



Product / Technology of Torque Generator

The new theory is helpful in understanding the unanswered questions in Physics related to magnetism. The prototype has opened new doors in the area of Space Transportation. Some of the applications are Satellite orientation and positioning, placing geo-sync satellite in lower orbits & Making space transportation safer.

This research will be considered as a great achievement in this century

Apparatus name & model	:	Gravity Motor D10P4
Weight	:	17 kg
Power consumption	:	320 W
Torque Output	:	0.013 Nm (130 gram-cm)

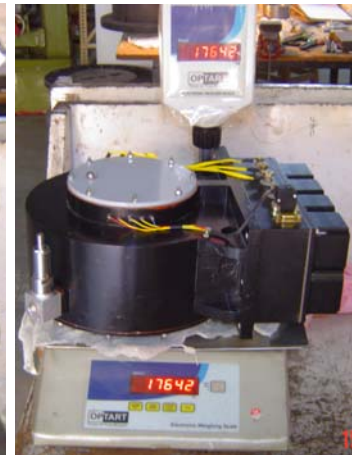


High performance customized Motors & Controls

BLDC motor (12KW) with Integrated Control

(For Aerospace applications)

- Power 12KW, Torque 18 N-m
- Mass 20.5Kg, 2.5 Kg coolant inside
- Operative on 130 to 160V DC
- Duration 16 minutes in vacuum
- Designed for Reusable launch vehicle to run hydraulic pump with load fluctuation of 0 to max, at 7 Hz response
- First prototype delivered to Indian Space Research Organisation in Feb. 2008

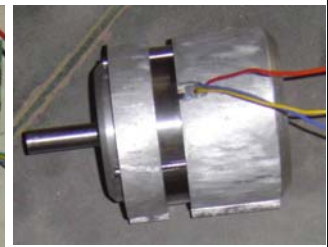
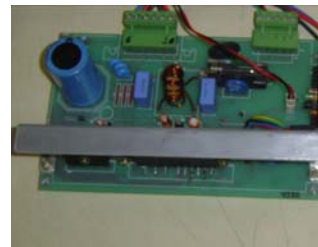


High Efficiency Washing Machine Solution

Capacity 500W

Designed to cope up with the increasing demands of Energy Efficient products, the BLDC Motor & Control solution aims at 20% improvement in Efficiency.

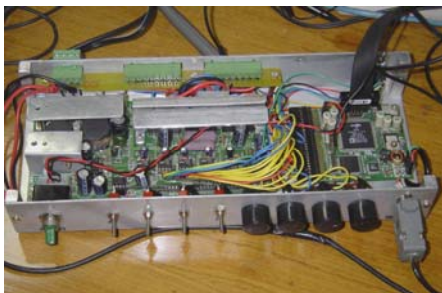
At the same time the solution does not compromise on the cost as the same is reduced by 20%.



Two separate solutions for small & large sized Washing Machines with scope for End-user customization.

DSP BF532 based dual motor controller

Controls 2 motors independently
Suitable for multi-axes control
High performance servo control
Capacity 150W each channel



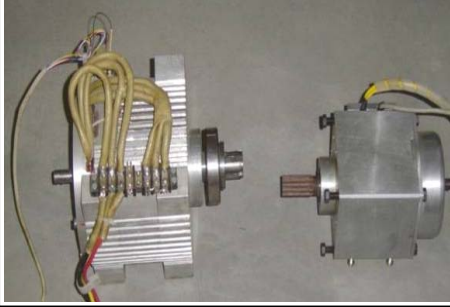
DSP based sensorless control

Controls PMSM in sensorless mode, Operates upto 400 Hz electrical frequency.
Built in PFC, Suitable for 1 hp rating for 3" submersible pump

SKD has also developed sensorless control for Permanent Magnet Synchronous motors up to 1.5 KW and holds 2 US patents in this field.

A Commercial R&D Company approved by Ministry of Science & Technology

Customized BLDC Motors



These Motors and their Controls give significantly improved performance, due to the number of poles and high frequency operation. They can be operated at up to 1000 Hz electrical frequency.

To counter the problem of heat transfer (Thermal resistance), some of these motors are partially filled with oil, which also cools the rotor magnets. The losses on a typical motor are slightly higher due to oil friction, still the oil helps in heat transfer, reduction of electrical losses and peak current rating.

