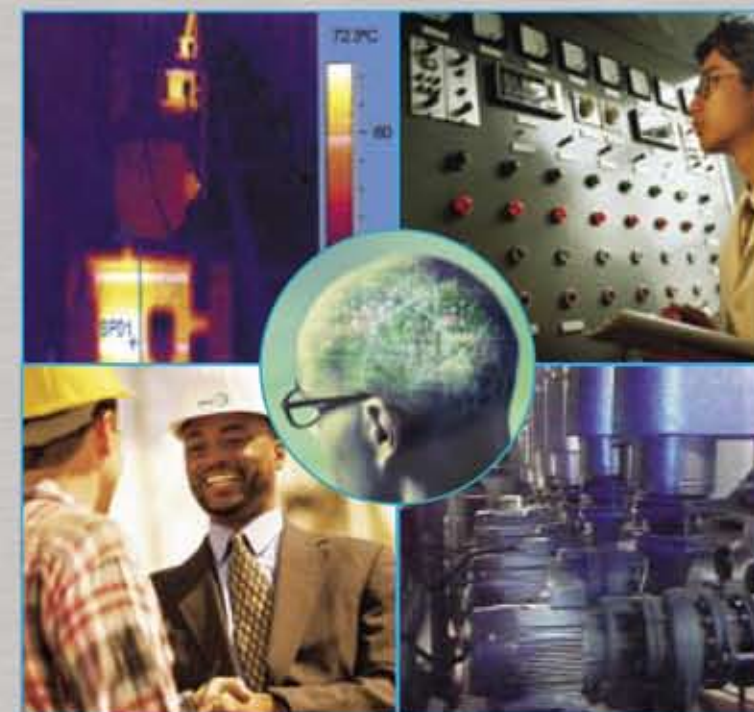
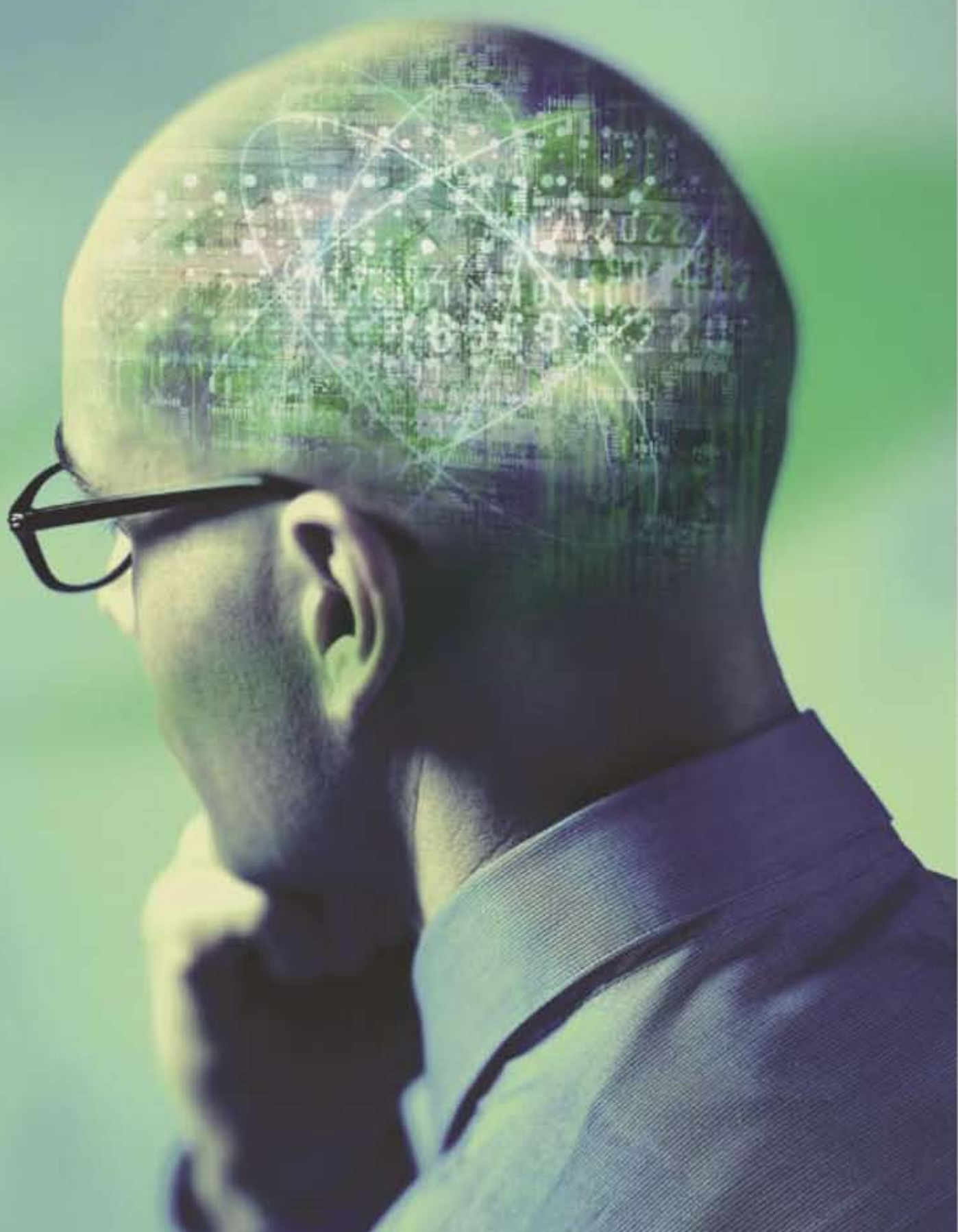


