

# CASE STUDY

DVR SHOPSMITH CASE STUDY



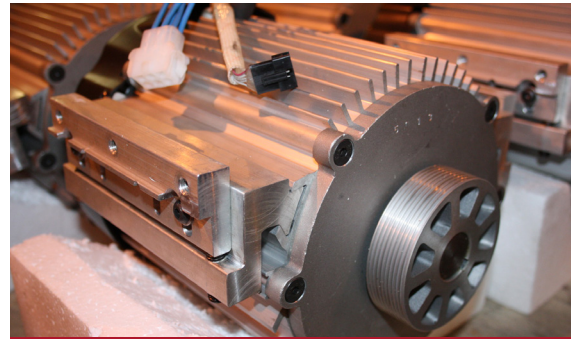
## BACKGROUND

The Shopsmith multipurpose woodworking machine was first developed in the 1950's and post WWII saw a developing boom in DIY activities in the USA. New houses were constructed using the Shopsmith and it enabled countless other DIY projects to be started; from furniture through to building projects. All this with a multifunction machine that only took up as much room as a bicycle. An important consideration for the more modest homes and workshop space available then.

The versatility of the Shopsmith single machine as a "does-it-all" all concept had massive appeal to the wood worker. It was seen as an economical approach, having advanced from the 'variable speed option table saw' - which even today is still a unique feature. In addition to this the benefits of a woodlathe, drill press, sander, horizontal borer, functions in a modest workshop space was very appealing.

Throughout the 1960s, '70s and '80s its popularity grew and it is estimated upwards of 600,000 units were sold. The Mark V, Model 510, was introduced in the 1980's with additional functions such as a bandsaw, beltsander, table saw, lathe, disc sander, drill press and horizontal boring machine - all driven by a separate stand and power unit.

Shopsmith took a radical direct market approach, selling the Shopsmith machines at State Fairs, Home Shows and at other venues across the USA, through a network of dedicated expert user salesmen. This was a ground-breaking approach to marketing which grew a very loyal community of Shopsmith users, sharing "how-to" tips and information. Even today, this is a very active community, with enthusiastic and energetic Shopsmith forums online providing valuable feed-back on the products and their benefits.



*DVR motor on Shopsmith Assembly Line, ready to be built into the Shopsmith Mark 7*

## Rise of the Single Purpose Machines.

However, as the versatility of the Shopsmith machine was limited and in order to perform multiple woodworking functions, there had to be compromises. It had to be set up for each different function and each one took time. Individual projects meant careful planning, so for example, if you were in table saw mode and you had forgotten to drill a series of holes, you needed to go back and change set ups – this proved to be a challenge for Shopsmith users.

This led to the quest for a multi-function machine, which the Shopsmith Mark 7 addresses.

In the '80's and '90's a whole new range of stand-alone stationary and bench top tools were steadily introduced. With additional work shop space available and the convenience of a separate drill press table we saw the popularity of Shopsmith begin to wane. These stand-alone machines generally had the edge in capacity, performance and convenience.

Shopsmith saw the need for a totally revamped machine. They began R&D work on a Shopsmith Mk 7 however, it became clear that more advanced technology, particularly an advanced powertrain, was needed to achieve their goal.

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## DVR TECHNOLOGY

In early 2002 Teknatool International Ltd, with the help of university collaborations and international partnerships developed its own, computer driven, advanced switched reluctance motor technology, called 'Digital Variable Reluctance'.

The initial DVR motor development was to provide a very advanced unique, powerful, direct drive motor (no belts or pulleys) which in addition to providing a huge speed range was able to deliver incredibly high torque at low rpm – the 'holy grail' feature for any woodlathe.

As it was controlled by a high powered computer, it was able to offer many additional benefits, including constant rpm with micro sensing of spindle position and speed which also enabled safety sensing.

It is set for safe running conditions and will shut down with a chisel dig-in where normal motors will just keep running. Another great benefit is that the DVR constantly monitors power, and only uses enough power to maintain the speed under the cutting conditions. After cutting it trickle supplies the power – so over the course of a project it can save up to 80% of the power used in a normal AC or DC motor.

The basic DVR motor has many other features and innovations, such as reverse, favourite custom speed presets and electronic stop.

And combined with its ruggedness and reliability, it makes an outstanding motor for use in many woodworking machines.

In late 2005, it became apparent to Teknatool International that if the Shopsmith machine could be converted to a DVR motor it could enhance its performance and transform the product. This thought intrigued the Shopsmith Management and Engineers and with cautious optimism, the following year the first DVR motors were sent for evaluation. The initial performance and results were an outstanding and exciting revelation of the superiority of our DVR Motor Technology.

