IMO Self Funding
Energy Saving Scheme...

IMO JAGUAR

...quite simply, peace of mind.

Why do all energy saving initiatives seem to involve considerable upfront cost?

Today that is no longer the case as IMO can deliver energy savings without any capital outlay.

Traditional fans and pumps are hugely inefficient consumers of energy and the introduction of a Variable Speed Drive can deliver energy savings of up to 50% in many cases. Equipment such as air handling units, swimming pool pumps and extraction systems can all be controlled to deliver optimum performance but at a fraction of the cost.

In the past, this proven technology has required capital investment and pay-back periods of up to 2 years. Now with the new IMO Jaguar Drives Self Funding Scheme, you or your clients can pay for the capital equipment directly out of the energy savings.

Sound simple? That's because it is.

Lets work out how much electricity your motor could be costing you...

1

Typical Example:	
Motor rating -	55kW
Daily use (hours) -	12
Weekly use (days) -	5
Weeks per year -	52
Electrical rate (kWh) -	£0.13
Annual running cost -	**£22,308**

...more importantly the savings you could make using Variable Speed Drives...

2

Drive cost* -	£9,000
Speed reduction -	20%
Monthly energy saving -	£907.19
Annual energy saving -	**£10,886**

* Drive cost + installation cost

...and how those savings can easily pay the monthly instalments on IMOs finance scheme.

3

Monthly energy saving during finance period -	£907.19
Finance Term -	24 Months
Monthly finance payment -	£411.84
Monthly saving to you -	£495.35
Annual energy saving during finance period -	**£5,944**

Want to know the technology behind saving energy with Variable Speed Drives?

Energy can be saved if the motor speed matches requirements at any given moment in time. This applies in particular to centrifugal pumps and fans where the energy consumed is reduced by the cube of the speed. So, for example, a pump or motor running at half speed would only consume 12.5% of the rated power.

Before calculating Energy Saving we need to consider;

1. What type of load is on the Motor?
2. How much energy can be saved?
3. What is the payback period?

There are two types of load when calculating energy saving, Constant Torque and Variable Torque.

Typical Constant Torque applications include:

- Conveyors
- Extruders
- Mixers
- Positive displacement pumps and compressors

In these kinds of applications, energy saving is directly proportional to the motor speed and VSD's offer advantages such as precise speed control and starting/stopping with controlled acceleration/deceleration.

Typical Variable Torque applications include:

- Fans
- Pumps
- Compressors

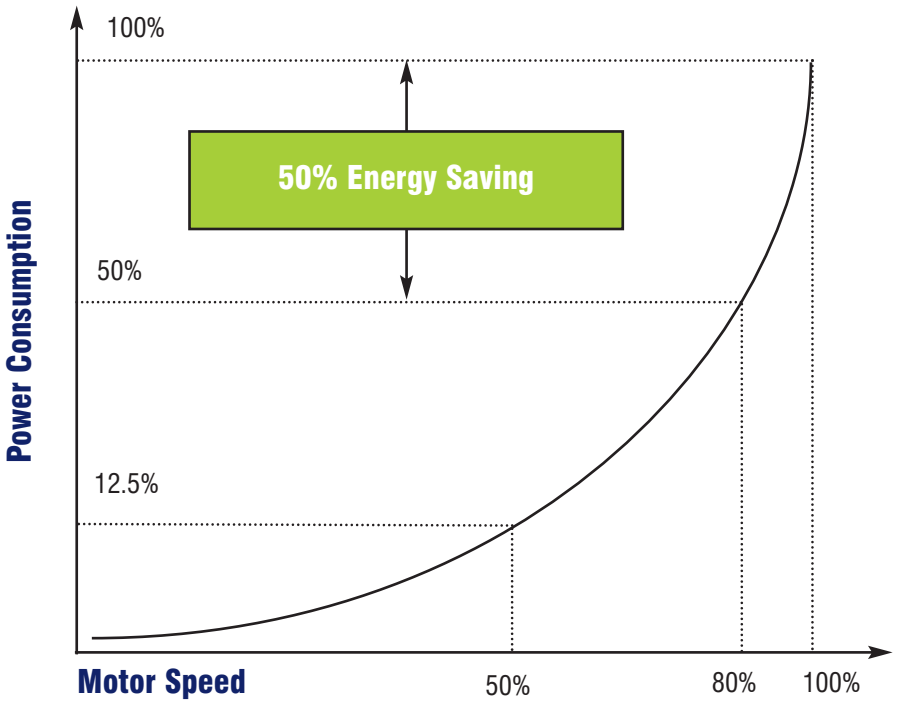







In these kinds of applications, torque (current) is proportional to the square of the speed and power is proportional to the cube of the speed, often referred to as “Cube Law”. However, speed reduction in these applications is usually achieved by “damping”, which is similar in concept to slowing a car by braking without releasing the accelerator.