Technically Speaking



Distributed by:



INVESTOR IN PEOPLE

S O M A R

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Version 7.2

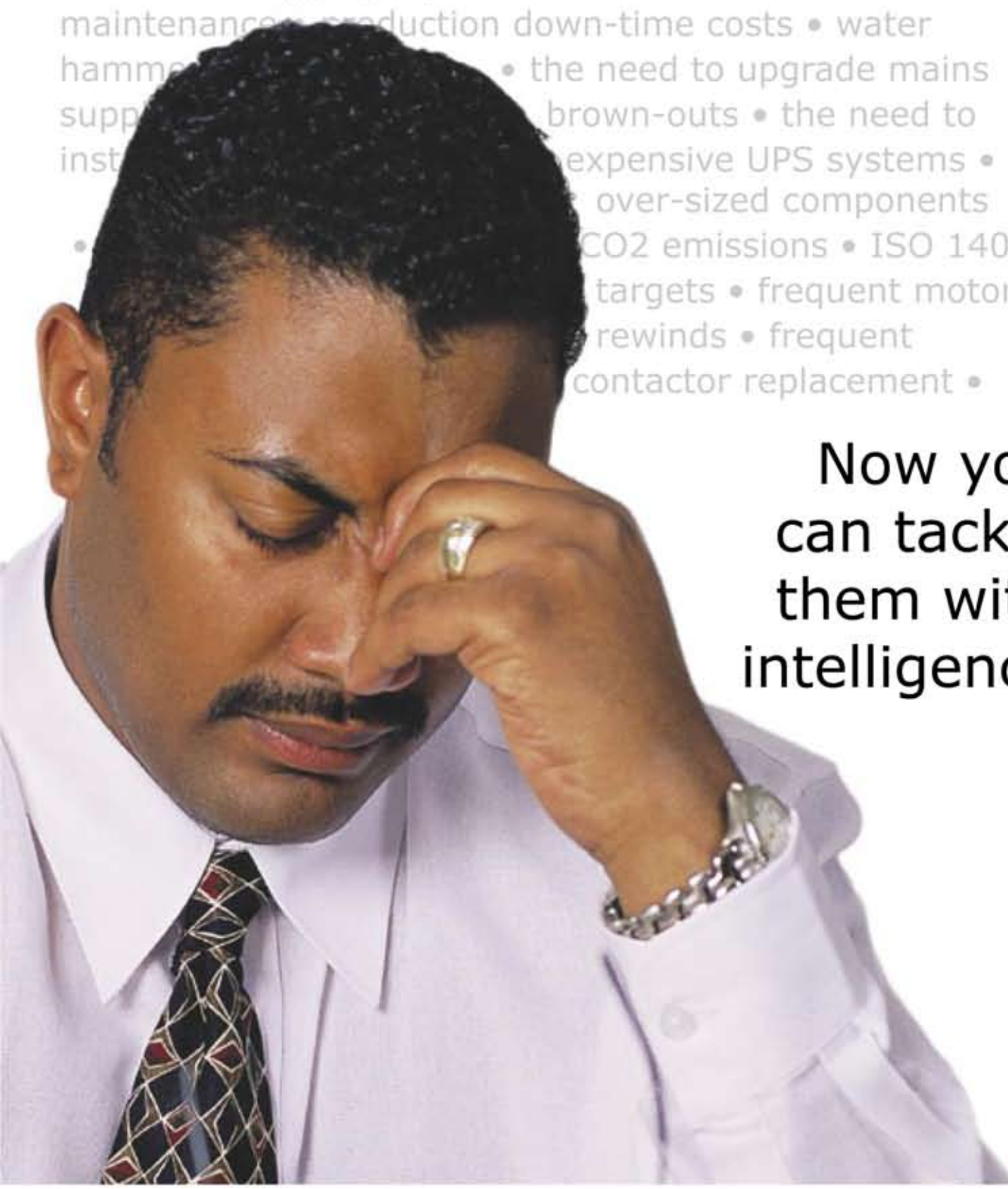


THE QUEEN'S AWARD
FOR ENTERPRISE
INTERNATIONAL TRADE
2004



Problems with your plant?

