

# CHARGE

February 2008

A Technical News Journal from Deki Electronics Ltd

## Editor's Desk

Dear Reader,

For the past few years Deki has been concentrating on the booming lighting industry with innovative and reliable products. We are proud of the fact that all the major lighting players in India are Deki customers and during the last year, 2006-2007, they contributed to more than 60% of our sales.

We have developed a number of new capacitors during the last two years that enhance the quality and reliability of CFLs. Two examples of capacitors that have found popular use with our customers are Mixed Dielectric Capacitors (PEP) and High Voltage (1000 and 1250V) PET Capacitors.

Another growing segment in the lighting industry is High Frequency Ballast. There is a wide range of these ballasts in India ranging from an economy model for around Rs 150 to sophisticated ones for over Rs 1,500. This segment is now a focus area for Deki and HF customers can get their complete requirements of film capacitors from us.

This issue of Charge is devoted to film capacitors for HF ballast.

As usual, we look forward to your comments and suggestions.

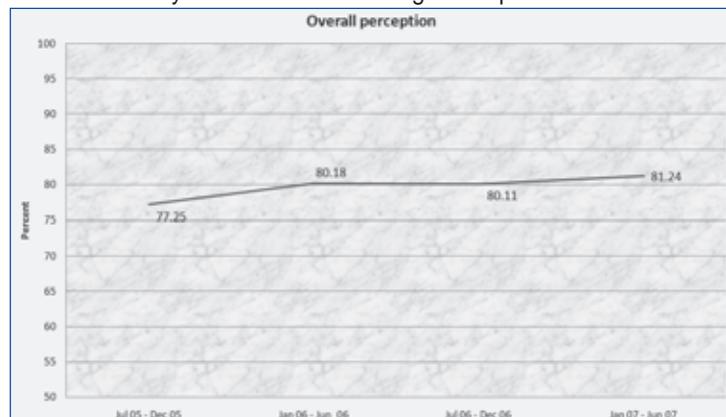
Anil Bali

## External Customer Satisfaction Survey

Deki conducts an external customer satisfaction survey every six months and the results of the last survey indicated another term of a consistently improving trend. The main improvements were in the areas of:

- 1) Price, and,
- 2) Your perception of Deki as a valuable supplier.

We could have got an even better score but for delivery performance where we lost 6% points! The Deki marketing team is committed to taking this score in excess of 85% in the next survey by improving delivery performance and giving customers material on time all the time. A project aiming at better delivery performance has been launched to ensure that delayed deliveries are a thing of the past.



## Employee Satisfaction Survey

Deki also conducts an employee satisfaction survey every six months in which employees are asked a set of fifteen questions pertaining to:

- 1) their work environment
- 2) salary
- 3) satisfaction level
- 4) growth opportunity
- 5) knowledge of targets, standard specifications and operating procedures, etc.

Their marks are consolidated into a report that compares the results with those of the previous six months. The report along with the action points for improvement are discussed with all the employees in an *Open House* by our Managing Director, Mr Vinod Sharma.

The August 2007 survey showed an improvement of 2% over the earlier survey with the main areas of gain being:

- a) **Availability of resources**  
A result of intensive training.
- b) **Work environment**  
Temperature, noise and lux levels are monitored and recorded at most work areas every month and suitable action is taken wherever required. PPM levels of VOC's like styrene and xylene are monitored once a quarter in the Dipping section.
- c) **Potential utilisation of individuals,**
- d) **Growth opportunities in Deki**  
Identification of key employees and giving them added responsibility has resulted in better scores in utilisation of potential and growth opportunities.



## Deki extends its manufacturing footprint

A new milestone was laid on Deki's growth path in October 2007 with the company deciding to invest in manufacturing facilities overseas. As part of this inorganic growth strategy, Deki embarked upon acquiring stakes in two electronic component manufacturing companies – one each in China and in Vietnam. Deki's technical team has been busy in the past few months in setting up the "Deki process" which includes changes in design, infrastructure, manufacturing process and very strict process controls at the target facilities. Once the acquisition process is complete, after mandatory clearances and regulations on each side, Deki's high quality capacitors will be available to customers in China, Vietnam, Taiwan and South Korea from these plants.

