coil Shape (Circular/ Rectangular)				
Finished Coil OD/Swing Ø in mm				
Winding width in mm				
No. of Parallel Conductors (If any)				
No. of Turns per layer				
No of Layers				
No. of coils per limb / phase				

Description	LV Coil			
	Coil 1	Coil 2	Coil 3	Coil 4
Conductor Shape (Round / Rectangular)				
Size of Conductor in mm (Dia)				
Conductor Insulation (Paper or Enamel)				
Conductor Type (Aluminum/ Copper /Others)				
Interlayer Paper insertion (Manual/ Automatic)				
Insulation Paper Thickness				
Insulation Paper Width				
End filling width				
Coil Shape (Circular/ Rectangular)				
Finished Coil OD/Swing \varnothing in mm				
Winding width in mm				
No. of Parallel Conductors (If any)				
No. of Turns per layer				
No of Layers				
No. of coils per limb / phase				

C. Kindly specify Special Requirements/ Additional coil details/ Automation desired (if any):

D. Type of Transformer:

- 1) Amorphous Core
- 2) Silicon Core
- 3) Wound Core
- 4) CRGO Core
- 5) Others

E. Remarks:

Date:

Filled by: