

# Props, Fans, & Pumps

## *Design & Performance*

**...just the color figures for those who got the B&W  
printed book...**

**by D. James Benton**

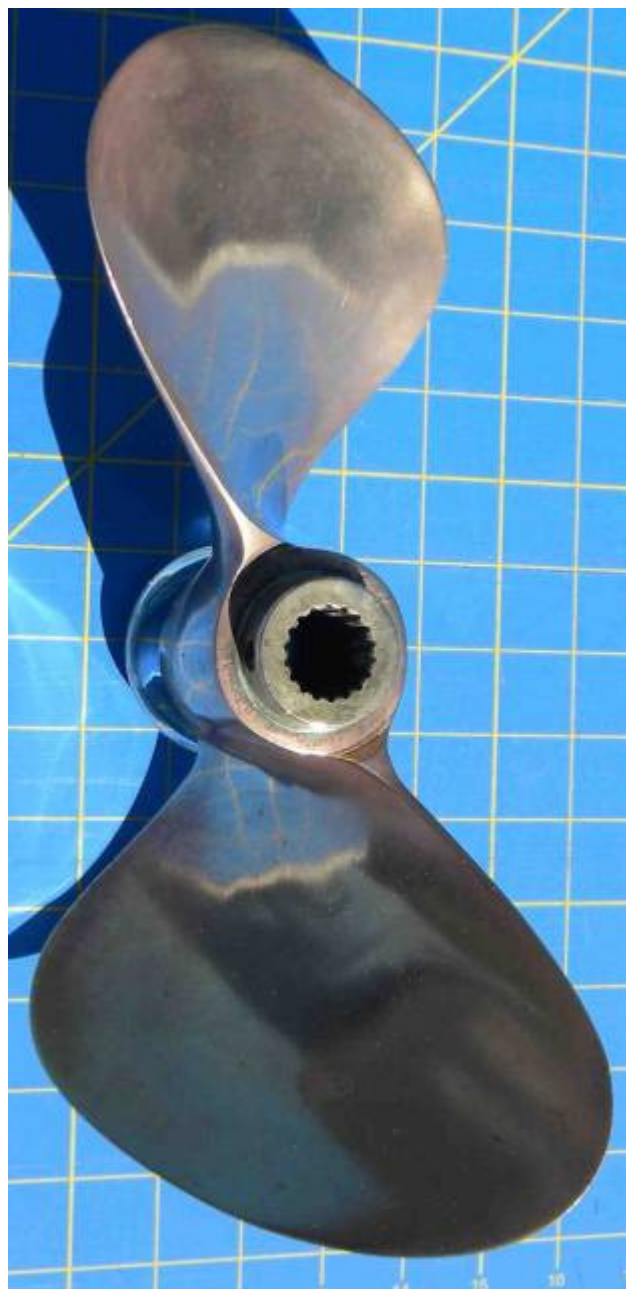
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### **Forward**

Propellers, fans, and pumps are an integral part of many machines of industry, transportation, and modern living. The designs are as diverse as the applications, but the theory behind how these devices work is the same. In this text we will consider nuances of design, such as prop cupping, trailing edge truncation, and blade curling. We will derive and apply the formulas in order to design and evaluate the performance of these fascinating devices. All of the software described herein is available free online.