Range of BLDC Motors (Developed for Production by our Sister Concern Company)

These BLDC Motors and their Controls give significantly improved performance, due to the number of poles and high frequency operation. The motor is designed on 8 pole configuration and the control is build on the rear side of the motor. Necessary heat sink are fabricated / mounted on the unit for handling heat transfer.

There are 2 basic models of these motors – one has a power output of 375W & is rated at 0.8 N-m while the other has a power output of 750W & is rated at 1.5 N-m. Both operate at 5000 RPM & have RS232 communication. A local host based on Microcontroller can be used to manually control Speed & Direction of the motor. These motors are available with integral gearbox combinations also.



Other Electrical Products (Developed for Production by our Sister Concern Company)



The Battery Charger on left is SMPS based with PFC which improves the overall performance of the system. It can also be used as a stand alone power supply & is available as 140VDC 3A, 60VDC 6A & 30VDC 10A with fine V & I adjustment available.

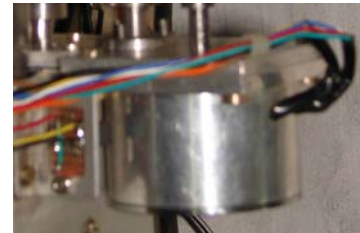
On the right is the 800W Lightweight Transformer less High Frequency Sine-Wave. This inverter is based on dual DSP technology where one DSP handles the high frequency DC-DC converter while the second

DSP generates 50 Hz sine-wave output. The inverter is compact and light weight due to elimination of bulky 50 Hz transformer.

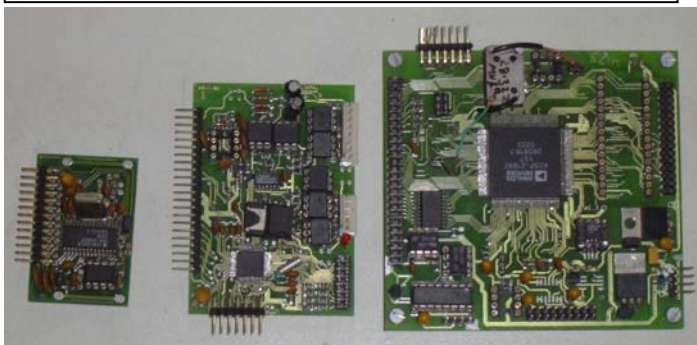


Different platforms for Motor Control

- ADMC326 / ADMC341 / ADMC340 based on ADSP2171 core
- ADuC7024 based on ARM7 core
- ADSP21992 based on 219x core
- BF532 based on Blackfin core for high performance servo application
- UC2625 hardware based control
- CPLD and ADC based control
- Various DSP's from Microchip for servo applications
- Freescale 56F8013 based simplified servo applications



Customized S22 Motor for EGR for an Indian Automotive company



Motors developed (for multiple applications)

- 2- Φ 400 Hz Induction servo
- 3- Φ 500 Hz induction motor for gyro application
- Sensorless PMSM
- SRM
- BLDC in normal, outer rotor and hub motor configuration

Papers Published

- (1) **Flexible Speech/ Audio Coding** published in "Signal Processing.", Jan 1993, IISC, Bangalore, India
- (2) **Possible Generation of Gravitational Force** (ICGA-5) Oct-2001, Russian Gravitational Society,
- (3) **Universal Embedded Controller** in ISPC conference, March 2003

Other Products and Technologies

- A. Image Processing System**
Ethernet Camera, Tracking Camera, Scanning Camera, 3-D Imaging System
- B. Electro Mechanical Products**
 1. Electric Bike
 2. Submersible Pump
- C. Vibration System:**
 1. Vibration Controller
 2. DSP based Class D Amplifier

Patents Granted/ Pending

1. Control System for Permanent Magnet Synchronous Motor, US Patent 5,635,810 [Granted]
2. Improved Gate Driver Circuit and Hysteresis Circuit, US Patent 5,675,276 [Granted].
3. Geared Permanent Magnet Synchronous Motor (India, Application No. 1884/cal/96) [Pending]
4. Electronic compass (India, Application No. 1011/cal/98) [Pending].
5. Gravity Motor (Aug 03, 2000) [India Pending]
6. Dedicated PMSM for washing machine (Oct 12, 2007) [Pending].
7. Low Cost Tacho Generator (Nov 14, 2008) [Pending].
8. Thrust and Torque Generation in space without reaction mass (April 2009) [Pending].