- starting problems • wasted energy • stopping problems
- peak demand penalty • heat damage • voltage dips
- nuisance tripping • plant breakdown • unscheduled maintenance
- production down-time costs • water hammer
- the need to upgrade mains supply
- brown-outs • the need to install expensive UPS systems • over-sized components
- CO2 emissions • ISO 14001 targets • frequent motor rewinds • frequent contactor replacement •



Now you can tackle them with intelligence

Your complete fixed speed motor solution



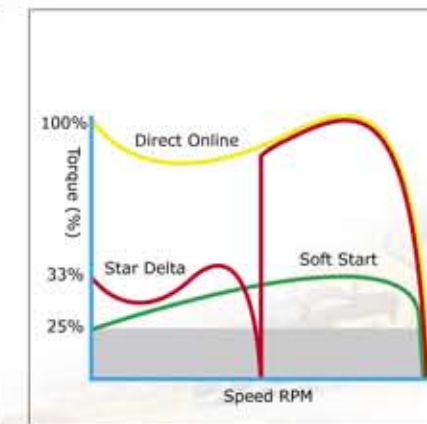
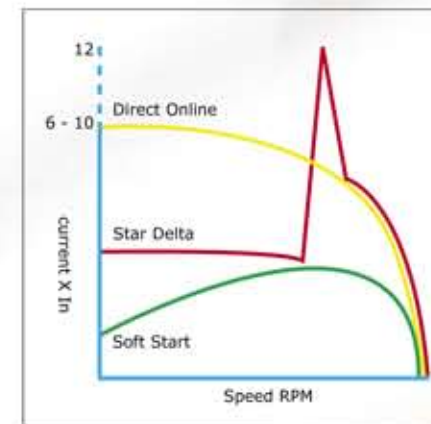
Powerboss is one of the finest soft-starters in the world with a wide range of adjustable features that allow you to start even the most awkward load with ease. Fully adjustable ramp times from 0-255 seconds give you ultimate flexibility. For high inertia loads current limit will provide you with a reduced current start. A kick start facility will help you to get things moving on loads with high static friction.

For smooth starting

High in-rush current and uncontrolled torque when starting your motors almost certainly causes you problems. This is an unnecessary worry as there is a solution that is well proven and readily available. The advantages of using a soft starter as opposed to, for example direct-on-line or star-delta are now comprehensively documented.

The soft start is in effect an electronic clutch. Gradual uptake of power, smooth, step-less acceleration, less stress on you and your valuable equipment. Why make problems for yourself?

“Would you buy a car without a clutch in it?”



The graphs above illustrate the comparison of both current and torque between Direct Online, Star Delta and Soft-start methods.

Using Powerboss as a soft-starter will put you back in control by...

- ✓ Significantly increasing the life of your contactors & drive train components
- ✓ Preventing dips in supply when starting larger motors
- ✓ Allowing you to attach more equipment to a single supply
- ✓ Allowing you to switch your motors on and off at any time because of reduced start current
- ✓ Reducing the worrying threat of peak demand penalties when starting

“Powerboss is the soft-starter that pays for itself.”

Your complete fixed speed motor solution



For efficient running

Due to variable duty cycles, many of your motors probably run at less than 50% of their capacity for much of their duty cycle. It is well known that motors are unintelligent and that in these off-load parts of the duty cycle they consume much more electricity than they actually need. This excess consumption is not only an unnecessary cost on your energy bill, but it also serves to damage your equipment as the excess energy is released through the windings of the motor in the form of heat, vibration and noise.

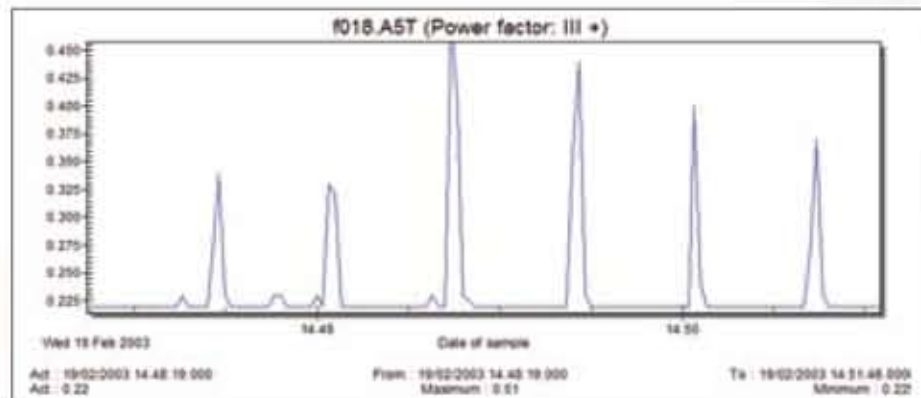
“Many energy-saving device manufacturers make false claims - the reality is whilst there is ample opportunity to save energy on fixed speed applications this is only at loads of less than 50% - you cannot save energy that is not being wasted...”

Powerboss will quietly work on your behalf to...

- ✓ Ensure that your motors only consume the energy that they require
- ✓ Switch your motors off automatically when they are not needed
- ✓ Significantly reduce your energy bills
- ✓ Protect the motors from excess heat and vibration
- ✓ Reduce levels of unscheduled breakdowns

Powerboss will give your motors intelligence. By monitoring the load on the shaft of the motor every cycle of the supply, Powerboss will feed your motors the electricity that they require to run efficiently at any point in the duty cycle. Powerboss integrates fully with its surroundings, and can even switch your motors off automatically when they are not being used, or use stored energy in certain applications (such as flywheel mechanisms) to reduce your electricity consumption even further.

The Power factor plot below illustrates a typical variable duty cycle revealing opportunity to realise energy savings, in this case, a hydraulic steel cutter.