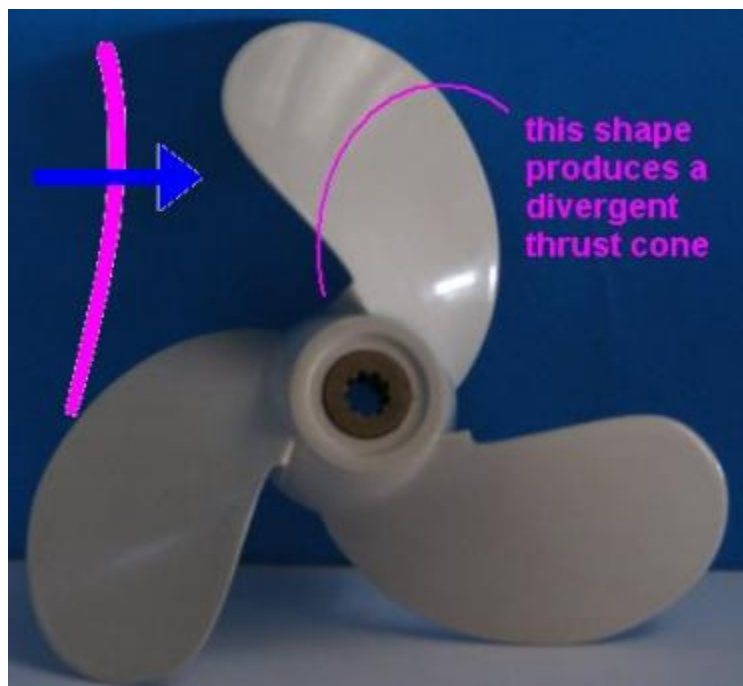
*All of the examples contained in this book,  
(as well as a lot of free programs) are available at...*

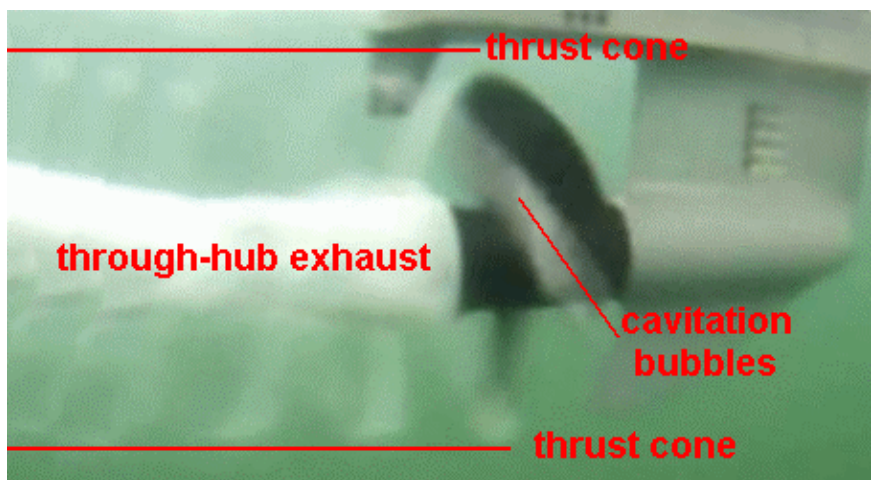
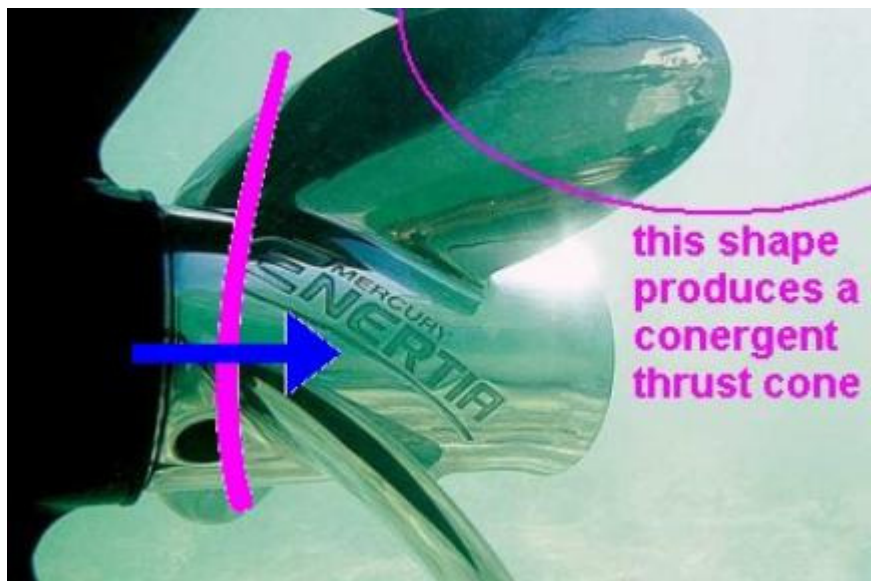
<http://www.dudleybenton.altervista.org/software/index.html>