This began the collaboration between Shopsmith and Teknatool International to design and configure our DVR motor technology and produce the Shopsmith 'PowerPro' products.

In 2010 Shopsmith introduced a PowerPro upgrade for the Shopsmith Mk V machines already in use providing them with considerable, distinct advantages, including :

- Big boost in power from 1 hp to 1.75hp (120V) or which readily converted to a 2 hp on 220V. This gave at least twice the torque throughout the full speed range, enabling a big increase to depths of cut and feed rates once the preserve of high powered commercial machines.
- A considerable increase in a smooth, electronic variable speed range from 250rpm to 10,000 rpm, enabling a big increase in projects; from drilling huge holes and metal drilling, resawing thick stock – to rout and shape without feathering or splintering and jointing/planning operations at lightening speed.
- An extensive computer database of operations to help select, function, choice of bit or drill and diameter, material – as the PowerPro selects the ideal speed, eliminating any guesswork or problems.
- The high 10,000 rpm speed range opens up smooth, professional results like a commercial shaper, jointer or hand held router.
- Reverse to make very desirable bi-directional sanding possible.



*Robert Folkerth, President of Shopsmith (LH) and Peter Baker, CEO of Teknatool International (RH) examine the first DVR motors shipped to Shopsmith manufacturing*



*Shopsmith Mark 7 containing the DVR Power Pro*



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## Market Reaction

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As expected from such a boost in performance and power, the market has reacted very positively. Since both the DVR PowerPro Mk5 upgrade and the introduction of the PowerPro Mk 7 (with its extra over/under router and over/undershaper capabilities) in 2010, thousands of these units have been sold and the forecast sales for the forthcoming years is buoyant.

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## Don't just take our word for it

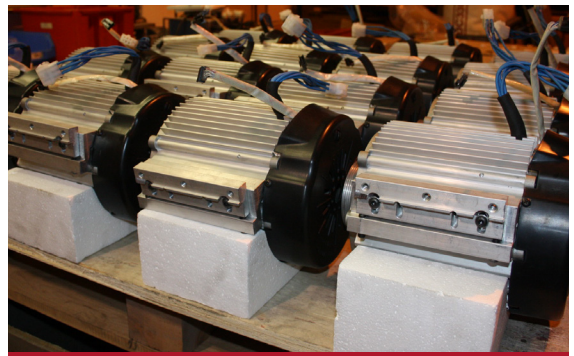
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Here is what some new owners say:

*"My new Shopsmith PowerPro Headstock is a blast! I haven't has so much fun with my Mark V since I bought it in 1987..."*

*"The enhanced high-end speed of my PowerPro Headstock produces super smooth saw and router cuts... The Power Pro is awesome"*

*"The DVR Smart Drive Motor will provide a range of unique features "*



*DVR Motors waiting assembly*

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## The Future of DVR Motor Technology.

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This case study illustrates how the Teknatool Intelligent DVR Motor Technology can enhance and transform the functions and uses of woodworking machines.

With added power, constant torque, huge speed range, direct drive, potential power saving, computerized selection screens for easy automatic speed selection and tested reliability, the DVR Motor Technology from Teknatool is going to revolutionize woodworking.

DVR meets the demands for safer, more energy efficient 'smart' technology. With its onboard computer, the DVR drive monitors conditions constantly, adapting its performance to real time situations. With constant monitoring of workload and projects, the DVR delivers 1.75HP at maximum torque throughout the speed range, for a smooth, vibration-free, safer user experience.



*Detail of DVR motor fan cowling*

Traditional DC and AC motors can no longer meet the sophisticated requirements of the market. The DVR Direct Drive has been proven in NOVA lathes over many years and has recently featured in its first independent manufacturer project, providing the highly successful DVR Drive for the Shopsmith PowerPro machine. DVR drive technology is now poised to expand into a wide range of products, providing consumer and industrial solutions that meet the demands for intelligence, safety and energy efficiency.

The next release is a DVR package drive, a bolt-on solution for a wide variety of existing machines. This can retro fit to older NOVA lathes, as well as a wide range of other machinery. Teknatool are actively working on a number of new projects independently and with other companies and these will be released in 2014.

In addition, Teknatool is working on applications to use DVR drives on drill presses, bandsaws and high performance midi lathes. With each of these traditional tool categories, the DVR Smart Drive Motor will provide a range of unique features to transform them into new generation, smart, computer-driven woodworking machines.



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