For controlled stopping

Pumping applications are particularly vulnerable to damage from hydraulic shock caused by fluid surge. Powerboss reduces sudden changes in flow by controlling the acceleration torque of the pump, extending the time to produce 100% flow, thus minimising the damaging effects of water hammer.

Using a DOL starter to stop your pump (coast to stop) will cause hydraulic problems because the system head will quickly overcome the motor inertia and then the pump will come to a rapid stop. The fluid, which is in motion and has momentum, must come to a complete stop as well. This uncontrolled stop will cause pressure surges on your pipes and valves – causing damage to the system.

The soft stop feature in Powerboss will control the deceleration of your pump by accurately controlling motor torque and allowing the head of water to slow the pump, preventing any sudden changes in speed and minimising any surges or hammering in your system.



Alternatively, there are a number of situations where you may need to stop your applications under controlled conditions for safety or operational reasons. An application with high inertia such as a circular saw will require a brake to be applied; this can be an expensive addition to the application. Powerboss can be configured to reverse the incoming supply and provide controlled braking, bringing the load to a safe stop.

Powerboss is a highly cost-effective method of tackling all of the above and insuring yourself against the unforeseen mal-effects of uncontrolled stopping.



“Complete fixed-speed motor control - starting, running, stopping.”

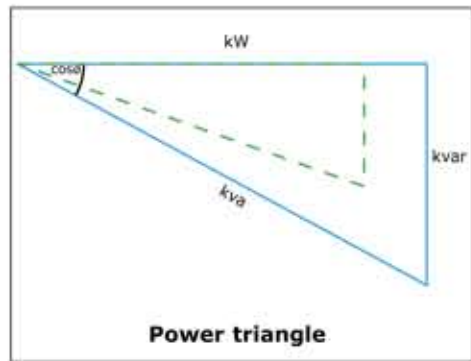
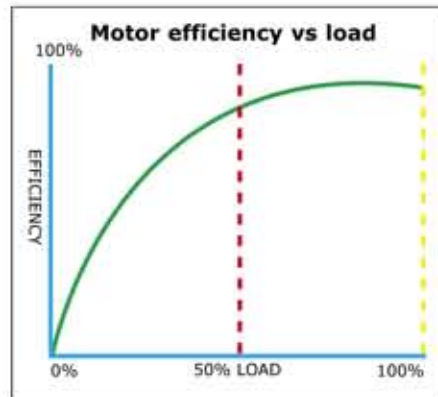
Through controlled deceleration, Powerboss Soft Stop...

- ✓ Provides an effective solution to minimise water hammer
- ✓ Reduces the probability of damage to pipe systems
- ✓ Provides safe, cost-effective plug braking

How does Powerboss work?

Motor efficiency - The theory

Basic motor theory highlights that A/C induction motors become increasingly inefficient when operating at less than 50% of their rated load. The efficiency curve on the right is a reminder of that relationship.



Due to motor torque being proportional to the square of the applied voltage it is possible to reduce the applied voltage, to match the motor torque to the load torque, according to the job of work that the motor is doing at any point in the duty cycle. Reducing the voltage reduces apparent power (kVA), active power (kW) and reactive power (kVAR). The illustration on the left shows the relationship between kVA, kW and kVAR.

In practice

Powerful digital technology has allowed Powerboss to utilise well established soft start engineering solutions to good effect whilst the motor is running. By adjusting the switch-on point relative to the voltage zero crossing in each half cycle of the supply, it is possible to regulate the current flowing through the thyristors by controlling the voltage. The thyristors are switched on at a calculated point in the waveform; the closer this is to the zero crossing point in the waveform, the smaller the value of the current that will be allowed to flow.

Using this principle and by connecting two thyristors in anti-parallel to each of the phase connections of a motor, Powerboss continuously adjusts the voltage to the motor terminals by precisely controlling the thyristor's switch on points.

Continuous dynamic control is applied to your motor through a micro controller embedded with unique software.

The Powerboss unit is also designed to consistently monitor the flux from the motor, and thus is able to maximise potential savings without stalling the application, adversely reducing its speed or altering its ability to effectively carry out its job of work at any point in the application duty cycle.

The basis on which Powerboss is so effective is:

- ✓ Motors lose efficiency rapidly when working at less than 50% capacity
- ✓ Motor torque is proportional to the square of the applied voltage
- ✓ Adjusting the voltage reduces the power triangle
- ✓ Reducing the power triangle reduces energy consumption



Powerboss works hard on your behalf...

- ✓ Assessing the load on the motor every cycle of the supply
- ✓ Adjusting the voltage proportionately to the load
- ✓ Preventing the motor from stalling by monitoring motor flux
- ✓ Giving your motor intelligence
- ✓ Putting you in control

"The concept is brilliantly simple - The results simply brilliant"



Where & how should you use Powerboss?

The criteria

Powerboss boasts a wide range of exciting features that you can use to make your plant more efficient. As a soft start / soft stop alone it will provide many benefits. In its role as an energy saver it is totally unique; however it should be remembered that you cannot save energy not being wasted. Powerboss Distributors are trained to assess the suitability of applications for energy saving, to give advice on where you can use Powerboss and to maximise your returns by utilising the library of features to the full.