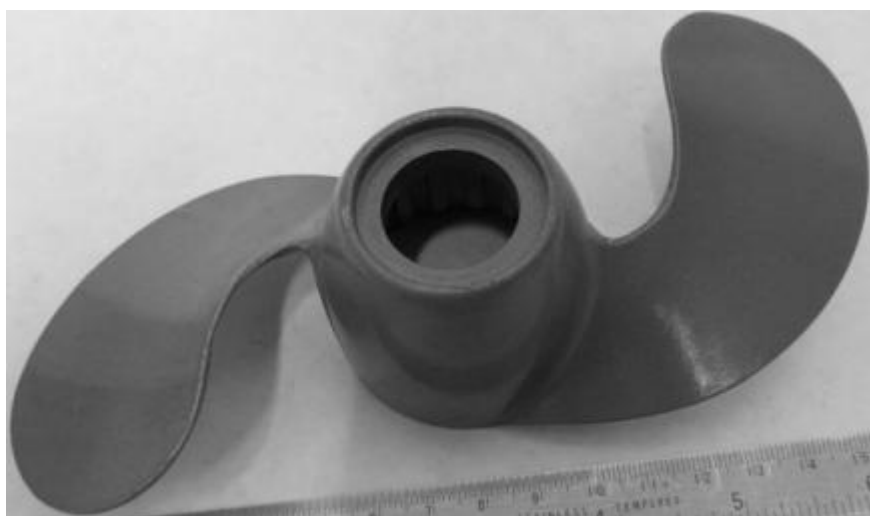
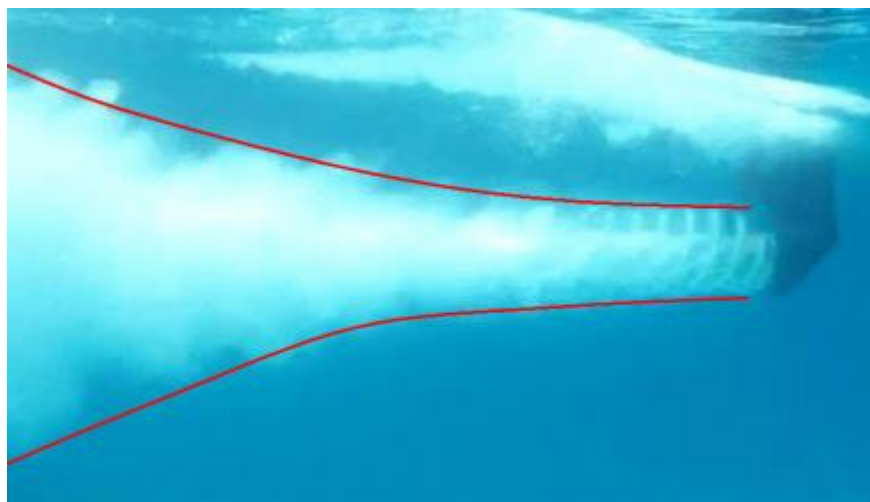
