By using an inverter to electronically reduce the speed of the fan or pump and applying Cube Law, the power actually reduces by the cube of the speed change. It follows that a 20% reduction in speed equates to a 50% reduction in energy consumed illustrated in the graph below.



Reducing speed by 20%
= 0.8 x 0.8 x 0.8 =0.5
50% saving

Reducing speed by 50%
= 0.5 x 0.5 x 0.5 =0.125
87.5% saving

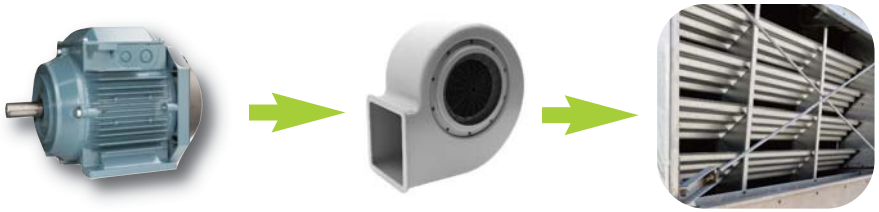
The energy saving payback period through Variable Speed Drive introduction is typically 12 and 18 months. Therefore IMO Jaguar’s unique FIVE year warranty makes it the only inverter in the world that actually underwrites your energy cost savings.

Mechanical damping and flow control

Many industrial and commercial fan or pump applications have been over specified in terms of motor size with mechanical damping or flow control systems introduced in order to achieve speed reduction. This type of mechanical control is highly inefficient as the motors run continuously at the speed required for the maximum delivery rate. This maximum speed is rarely required in practice.

Additionally, the throttles and valves lose energy and cause high temperatures and vibration levels which can have a negative operational impact.

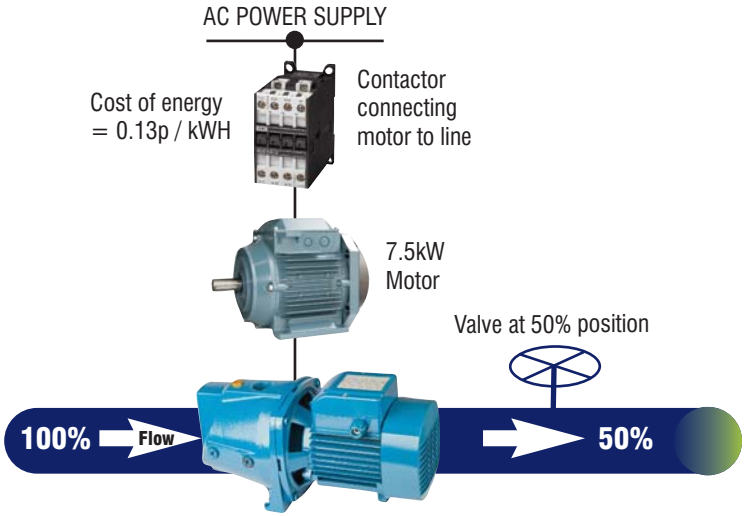
Fan with Damper Control



Pump control with Throttle Valve Control

A Variable Speed Drive reduces the pump or fan speed leaving the mechanical control fully open or removing entirely in new applications.