See us at  
**Light India International 2008**  
 Hall 7ABC, Stall 8  
 Pragati Maidan, New Delhi  
 22nd to 25th February 2008

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## Deki capacitors for Electronic Ballast

Deki proposal for electronic ballast

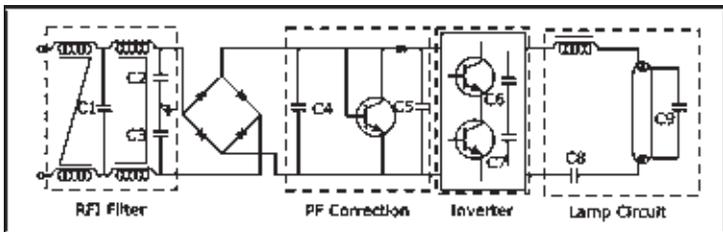
**RFI filter** :Deki proposal for interference suppression application.

**PFC** :Deki proposal for filter application after diode bridge.

**Lamp circuit** :Deki proposal for switching , resonant, and decoupling.

### Electronic Ballast

The block diagram of electronic ballast (shown below) consists of RFI filter unit, rectifier unit, power factor correction unit, start up circuit, inverter circuit and lamp circuit.



Using high frequency inverter as the electronic ballast for driving fluorescent lamps can improve the light quality and prolong the life of the lamps. High efficiency and unity power factor can be achieved simultaneously. However, the discontinuous current mode generates serious electromagnetic interference emission. EMI filters are widely used for filtering excessive conducted emission in electronic ballast.

Deki has a wide range for this application.

Capacitance value:

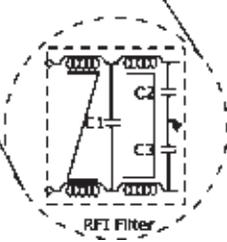
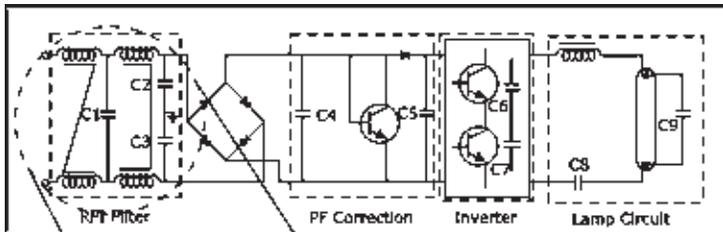
0.0047 Mfd to 2.2 Mfd (for C1)

0.001Mfd to 0.1 Mfd (for C2,C3)

*Recommended capacitors*

C1 - X2 Class (275VAC)

C2, C3 - Y2Class (250 ~275VAC)



In electronic ballast power factor correction is achieved by passive low-cost valleyfill circuit or passive PFC using mosfet or ICs. Other methods are also available.

For smoothing the wave form after PFC correction Deki offers MPET as well as MPP series. The range starts from 10 nf to 10 Mfd. Voltage range is from 420V DC to 630V DC. For smarter dimension and high temperature MPET is recommended with a dissipation factor more than MPP. Replacement of electrolytic capacitor is achieved with high reliability film capacitor though with the compromise of dimension.



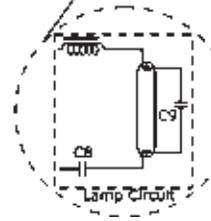
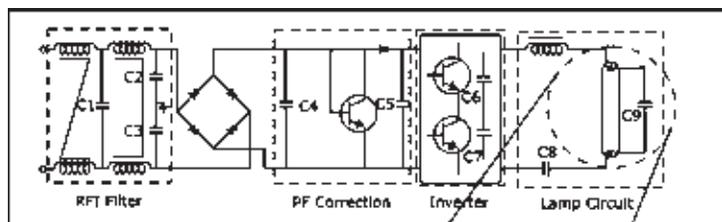
### Snubber Capacitor

An electronic ballast comprising an inverter with a pair of transistors; and a snubber circuit for reducing turn off losses in the transistors wherein said snubber circuit comprises snubber capacitors connected in parallel with said pair of transistors; wherein a turn-off time for said transistors is selected to correspond to a discharge time of said snubber capacitors and a high amplitude load current.