Due to the nature of their duty cycle the applications in the table that follow are the most popular recommendations.



	Plastic Injection Moulding Machines	Power Presses	Timber Saws	Aggregate Crushers	Granulators	Compressors	Pump-Jack Oil Pumps	Hydraulics	Cutting Machines	Textile Looms	Water Pumps	Fly-wheel Applications	Conveyors	Sewing Machines
General Control														
Soft Start	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Optional DOL Start					✓									
Current Limit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Kick Start							✓						✓	✓
Soft Stop												✓		
Plug Braking				✓										✓
Energy Saving	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Special Features														
Timed Cutoff	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Stored Energy			✓	✓										✓
Signal Optimisation	✓	✓	✓					✓						✓
Controlled Star/Delta	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Semi Controlled Star/Delta	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Belt Breakage Protection			✓	✓	✓	✓				✓			✓	✓
Dry Well Protection												✓		

For more information on the features, please ask your Distributor

"One box offers you a complete fixed-speed motor solution"



Practical and easy to apply

The result of over a decade of field consultation

Powerboss has been developed over a 12 year period to satisfy the real needs of industry and business in today's fiercely competitive commercial climate

All of the additional special features that have been designed into Powerboss are in effect a direct response to requests for additional functionality to enable the customer to maximise the return out of each motor. If you can think of anything specific in addition that may benefit you, please let your local distributor know.

"All good ideas start with a question."



Clear and concise commissioning

Commissioning of Powerboss units is via a digital programmer and hence is clear, concise and highly adjustable. You or your colleagues may wish to use your local experience to contribute to the best settings to maximise effect. Your local distributor will gladly discuss options with you and give you a copy of the menu showing the numerous functions and settings.



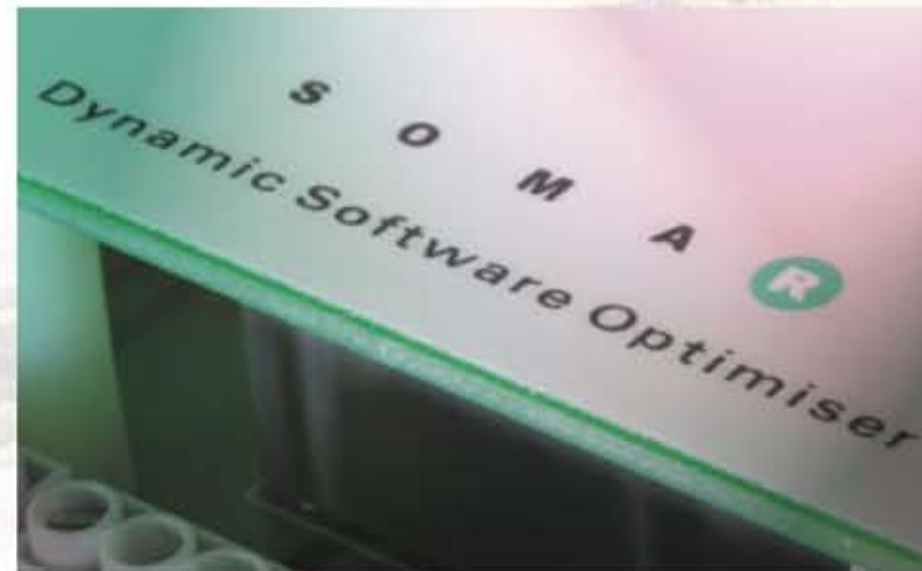
Low maintenance

Once Powerboss is installed you can almost forget about it. It generally requires no readjustment once it is fitted as it automatically reacts to changes in the motor's behaviour. The only maintenance that you need worry about is cleaning from time to time, and ensuring that the fans are operating effectively.



Simple to install

Powerboss is simple to place into existing systems or panels. The unit can be installed "direct on line", or in-line with an existing star-delta starter. General connections are similar to other popular soft-starters.



Powerboss Integra makes it easy

- ✓ Practical and useful functions
- ✓ Designed to integrate with your systems
- ✓ Looks after itself
- ✓ Reduces general maintenance and contact wear

"Developed in conjunction with motor users, for motor users."