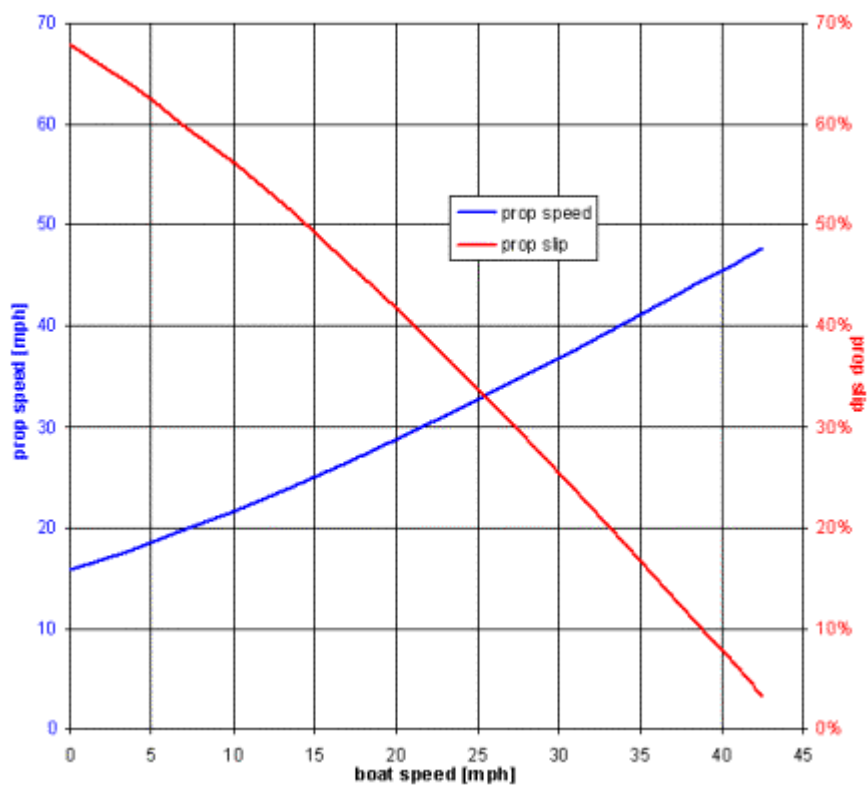


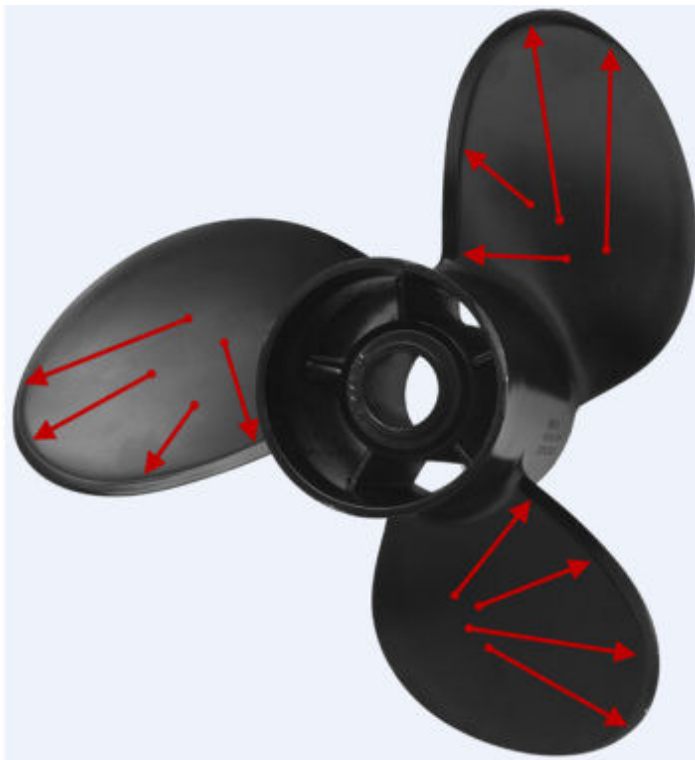




Photo of a blade damaged by Cavitation Erosion





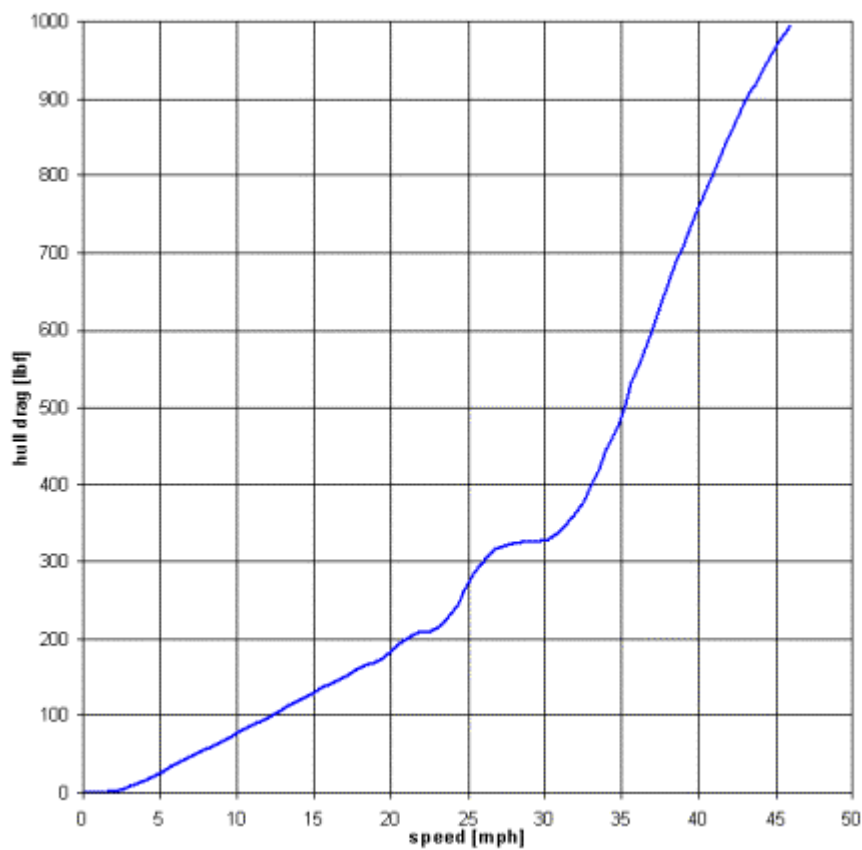