Products & Technologies Developed (Y2000 – 2005)



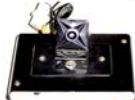
Submersible Pump



Sine Wave Inverter –
ADMC326- SKD1F based



Blackfin DSP Control



Ethernet Camera



Sine Wave Inverter



CD Servo based on
Blackfin DSP



Tracking Camera



UAV VTOL Toy

Products & Technologies Under development



3-D Imaging system



Gravity Motor



Self Leveling
UAV VTOL Toy



STOL Vehicle



Motor for E-Car

Past Products (Y1980-1990)



Recorders, Mech. Vibration generators, Transducers

Past Developments (Y1990-2000)

- ◆ Analyzer for testing of circuit breakers
- ◆ Vibration & Environmental Test Systems
- ◆ Electric Bicycle
- ◆ Stable Platform and Electronic Compass
- ◆ Microphone Testing machine
- ◆ Appliances Control



Circuit Breaker tester



Gun Control Unit



Compressors from
customers for testing



Motors & Controls



Electric Bike



Electro Dynamic
Shaker System

Past Technologies:

CEO of S K Dynamics, Mr. Rakesh Goel, is Bachelor of Engineering in Electronics & Communication [Gold Medalist] from IIT Roorkee, India in 1977. He worked as a Technical Director and Partner in an engineering firm from 1978 to 1992 where he developed various projects and many Test Equipments. He then set up a new company S K Dynamics Pvt. Ltd. in 1992 with focus on R&D activities. But technologies developed between 1977 and 1992 are still available. Some of them being strain gauge based sensors, vibrating wire transducers, mechanical and electro-dynamics vibration systems, recording instruments, microprocessor based controls.

The Company:



- ◆ S K Dynamics Pvt. Ltd. (SKD) was established in 1992 with sole purpose of pursuing R&D projects in the area of Electromechanical Engineering, Digital Signal processing, Power Electronics and System engineering.
- ◆ Since 1995 SKD is recognized by Department of Scientific and Industrial Research (DSIR), India as in-house R&D unit and now approved as **Commercial R&D Company**.

- ◆ SKD has worked with Analog Devices, Inc. USA in the area of Motor Control, and has launched ADMC326-SKD-1F Universal Embedded Processor.
- ◆ Around **2 Million** Household appliances in the USA, Japan, Europe and China are working using SKD Embedded (Motor) Control Technology.
- ◆ Recently developed high performance Motors with power to weight ratio of 1 hp / Kg for Aerospace application. Also developed solutions using high performance DSP of 400 MIPs for motor control, vibration control, image processing etc.



Present & past Clients

- ◆ Indian Space Research Organization
- ◆ Indian Defense Labs
- ◆ Indian Automotive Industry
- ◆ ACC / SOLE Italy
- ◆ Analog Devices Inc. USA
- ◆ Sharp Japan, (Embedded Control for Refrigerator)
- ◆ Frigidaire USA, (Embedded Control for Washing Machine)
- ◆ Huening China, (Embedded Control for Air-Con.)

Core Competence

- Motors and Motor controls
- Digital signal processing & processors
- Embedded software
- Microprocessors & Micro controllers
- Power Electronics
- Electromechanical Engineering
- FPGA, Analog and Digital Electronics
- System Engineering /System Integration
- Product manufacturing capabilities & Prototype Manufacturing

General Statistics	
Type of business	Commercial R&D company
Land & Building	40,000 sq. ft total land , Built up: 20,000 sq feet
Manpower	Forty
Year of Establishment	1992
Services / Products	Technical Consultancy, Design support, Prototype development, Pilot production, Production support
Commercial R&D	DSIR- Ministry of Science and technology, Government of India, New Delhi
Import / Export	RBI No: KS002059, IEC No: 059203073
Export	Electronics & Computer Software Export Promotion Council New Delhi, India

Awards and Achievements



- ◆ DSIR National Award 2000 for Technology Export of Motor control.
- ◆ EEPC Award 2000 and 2001 for Services Export.
- ◆ ESC Award for Services Export in the years 1998, 1999 and 2001.
- ◆ NSIC Award for Electric Bicycle Technology
- ◆ ADI Award for world's first Washing Machine using DSP Control
- ◆ VNMM award by IIT – Roorkee to Mr. Rakesh Goel (CEO)



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