Technical specifications

powerboss *integra*

Chassis Size (HxWxD mm) (525 - 575V)	Weight kg (525-575V)	Motor Rating Amps 220 - 690V	Motor kW @ 220V*	Motor kW @ 380/480V*	Motor kW @ 550 - 575V*	Motor kW @ 690V (Amps 110V)	Motor kW @ 1100V	Semi-conductor Fuses	Cooling	Fuse Types	
SIZE 1 H 270 (H 326) W 130 D 115	PBI 2.2	3.5	4	1.1	2.2	N/A	N/A	N/A	Natural	N/A	
	PBI 4		9	2.2	4	N/A	N/A	N/A	Natural	N/A	
	PBI 5.5		11	3	5.5	N/A	N/A	N/A	Natural	N/A	
	SIZE 2 H 385 W 130 D 215	PBI 7.5	4 (5)	15	4	7.5	11	N/A	N/A	Natural	N/A
		PBI 11		23	5.5	11	15	N/A	N/A	Natural	N/A
		PBI 15		30	7.5	15	22	N/A	N/A	Natural	N/A
		PBI 22		42	11	22	30	N/A	N/A	Natural	N/A
SIZE 3 H 448 W 305 D 205	PBI 30	10 (11)	53	15	30	37	N/A	N/A	Forced	N/A	
	PBI 37		65	22	37	45	N/A	N/A	Forced	N/A	
	PBI 55		97	30	55	75	N/A	N/A	Forced	N/A	
SIZE 4 H 590 W 368 D 211	PBI 75	22	132	37	75	110	150	N/A	Forced	Optional Brush 315FM*	
	PBI 90		170	55	90	132	N/A	N/A	Forced	Optional Brush 350FM*	
	PBI 110		205	63	110	150	N/A	N/A	Forced	Optional Brush 350FM*	
			255	75	132	185	N/A	200 (125)	Forced	Fitted	Ferraz 5URZ2BS88Z-700*
SIZE 5 H 730 W 460 D 253	PBI 150	28	290	85	150	220	300	300 (195)	Forced	Fitted Ferraz 5URZ2BS88Z-700*	
	PBI 185		340	110	186	260	N/A	350 (220)	Forced	Fitted Ferraz 5URZ2BS88Z-800*	
	PBI 225		410	132	225	315	400 (250)	Forced	Fitted Ferraz 5URZ2BS88Z-800*		
SIZE 6 H 920 W 784 D 339	PBI 260	46	475	150	260	375	N/A	N/A	Forced	Fitted Ferraz 33TTF1100*	
	PBI 315		580	186	315	450	550	450 (280)	Forced	Fitted Ferraz 33TTF1250*	
	PBI 375		670	215	375	500	N/A	650 (400)	Forced	Fitted Ferraz 33TTF1400*	
SIZE 6 H 920 W 784 D 339	PBI 450	72	800	260	450	600	800	750 (455)	Forced	Fitted Ferraz 33TTF1600*	
	PBI 630	110	1100	375	630	850	1100	1000 (670)	Forced	Fitted Ferraz 33TTF1800*	
	PBI 800	120	N/A	N/A	N/A	N/A	N/A	1450 (870)	Forced	Fitted *Fuse types for 1100V tba	

*Fuse types for 1100V tba

Universal Specifications	
Supply Voltage	220 - 480V and 525 - 575V +6% / -15% 220 - 1100V +6% / -15% on PBI 75 and above
Supply Frequency	47/63 Hz
Ambient Temperature	-10 - +40C, Reduce kW Rating 2% per Deg C up to 60 C
Storage Temperature	-40 - +60 C
Relative Humidity	<95% No condensation allowed
Application Sets	7 Application sets are provided as standard
Altitude	Maximum 1000 m. Reduce kW Rating by 1% per additional 100 M
Starting Duty	2.5 X unit rating in amperes for 60 Sec, 3 X unit rating in amperes for 30 Sec, 4 X unit rating in amperes for 10 Sec, 5.5 X unit rating in amperes for 5 Sec.
Starts per Hour	12 evenly spaced starts per hour at the 'Starting Duty' ratings
Pedestal Voltage	25 - 80% of supply voltage 1% increments *
Starting Current Limit	25 - 80% of the DOL starting current in 1% increments *
Starting Current Time	0 - 255 in 1 Sec increments *
Starting Torque	6 - 64% of the DOL starting torque in 1% increments *
Kick Start Level	9 - 100% of the DOL starting torque in 1% increments *
Kick Start Time	0.1 - 25 Sec in 0.1 Sec increments *
Ramp Up Time	0.5 - 255 Sec in 1 Sec increments *
Ramp Down Time	0.5 - 120 Sec in 1 Sec increments *
Step Down Voltage	100 - 30% Line voltage in 1% increments *
Fault Detection	Shut down for loss of phase and short-circuit Thyristor
Cooling	Naturally cooled <42 amps, force cooled >53 amps
LED Indications	Power on, Run, Ramp up, Ramp down, Fault, Optimising/Top of Ramp. LCD Display on PBI 75 and above.
Relays	Run, Fault and Top of Ramp. Fully Programmable Contact Rating 1.2KVA, 250V AC Max
Fan Voltage	110 or 220V as specified
Enclosure	IP20 / Nema 1
Safety Standards	UL508C, CSA, EEC EN50082-2, EN55011, 73/23/EEC

* Needs PBI programmer from PBI 2.2 to PBI 55 to access parameters



Important Safety Notice

Each Powerboss has been designed, manufactured and tested in order to comply with the most exacting standards. From practical experience across a wide range of installations, Powerboss has consistently proven to be a safe and reliable installation for most normal environments. In extreme cases however, if additional protection is required, it may be necessary to install Powerboss either, away from the high-risk area, or within a specially designed housing. As standard, each Powerboss is manufactured to a rating of IP20. In the interests of safety therefore, installation of unprotected units in potentially destructive or unsuitable environments must be avoided.

Installation Notice

Installations must be undertaken only by suitably trained, qualified and experienced electricians. Installations should conform to all relevant national codes of practice with special attention to the current Institute of Electrical Engineers Regulations and The Health and Safety at Work Act. For more detailed installation information please refer to the Installation Manual supplied with each unit.