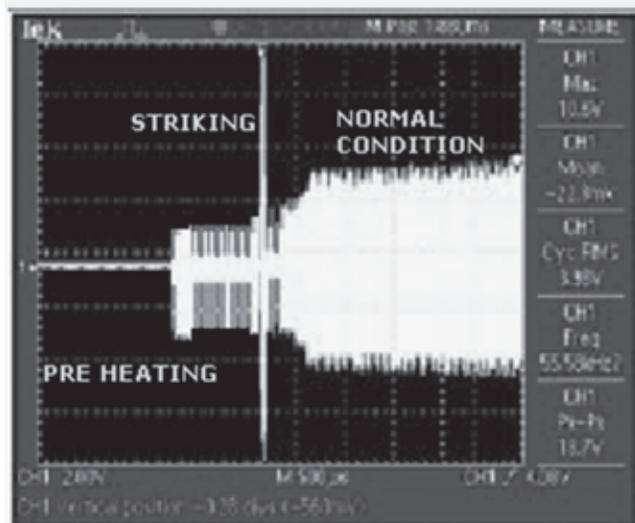
Deki has a range of capacitors from 0.022 Mfd to 0.47 Mfd and voltage ranges from 400V DC to 1000V DC.

### Blocking

For DC blocking Deki has two series, MPP and MPET, voltage from 400V DC to 630V DC. MPET provides smarter dimension and higher temperature.



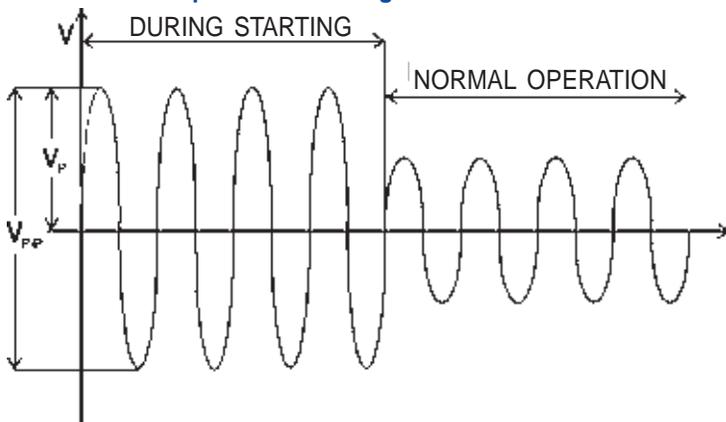
### Preheating and Striking Application



The turn-on sequence can be divided in three phases: preheating, ignition and normal lamp burning.

The preheating of the lamp filaments is achieved by a high switching frequency  $f_{PRE}$ , about 60 kHz. The current flows in the filaments without lamp ignition. In fact, the initial voltage applied across the lamp is below the strike potential. The choice of this time is strictly dependent on the lamp type. The ignition sequence begins after  $T_{PRE}$ . The switching frequency decreases towards the resonance point, increasing the voltage across the lamp, and causing the ignition.

### Selection of capacitor for striking



### Deki proposal for electronic ballast

Capacitor	Function	Type	Series	Rated Voltage	Rated Capacitance
C1	EMI Suppression	X2	IS-X2	275 V AC	0.0047 Mfd-2.2 Mfd
C2, C3	EMI Suppression	Y2	Y2	250-275V AC	0.001 Mfd-0.1 Mfd
C4	Smoothing	MPET, MPP	MPET, MPP	250-630V DC	0.22-1 Mfd
C5	Smoothing	MPET	MPET	420-630V DC	0.01-2.2 Mfd
C6, C7	Snubbing	MPET, MPP, MPP/MPP	MPET, MPP, MPP/MPP	400-1000V DC	0.001-0.15 Mfd
C8	Blocking	MPP, MPET	MPP, MPET	400-630V DC	0.022-0.1 Mfd
C9	Striking	MPP/MPP, MMPP, PP-MPP	MPP/MPP	1250-2000V DC, 500-900V AC	0.001-0.15 Mfd
C9	Striking		MMPP	1250-2000V DC	0.001-0.082 Mfd
C9	Striking		PP-MPP	1000-2000V DC	0.001-0.056 Mfd

