

# White Paper

ProDrive Systems: Improve the Handpiece, Improve Dentistry

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*Handpiece Performance Through Innovation*

**Company:**

ProDrive Systems Ltd.  
www.prodrivesystems.com

**Industry:**

Dental Instruments

**Established:**

2003

**The ProDrive System:**

ProDrive Turbine  
ProDrive Bur

*“With all the advances that have been happening in dentistry today one of the areas that really has been lacking is an enhancement or improvement to the dental handpiece.”*

Dr. G. Curatola, DDS;

Founder, Curatola Dental Group;

Cofounder & Chairman, C.S. Bioscience, Inc.

## White Paper

### ProDrive Systems: Improve the Handpiece, Improve Dentistry

#### Introduction

The air driven handpiece is the mission critical instrument for over 150,000 dentists across North America. Until now, high-speed handpieces have relied on a friction grip design, a round chuck gripping a round bur shank. This round-on-round chuck and shank drill design dates back to the 1800's. While drill technology in virtually every other industry has evolved to a high performance, locking chuck and bur design – today's dental handpieces and burs still use the century old friction grip design.

#### The ProDrive System – Upgrade Turbine and Bur

The ProDrive System is a fully compatible upgrade for leading brand handpieces. ProDrive allows dentists to continue using their preferred handpiece, yet with superior performance.

Due to ProDrive's patented, triangular design, the chuck locks the bur shank into place, resulting in a improved hold that grips a greater length of the bur shank. This provides superior torque transfer from turbine to bur tip.

#### Faster Cutting Speed

Engineering tests prove that the superior grip of the ProDrive System drastically improves cut speeds versus original manufacturer handpieces.

#### Smoother Cutting

The ProDrive System's enhanced bur shank and chuck mechanism is markedly smoother, which results in less vibration and chatter during cutting.

#### Accuracy of Cut

The ProDrive System's improved design revolutionizes traditional friction grip handpieces, providing improved precision and accuracy resulting in superior margin integrity and cut definition.

#### Bur Lengthening

ProDrive Burs feature patented, double grooves on the shaft. When fully seated, the chuck locks into the lower groove (closer to the cutting tip). When lengthening the bur, depress the back cap and extend the bur until the upper groove becomes engaged. This enables safe lengthening of the bur without concern of the bur ejecting during use. In either mode (standard or lengthened) the concentricity of the bur remains true, providing greater speed and improved quality of cut.



*"I can now say without any doubt that ProDrive makes a significant and noticeable difference in handpiece performance."*

Dr. John Flucke, DDS

## Dr. John C. Flucke

**New Technology Editor:** Dental Products Report Magazine

**Technology Editor:** Missouri Dental Association Publication

**Education:** University of Missouri at Kansas City

**Location:** Kansas City, MO

**Interests:** Technologies in healthcare, computers in dentistry, technology evangelist

**Memberships:** American Dental Association, Missouri Dental Association, Academy of General Dentistry

**Associations:** Former President of the Greater Kansas City Dental Society and Chairman of the Missouri State Peer Review Committee

Dr. Flucke is a general dentist specializing in high tech and cosmetic dentistry with a private practice in Lee's Summit, Missouri. Dr Flucke is avidly involved in technology for dentistry, particularly with computers and the internet.

Practicing dentistry for twenty-two years, Dr Flucke has written countless articles on dental technology, participated in clinical testing for dental manufacturers and lectured at major dental meetings across North America, including the ADA Annual Session, Greater New York Dental Meeting, The Thomas P. Hinman Dental Meeting, The Yankee Dental Congress, and the Chicago MidWinter Meeting.

Dr. Flucke, striving to keep his practice on the leading edge, put to the test two KaVo 635 handpieces upgraded with the ProDrive System against two unused (brand new) KaVo 635 factory original handpieces. In a side by side comparison, Dr. Flucke noticed a significant improvement in the performance of the KaVo 635 handpieces upgraded with ProDrive.