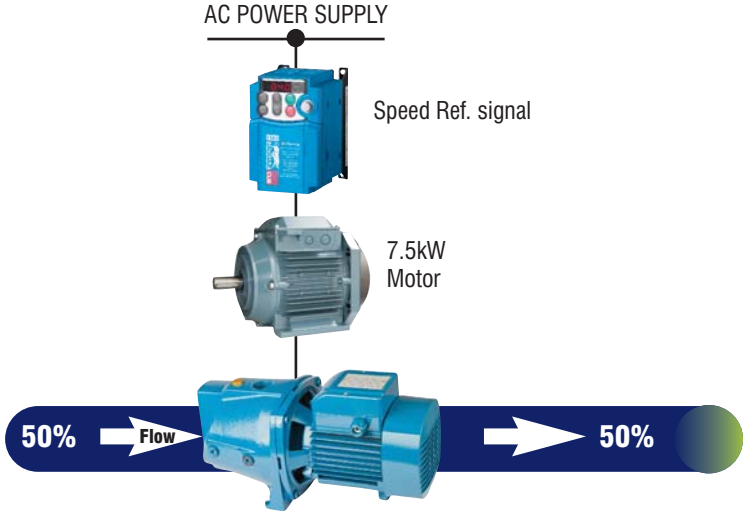
How it Works with DOL / Star Delta connection and mechanical control...



PUMP DUTY = 24 HOURS/DAY x 7 DAYS/WEEK x 52 WEEKS/YEAR = 8,736 HOURS

TOTAL YEARLY RUNNING COST = 8,736 x 7.5 x 0.13 x 100% = **£8,517.60**

... and how it works with a Jaguar Variable Speed Drive.



PUMP DUTY = 24 HOURS/DAY x 7 DAYS/WEEK x 52 WEEKS/YEAR = 8,736 HOURS

TOTAL YEARLY RUNNING COST = 8,736 x 7.5 x 0.13 x 12.5% = **£1,064.70**

Now for the maths...calculating energy saving for Variable Torque Loads

Step 1:
Calculate the cost of the power you currently use (no VSD):

Yearly cost = kW x T x C = X

kW = Power used by motor	T = Pump / Fan duty (hours)	C = Power cost (£) per kW hour

Step 2 :
Calculate the cost of the power at a reduced speed (with VSD):

Yearly cost = kW x S^3 x T x C = Y

kW = Power used by motor (at full speed)	S = Cube Law (80% speed = 0.512)
T = Pump / Fan duty (hours)	C = Power cost (£) per kW hour

Step 3 :
Now for your energy saving per year:

Savings = X - Y = Z

X = Annual Cost (no VSD)	Y = Annual Cost (with VSD)

Step 4 :
Finally calculate your overall payback time:

$$\text{Payback time} = \frac{\text{cost of VSD}}{\text{Savings}} \text{ in years}$$

Now ask IMO for its finance terms and start saving energy for nil capital outlay

Just some IMO customers that are saving energy and money thanks to Jaguar Drives.

thistle

Jaguar Drives make a splash with energy saving swimming pools

After reviewing and implementing all other ways to save energy and recognising that greater energy savings could still be achieved through pump and fan control in their Leisure and Spa facilities, the Thistle Hotel in Brands Hatch looked for a partner that specialised in this technology and turned to market leader IMO.

The application was the re-circulating pumps for the main pool and spa pool running at a fixed speed (50Hz). The recommended solution was fitting IMO Jaguar CUB Variable Speed Drives to slow the pump speed during daytime and night time running when the pumps are not required to operate at full capacity.

In order for the Swimming and Spa pool operator to understand the technology and what was being proposed, IMO Engineers visited the site and conducted a full energy reduction survey and thought it best to demonstrate the savings that could be made by fitting two Jaguar CUB Inverters, one to the main swimming pool pump and the other to the Spa pool pump and monitoring the power consumption of both over a period of time.

Monitoring of the main pump without the Jaguar CUB attached in fixed speed DOL operation showed that the power consumption over a 24Hr period was 72.908kWh. Over the 24Hr period the average Amps used was 5.433 Amps.

Monitoring of the main pump with the Jaguar CUB attached showed that the power consumption over a 24Hr period was 46.564.kWh equivalent to a 38% reduction in the power used (figures based on a 40Hz running speed during daytime and 30Hz during the evening). Over the 24Hr period the average Amps used was 2.7 Amps in Variable Speed Operation, a 50% reduction in the current absorbed.

Monitoring of the Spa pump in fixed speed DOL operation showed that the power consumption over a 24Hr period was 43.727kWh, and the average Amps used during the same period was 2.62Amps.