### During striking

$$V_{P,P} \approx 1500V \text{ AC}$$

$$V_P \approx 750V \text{ AC}$$

$$\text{So } V_{RMS} = 530V \text{ AC}$$

Frequency is above 20 kHz

For this application the following series are available

### AC & Pulse Capacitor Series

- MPP/MPP AC Series
- PP/MPP Series
- MMPP Series

The following conditions should be satisfied when selecting a capacitor for striking application.

- $V_P$  should be less than DC rated voltage.
- $V_{P,P}$  should be less than  $2 \times 1.414 \times V_{RMS}$ .
- dv/dt rating should be fulfilled
- Peak current should be less than  $C(dv/dt)$
- Temperature rise should be less than  $10^\circ\text{C}$  at its category temperature.

From these conditions we can easily select the correct series for striking application.

For example, 2000V DC/700V AC (MPP/MPP AC series) for above data.

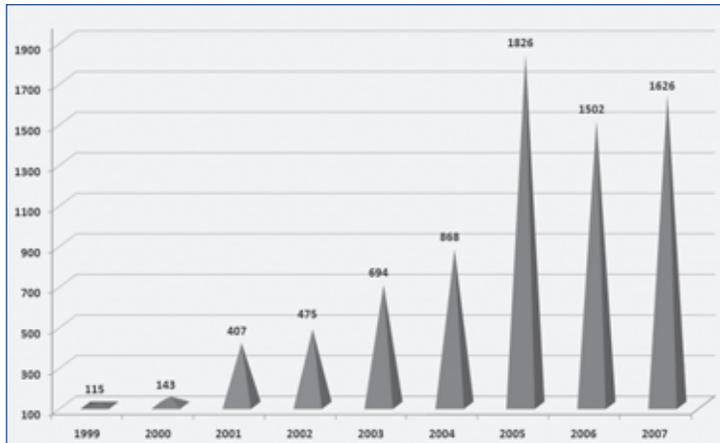
MPP/MPP capacitor is for good pulse characteristics and smaller dimension. Another choice for this application is MMPP with very good pulse characteristics and increased dimension compared to MPP/MPP series capacitors. PP/MPP series can also be used for this application. This series has extremely good pulse characteristics with increased dimension compared to MMPP series.

### SWITCHING TEST REPORT (STRIKING CAPACITOR)

Capacitance value	0.0047 $\mu\text{fd}$			Applied voltage	230 VAC				
Rated voltage	2000VDC			Ambient Temperature	85 Degrees				
Tolerance	$\pm 5\%$			No of cycles	10000 cycles				
Type of testing	SWITCHING TEST			Chamber Name	Environmental chamber				
ON Time	5 Sec			OFF Time	90 Sec				
s.no	INITIAL VALUE				FINAL VALUE				% CHANGE
	C value	Tan $\delta$			C value	Tan $\delta$			Cap Change
	In Mfd	1KHz	10KHz	100KHz	In Mfd	at1KHz	at10KHz	at100KHz	in %
1	0.0047293	0.0006	0.0004	0.0005	0.004709	0.0006	0.0004	0.0008	-0.43
2	0.004736	0.0006	0.0005	0.0004	0.0047187	0.0006	0.0005	0.0006	-0.37
5	0.004573	0.0006	0.0003	0.0003	0.0045373	0.0006	0.0003	0.0004	-0.78
6	0.004594	0.0006	0.0004	0.0003	0.0045566	0.0006	0.0004	0.0004	-0.81
7	0.0046516	0.0006	0.0005	0.0004	0.0046191	0.0006	0.0005	0.0004	-0.70
8	0.0046484	0.0006	0.0004	0.0004	0.0046278	0.0006	0.0004	0.0004	-0.44
9	0.00463	0.0006	0.0005	0.0005	0.0045957	0.0006	0.0005	0.0005	-0.74
10	0.004623	0.0006	0.0004	0.0004	0.0046006	0.0006	0.0004	0.0004	-0.48

Deki has conducted a switching test for striking capacitor for 10000 cycles. The capacitance change after life testing is less than 1%.