### It's all about improving the patient experience

*"The superior cutting speed and improved cut accuracy made possible by the ProDrive technology allows me to significantly reduce my prep time,"* said Dr. Flucke. *"The ones who really benefit from this are my patients, because it means less chair time for them. No matter how much they like you, no patient will ever say they'd like an appointment to last longer. The faster the patient is in and out, the happier they are."*

In addition to cut speed, Dr. Flucke noticed a smoother and more reliable cut with the ProDrive System over traditional friction grip handpieces.

*"Increased cutting speed and a smoother cut means less strain on both me and the patient,"* noted Dr. Flucke. *"This means less post-op sensitivity for the patient, and greatly reduces the chances they'll need endodontic treatment in the future."*



*"It was as if I had an epiphany the first time I used ProDrive and I could not wait to prepare my next crown."*

Dr. Slade Lail, DDS

#### Dr. Flucke continued

According to Dr. Flucke, the ProDrive System's better transfer of cutting torque from turbine to bur was especially evident when removing old crowns.

*"Cutting off a PFM with a non-precious core can often be an adventure that usually results in a lot of chatter and vibration. This is not the case with the ProDrive System."*

#### Added bonus for the dentist

*"The bottom line for me is that I love to improve my patients' smiles through the use of innovative products. And I believe the ProDrive System is a game changing technology that will help me to be a better dentist,"* said Dr. Flucke.

*"The added bonus is that it also gives me more time to devote to my other passions in life, such as writing, teaching and tinkering with new technology."*

#### Dr. Slade W. Lail

**Education:** University of Tennessee at Memphis

**Location:** Duluth, Georgia

**Practice:** General Dentistry

**Memberships:** American Dental Association and the Academy of General Dentistry

Dr. Lail tested two ProDrive Midwest Tradition lever handpieces against two Midwest Tradition factory original handpieces. In a direct comparison, Dr. Lail experienced a noticeable difference between the original Midwest handpieces and the upgraded ProDrive handpieces.

*"It was as if I had an epiphany the first time I used ProDrive,"* said Dr. Lail. *"I felt like a dental nerd and couldn't wait to prepare my next crown. The quality of my crown and bridge preparations has improved dramatically and the margins are textbook perfect. It [ProDrive] also gives me more control over the handpiece with no loss of concentricity and I no longer worry about bur chatter or vibration."*

#### Less chair time means happier patients

*"The ProDrive System definitely cuts faster, which results in less chair time for the patient and an increase in office productivity,"* said Dr. Lail.

He also observed that ProDrive delivers a far smoother, higher quality cut than traditional friction grip handpieces, which are prone to vibration under difficult or heavy cutting circumstances.

*"This means less tooth trauma during crown & bridge preparations, which essentially eliminates post preparation sensitivity,"* said Dr. Lail. *"The improved accuracy also results in a better fit for the patient meaning longer lasting, more comfortable dental work."*

**Dr. Lail continued**

Dr. Lail was impressed by ProDrive’s convenient bur-lengthening feature that allows for safe and efficient lengthening of the bur up to 3mm.

**Added bonus for the dentist**

*“It certainly saves me a lot of time during crown & bridge preps because I don’t have to change burs,” he said.*

The value of the ProDrive System for dentists can be summed up not only through the increase in efficiency it affords but also by the return on their handpiece investment.

*“I’m a workaholic and so for me the biggest advantage of the ProDrive System, apart from improving the patient experience, is that it allows me to practice even more dentistry,” said Dr. Lail. “The fact that ProDrive also has a complete selection of Meisinger burs means everything I need is right there. I am definitely keeping my ProDrive products and will continue to use them to improve my practice.”*



**Dr John C. Stangl**

**Education:** University of Minnesota

**Location:** Buffalo, Minnesota

**Practice:** General Dentistry

**Clinical Evaluator:** Dr. Gordon J. Christensen’s Clinician’s Report

*“ProDrive can make an air turbine handpiece do anything an electric handpiece can do. The added bonuses are it costs less, is not as heavy nor as bulky.”*

**Dr. John Stangl, DDS**

Dr. Stangl tested two ProDrive KaVo 635 handpieces versus two new KaVo 635 factory original handpieces. Upon completing the testing, Dr. Stangl exclaimed, “This is a great product!”