Jaguar Drives make a splash with energy saving swimming pools (continued)

Monitoring of the Spa pump with the Jaguar CUB attached showed that the power consumption over a 24Hr period was 26.14kWh equivalent to 40% reduction in the power used (figures based upon a 40Hz running speed during daytime and 30Hz during the evening). Over the same 24Hr period the average Amps used was 1.54 Amps in Variable Speed Operation, a 41% reduction in the power absorbed.

Once the results were presented, Kevin Filmer, Site Property Maintenance Manager, had no hesitation in recommending the IMO Jaguar backed by its five year warranty. Kevin commented, " I have been very impressed at IMOs professionalism and support in educating all members within the organisation on the energy saving achievable with this technology".

Del Tiwana, Drives & Automation Manager at IMO, commented, "Businesses have exhausted many of the basic opportunities to save energy and lower costs but many remain unaware of the significant savings that can be achieved using Variable Speed Drive technology. Our focus is on alerting customers to these significant savings and potential payback in some cases of less than 12 months. With the ever increasing cost of energy businesses cannot afford not to learn".

Since the installation of the Jaguar Drives it has prompted the hotel to look at others areas of their infrastructure where drives can be fitted to continue to make energy savings including central fans and air conditioning, all of which is helping the Thistle Hotel Group achieve the Green Tourism Award.

Tielle
Tecnologie per la lavorazione del legno

IMO JAGUAR

Jaguar drives mixers to €1000 per day energy saving.

IMO is enabling a manufacturer of paper bleaching agents to fight back against rapidly rising energy costs. The manufacturer, Tielle S.R.L. is benefiting from savings of €1000 per day in production costs following the installation of 8 – 280kW IMO Jaguar drives to grinding mixers at its plant in North West Italy.

“This application ably demonstrates the potential for energy saving with AC drives, outside of the normal areas such as pumps, fans and compressors,” said Del Tiwana, Drives and Automation Manager at IMO. “The rapid rise in the price of oil is hurting manufacturers all across Europe but with applications like this we are opening up possibilities for reducing energy costs across a wider area of a company’s operations.”

The Tielle application was piloted by Claudio Bozza, at IMO’s Italian office. He visited the company following attempts by Tielle personnel to use mechanical means to reduce some of the huge energy costs associated with the mixing application. These involved modifying the diameter and shape of the paddles in the eight large mixing vessels, which are used sequentially in the manufacture of the bleaching agent. However, the quality of the finished product could not be guaranteed using this method, and so another solution was sought.