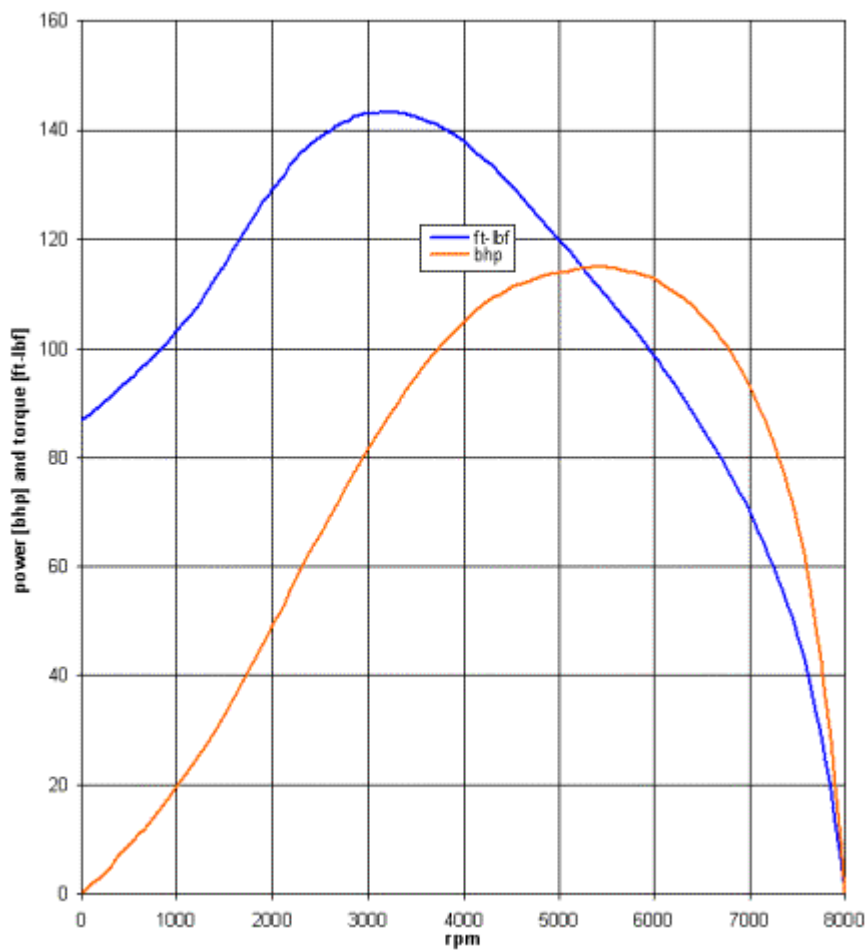


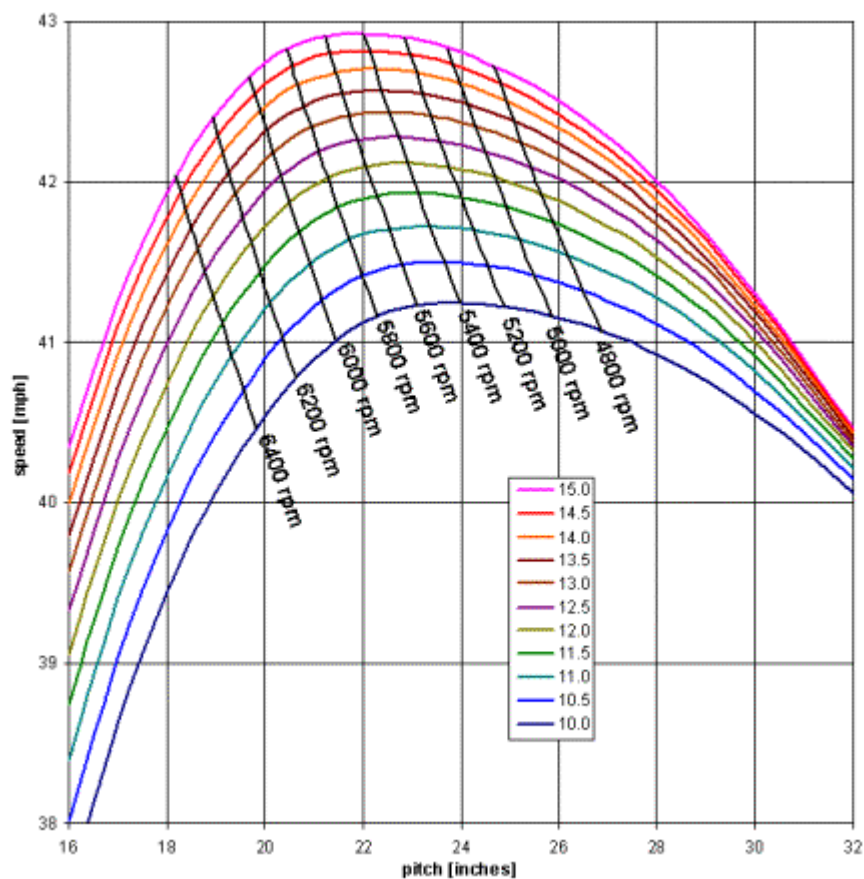


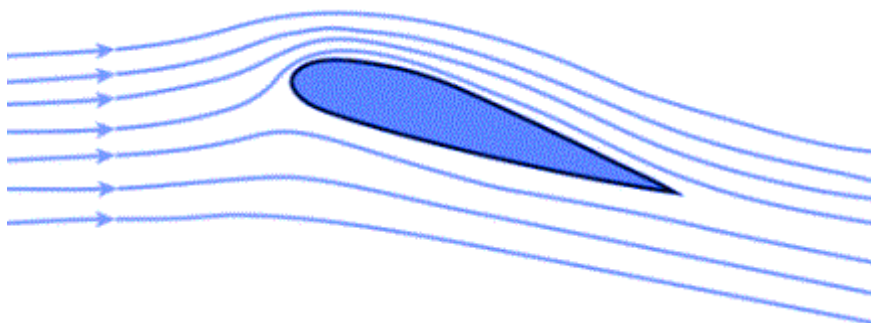


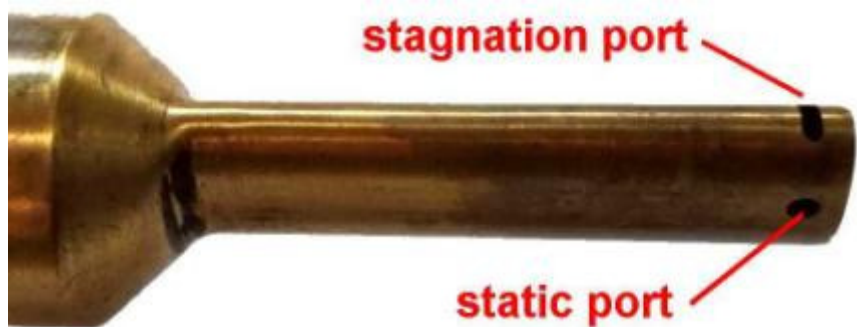


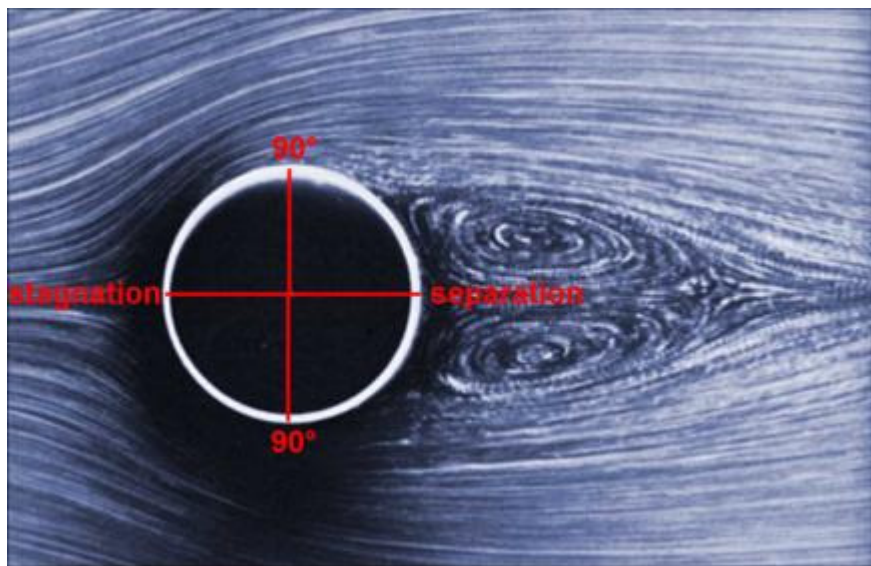