The following restrictions are given for guidance only

Avoid:- External or wet areas. Exposure to rain or spray, Atmospheres designated as 'explosive', Highly corrosive atmospheres, Subjection to contamination by corrosive chemicals, Atmospheres containing a high density of abrasive dust, Extremes of temperatures beyond specific limits, Electricity supply voltage or load current beyond the published operating criteria.



Powerboss in action *field test case study*

A well-known international office machine manufacturer recently applied Powerboss units to their injection moulding machines as part of their corporate policy to reduce energy and CO2 emissions. The details that follow are an example of Powerboss performance on an 800 tonne injection moulding machine with a 55kW main-drive motor. Power factor traces taken on this machine illustrate a duty cycle that is 40% on-load and 60% off-load, this is quite typical of this sort of application. A Circuitor AR5 data recorder was used to measure the effect that Powerboss had on real power, reactive power, apparent power, current and power factor.

Active (Real) Power

Figure 1, below, shows a reduction in active (real) power in the no-load condition from 9kW without Powerboss to 8.1kW with Powerboss. This is a real power saving of 0.9kW or approx. 10% which is typical for a well-constructed motor of this power rating.

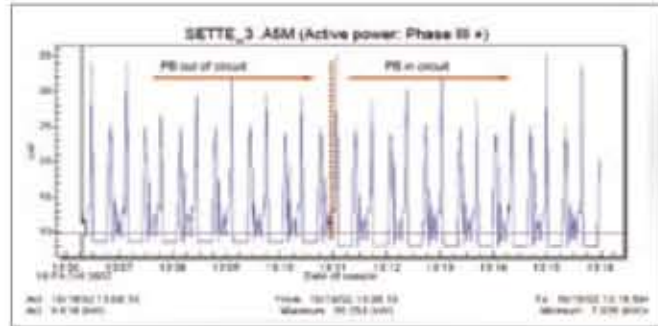


Figure 1

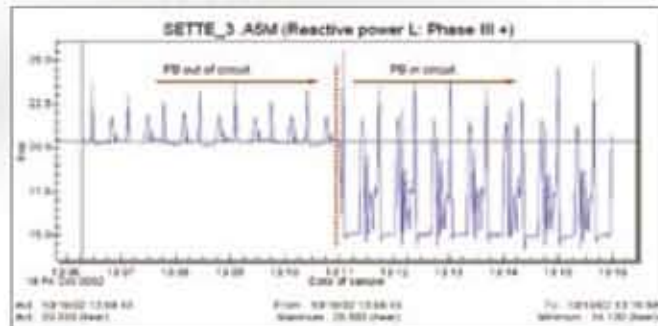


Figure 2

Reactive Power

Figure 2, above, shows a reduction in reactive power in the no-load condition from 20.4 kVAR without Powerboss to 15.1 kVAR with Powerboss. This is a reactive power saving of 5.3kVAR or 26%, which again is typical. Whilst kVAR savings are not paid for directly by the user they are important because a reduction in kVAR assists in the management of the local electrical distribution system by reducing the amount of VAr compensation needed to correct the system power factor. A reduction in kVAR translates directly into reduced motor temperature, helping to extend its life by minimising bearing and insulation operating temperatures. Reduction in kVAR also increases the real power capacity of the existing distribution system allowing more equipment to be added before the system power factor correction equipment needs to be upgraded.

Apparent Power

Whilst we do not have a trace of apparent power it can be calculated simply using Pythagoras Theorem applied to the AC electrical "power triangle".

$$\text{Apparent power} = \sqrt{(\text{real power})^2 + (\text{reactive power})^2}$$

At the no-load condition, as before, apparent power with and without Powerboss in circuit is calculated as follows:

With Powerboss in circuit

$$\text{Apparent power} = \sqrt{8.1^2 + 15.1^2}$$

$$\text{Apparent power} = 17.1\text{kVA}$$

Without Powerboss in circuit

$$\text{Apparent power} = \sqrt{9.0^2 + 20.4^2}$$

$$\text{Apparent power} = 22.3\text{kVA}$$

This calculation shows a reduction in apparent power from 22.3 kVA without Powerboss to 17.1 kVA with Powerboss. This is an apparent power saving of 5.2 kVA or 23%, which again is typical. Apparent power or kVA savings are crucial, because apparent power is the power that appears to the source (the power generation facility) because of the circuit impedance. Since the impedance is the total opposition to ac, the apparent power is that power the voltage source "sees". This fact is very important in calculating the reduction in CO2 emissions directly associated with installing Powerboss. CO2 emissions reduction resulting from fitting Powerboss are proportional to the reduction in apparent power (kVA) not real power kW or reactive power kVAR.

Current and Power factor

To complete the evaluation current and power factor readings were taken with and without powerboss in circuit. These are illustrated respectively in figure 3 and figure 4 below.