Dr. Stangl went on to state that, *“This is one of the few times that I’ve tested a new product and said, ‘WOW this is better than anything else on the market today!’”* *“The ProDrive technology delivers a huge transfer of power and so I would highly recommend it to anyone considering an electric handpiece,”* he continued. *“ProDrive can make an air turbine handpiece do anything an electric handpiece can do. The added bonuses are it costs less, is not as heavy nor as bulky.”*

*“Because the ProDrive System gives superior power it makes it unnecessary to use electric handpieces. The ProDrive Bur inside the ProDrive Turbine is much more concentric and therefore a lot less noisy and that is a big consideration for patients and for dentists.”*

Dr. Jose Luis Ruiz, D.D.S

“Top 100 Clinicians in CE in 2006 & 2007” by Dentistry Today;  
Course Director of the USC Advanced Esthetic Dentistry Continuum and Clinical Instructor at USC

## ProDrive Field Test

ProDrive conducted field tests with 32 dentists across North America. Participants had three of their existing handpieces upgraded with the ProDrive System for a comparison against their standard factory original handpieces. Methodology included isolating an operatory to a ProDrive only practice area. This allowed dentists to move from a traditional friction grip operatory to a ProDrive operatory and document performance improvements and dental practice benefits.

Dentists were asked to rate their experience using the ProDrive System on 4 key performance indicators (a) cutting speed (b) cut consistency (c) cut accuracy (d) functionality of the bur lengthening feature. The goal of these tests was to identify if the dentists observed the ProDrive performance improvements and measure their benefits in practice. Handpiece models tested include ProDrive upgraded Midwest Tradition, Star 430, or KaVo handpieces for two weeks. The tests were organized in four phases over a three month period, involving approximately eight doctors per phase.

## ProDrive Test Results

When using a scale of 1-5 to rank the performance of the product, there was an obvious and powerful consensus among all dentists testing ProDrive that there were near-perfect performance results.

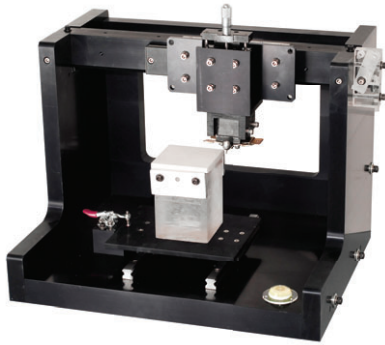
The consensus among the panel of dentists was a marked, overall improvement of handpiece performance as well as true and measurable practice benefits. 100% of participants agreed that ProDrive helped to reduce preparation time, while providing a noticeable improvement in cut quality and superior margin integrity.

The bur-lengthening feature was considered a useful and convenient tool for safely extending a bur by an additional 3mm.

A number of dentists kept their upgraded ProDrive handpiece and continue to use it in their daily practice.

PERFORMANCE INDICATOR (Scale of 1 to 5, where 5 is “strongly agree”)	RESULTS				
	PHASE 1	PHASE 2	PHASE 3	PHASE 4	AVG
The ProDrive upgraded handpiece reduced preparation time	4.5	5	4.5	4.7	<b>4.7</b>
The ProDrive upgraded handpiece provided a noticeable improvement in cut quality during preparations	4	4.5	4.5	4.5	<b>4.4</b>
The ProDrive upgraded handpiece improved my margin definition	4	4.5	4.5	4	<b>4.3</b>
The bur lengthening feature was convenient and useful	4.5	4	4.5	4.5	<b>4.4</b>

*When using a scale of 1-5 to rank the performance of the product, there was an obvious and powerful consensus among all dentists testing ProDrive with near-perfect performance results.*



**Engineering Test Platform**  
Designed to accurately measure handpiece cut performance under load.

## Engineering Test Methodology

Arcturus Solutions is an independent research firm specializing in quantitative and qualitative research methods and complex data analysis. Arcturus consulted with ProDrive to define test methodology and data analysis standards to ensure performance test results would stand up to peer review.

ProDrive set out to accurately quantify the faster cut speed of the ProDrive-upgraded handpieces in comparison to standard factory original handpieces. ProDrive created an Engineering Test Platform device to compare handpiece performance under heavy cut loads. The Engineering Test Platform was designed to reliably measure cut performance and provide consistent results under controlled conditions.