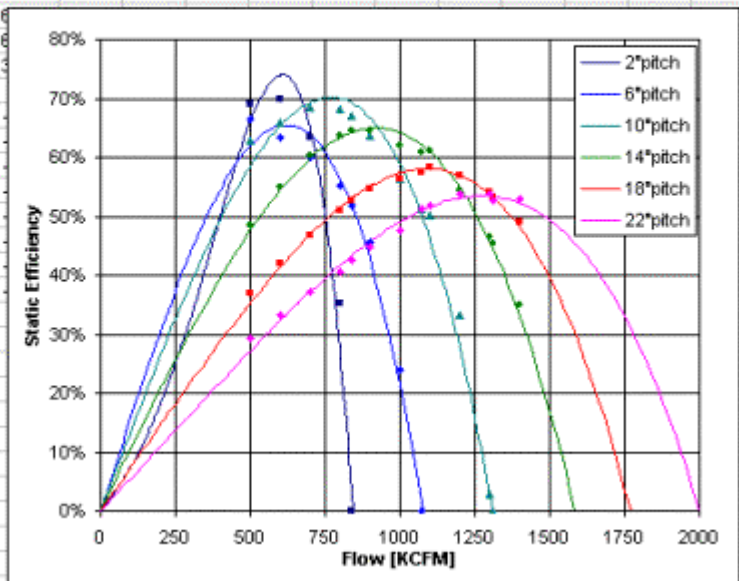






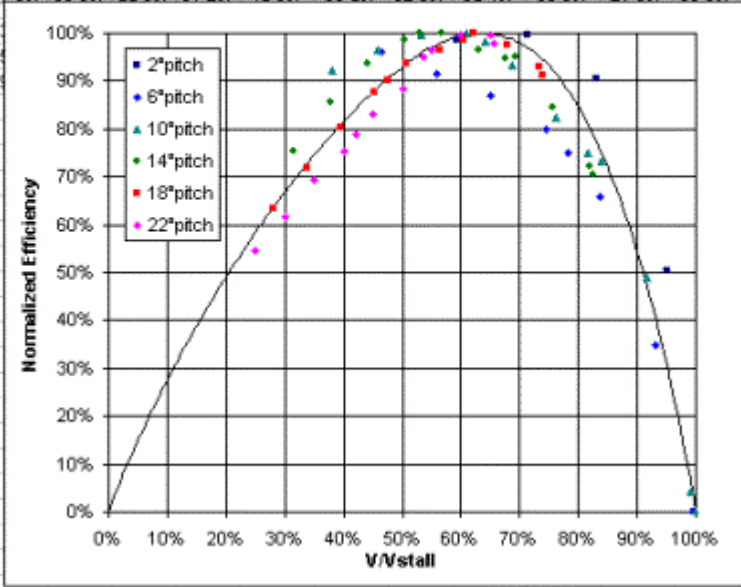


	A	B	C	D	E	F	G	H	I	J	K	L	M
1		2°pitch		6°pitch		10°pitch		14°pitch		18°pitch		22°pitch	