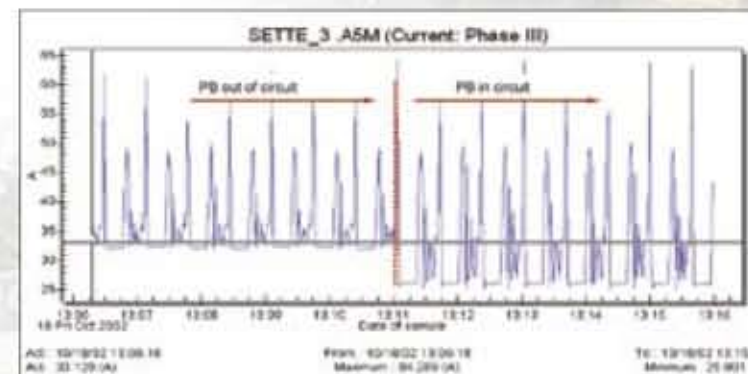


Figure 3

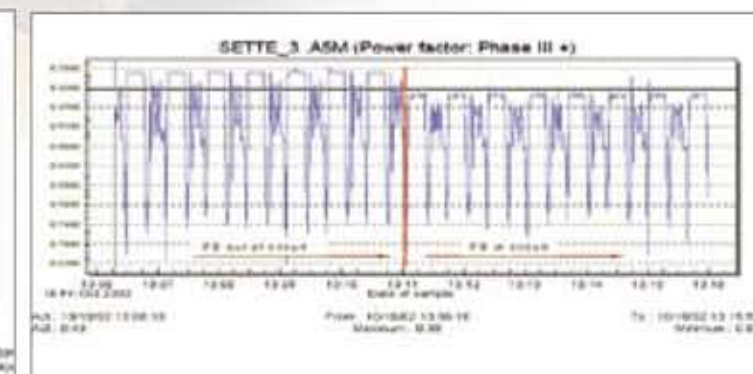


Figure 4

Your reassurance

localised support

Regional Distributor network

Powerboss is now distributed in over 73 countries around the World. In spite of this considerable geographic spread you are assured true local service.

Powerboss is supplied exclusively through specially appointed regional Distributors. Somar International provides training and on-going support that is designed to ensure that Distributors can:

Assess the suitability of your applications

In view of the fact that you cannot save energy not being wasted, it is imperative that Powerboss is installed where it will be effective. Powerboss Distributors are trained to evaluate duty cycles and quickly establish where there are savings to be had.

Supply, install and commission your units

Efficient installation is sure to be a vital consideration for you when integrating new products into your system. Powerboss training not only informs Distributors of how to minimise the disruptive effects of installing the units through careful planning. Your local Powerboss Distributor can, if you prefer, supervise your own installers, and then apply his extensive knowledge of fixed speed motor control to ensure that the units are fine tuned at the commissioning stage thus ensuring that you get maximum return in each situation.

Provide on-going product support

In spite of the units being almost maintenance free, it is still reassuring to know that you can call your local Distributor to assist you should you be concerned about any aspects of the Powerboss operation.

quality & reliability

Strict quality control

Reliability is sure to be a major concern for you. You can relax – with Powerboss you are teaming up with a product that is being produced in the UK under international quality systems. Somar International holds ISO 9001:2000. Most suppliers are QS 14000.



Recognised standards

Powerboss meets all major safety and this is endorsed with the CE and ETL marks. ETL is US and Canadian standard UL508C 2000 and CSA C22.2. No. 14-95

Comprehensive guarantee

Each Powerboss unit comes with a comprehensive 2 year Guarantee. Your local Distributor will be happy to provide you with written details.

Satisfied customers

Whilst Powerboss is relatively new, it is already sold to over 73 countries around the world, and is fast becoming a preferred choice for fixed speed motor control. Somar Distributors are proud to have supply and support relationships with a large number of very prestigious blue chip companies who have installed the units after extensive testing.



**"Powerboss -
why settle for less?"**



Responsible management

your business need not cost the earth

Responsibility to your business

Reducing daily running costs will immediately improve the profitability of your operation. It may not be as glamorous as increasing sales figures, but it is safe and effective year after year.

Not only does Powerboss enable you to significantly reduce energy consumption, but it also directly cuts the cost elements associated with regular maintenance and breakdowns – Labour, Parts and Lost Production.

Investment in cost control is safe, it offers a guaranteed return on investment, with payback being swifter than many conventional methods of investment. Powerboss is a responsible investment and it literally does make your capital work for you.

It won't cost you a thing! You are already paying for Powerboss even though you do not have it - through increased energy bills and maintenance schedules. You can have Powerboss installed and pay for it directly from savings made, thus enjoying all of the benefits with no capital outlay. Why not speak with your Distributor about staged payments taken from savings made?

Responsibility to the environment

With most electricity being generated from fossil fuels, electricity consumption directly contributes to global warming through emissions of CO₂.

Managers in the 21st century are under constant pressure from both the general public and from Government bodies to balance profitability with environmental preservation.

The days of "asking" are over....Governments are now penalising companies who pollute with Environmental Taxes, and with the introduction of Carbon Quotas – companies that stay within these enjoy financial reward.

Many responsible companies have now signed up to ISO14001 standards in an attempt to "be seen to be green" – hitting the ISO targets requires the identification and application of suitable energy saving solutions.

Powerboss is a solution that satisfies both fiscal and environmental criteria – directly reducing CO₂ whilst increasing profitability – your business need not cost the earth - when you could be doing something as effective as this is it responsible to ignore it?



Now YOU'RE in control