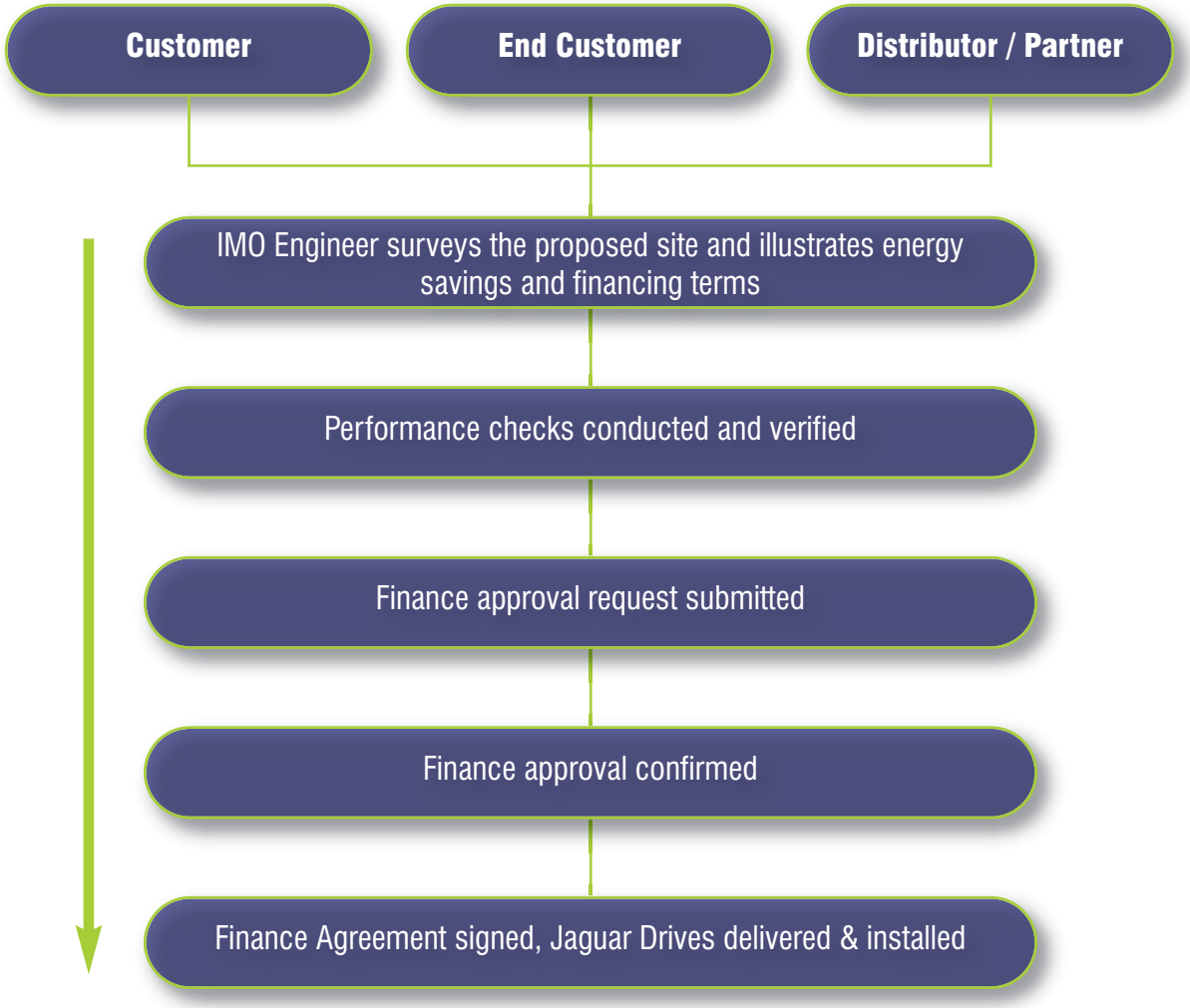
Each of the mixing vessels is equipped with a vertically mounted 250kW/400v/4-pole motor, which drives the grinding paddles through reduction gearboxes. IMO’s proposal was to equip these motors with energy-saving IMO Jaguar drives.

Working closely with IMO engineers, a local system builder, Delta-I, installed the 8- IMO Jaguar VXM280K Variable Speed Drives in a substation, adjacent to the mixing hall.

This involved leaving the original motor cables in place, but diverting them from the existing starter panels into the inverter modules. In addition, local and remote controls were installed for stop, start, frequency control and monitoring. Finally, each inverter was fitted with a suitable DC reactor to limit the harmonic distortion in the factory power supply.

Once installation was complete, each inverter was tuned to its respective motor and commissioned by IMO engineers. The result is that the original mixer configuration has been reinstated, but, crucially, operating at a reduced inverter/motor frequency of approximately 42Hz. This reduction in running speed and motor current is not causing any quality issues, but is saving Tielle in the order of €1000 per day in production costs.

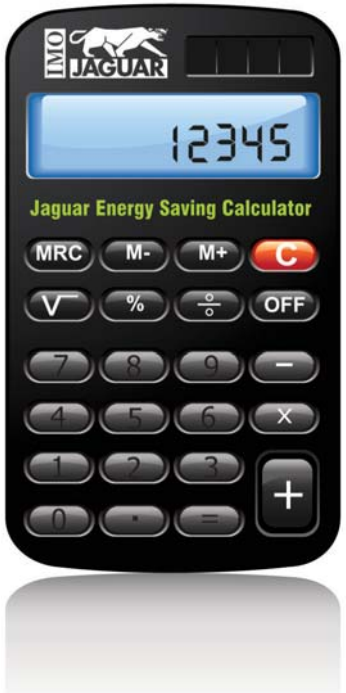
Applying for the IMO Self Funding Energy Saving Scheme is simple...



See for yourself how much you could be saving.

IMO's Energy Saving Calculator allows you to easily work out your potential energy savings.

To find out what savings you could be making, visit **www.jaguar-acdrives.com** and fill in the online calculator.



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