## Training, an important part of Deki



Training inputs at Deki have been growing at a steady rate. There was a sharp jump in 2005 when we recruited a large batch of workers to cater to the three-fold increase in capacity planned for early 2006. In 2006 and 2007 we have spent 1502 hours and 1626 hours on training respectively. This translates to over 2.5% of hours/month/person!

## Highlighting machine care through theatre



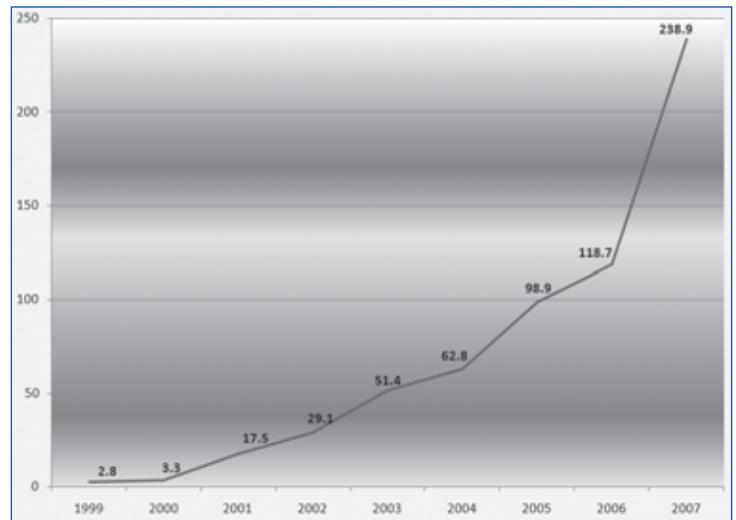
Mr Imran Khan, renowned theatre actor and director organised a unique play on April 16, 2007 at Deki with Deki employees portraying different machines. Very much like humans, the machines talked about the care they required to function optimally. The play depicted how a well cared for machine with regular preventive maintenance produced much more than a machine which did not have its preventive regularly. The play was a huge success with all machine operators realising the importance of daily checklist and regular preventive maintenance.

Mr Khan learnt theatre from Dr Ashish Ghosh at National Bal Bhavan and has directed a number of highly appreciated large scale productions that have been in Delhi schools like DPS, Modern, St Mary's, Presentation Convent and Ryan International, etc.

## Continuous improvement through the Suggestion Scheme

The suggestion scheme in Deki has been growing year after year with implemented suggestions doubling to 239 per month in 2007 from 119 in 2006. The beauty of this scheme is its simplicity. The worker fills up a suggestion form mentioning:

- 1) the present process,
- 2) the proposed process, and,
- 3) the savings/benefits.



The form is then handed over to the line in charge who send it to the suggestion committee with his comments. This committee of fifteen has three executives and twelve non-executives. The committee goes through each suggestion and picks out the most promising ones. Once implemented, the suggestor is given a monetary award and two persons with the maximum suggestions each month are given an additional award. In addition, the two best suggestions are also recognised.

## Deki celebrates Annual Day



At Deki, we celebrate our Annual Day just before Diwali each year and in 2007 the celebrations were held on November 8th. After a sumptuous lunch all employees gathered for the function that was flagged off by the traditional lighting of the lamp by our Chairman, Mr Jai Kumar followed by the prize distribution for the intra-company team tournaments for cricket, kabaddi and volleyball and individual competitions for carrom and chess. As part of the Employee Suggestion Scheme, employees with the best suggestion and the maximum number of suggestions were also awarded. This was followed by a variety entertainment programme by the employees after which sweets and presents were given to all employees.