A test protocol was established to ensure test/retest validity. The test platform consisted of three tests. Three standard Star 430 handpieces were tested and the same three Star 430 handpieces were then upgraded with the ProDrive System. Subsequently, the same methodology was applied to three standard Midwest Tradition handpieces and three standard KaVo 635B handpieces. All three models were tested with normal factory turbines and then again with ProDrive Turbines.

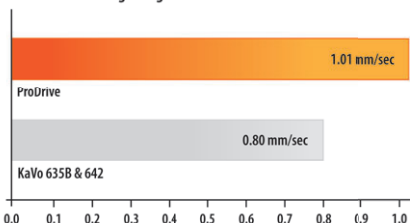
To ensure consistency, all tests were conducted using Macor blocks, a uniform, man-made material that is frequently used to test handpiece bur performance. Burs used for testing were identical Friction Grip Meisinger 557 Carbide burs and ProDrive Meisinger 557 Carbide burs.

Over 200 test runs were completed, at a cut depth of 3mm and 1.47 inch cut length under normal to heavy cutting loads. The reference cutting load was 160g, the highest load at which valid test results could be obtained.

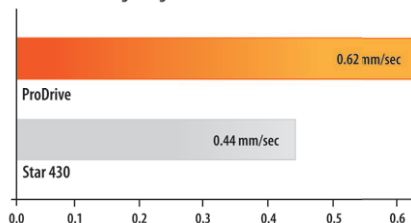
## Engineering Test Results

Testing demonstrated that a ProDrive-upgraded Star 430 handpiece cut 41% faster than a standard Star 430 handpiece. A ProDrive-upgraded Midwest Tradition handpiece cut 143% faster than a standard Midwest Tradition handpiece, and a ProDrive-upgraded KaVo 635B handpiece cut 26% faster than a standard KaVo 635B handpiece.

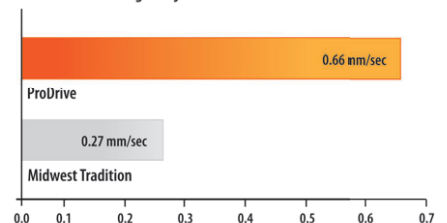
**Cutting Time - ProDrive vs. Kavo 635B & 642**  
26% Faster Cutting Using ProDrive



**Cutting Time - ProDrive vs. Star 430**  
41% Faster Cutting Using ProDrive



**Cutting Time - ProDrive vs. Midwest Tradition**  
143% Faster Cutting Using ProDrive



Testing demonstrated that a ProDrive upgraded handpiece cut faster than standard handpieces.

*“ProDrive is in a position to take a major role and really change the way the dental industry looks at handpieces and burs. There’s nobody out there who can compete with them.”*

Alex Miller, President, Meisinger USA

## Strategic Partnerships

ProDrive has partnered with the industry’s leading dental brands to ensure the highest quality and performance of its product. Our handpiece manufacturer partner is Sirona, a Top 5 international dental brand, and one of the world’s largest handpiece manufacturers. Our R&D partner for the ProDrive Handpiece is SycoTec, the R&D spin-off of KaVo, North America’s most prestigious high-performance handpiece brand.

ProDrive has a long-established relationship with German bur manufacturer Meisinger. ProDrive Burs adhere to strict ISO certification standards and are manufactured in Meisinger’s modern facility in Dusseldorf, Germany. Established in 1888, Meisinger has over 800 machines manufacturing a variety of burs to meet the needs of dentists worldwide.

## Conclusion

ProDrive Systems has demonstrated through engineering tests, field trials and everyday use in dental offices across North America that it provides several practical and value-added benefits. Practitioners may continue to use their handpiece of choice, and simply upgrade it for superior performance and improved efficiency. ProDrive is revolutionizing the dental industry by improving the dentists’ most important instrument - the handpiece.

*ProDrive Systems is the world’s first handpiece upgrade manufacturer. It is a subsidiary of Turner Technology Instruments Inc. (TTi)*