2	KCFM	Es	Et	Es	Et	Es	Et	Es	Et	Es	Et	Es	Et
3	500	69.0%	74.5%	66.4%	69.9%	62.9%	65.4%	48.5%	50.3%	37.0%	38.3%	29.4%	30.4%
4	600												
5	700												
6	800												
7	840												
8	900												
9	1000												
10	1070												
11	1100												
12	1200												
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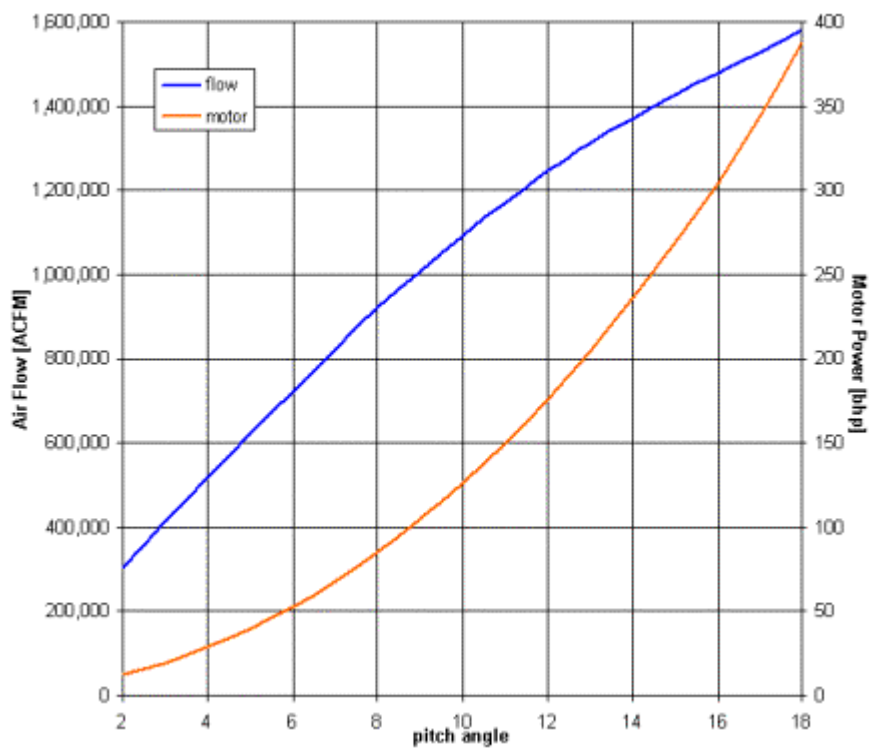


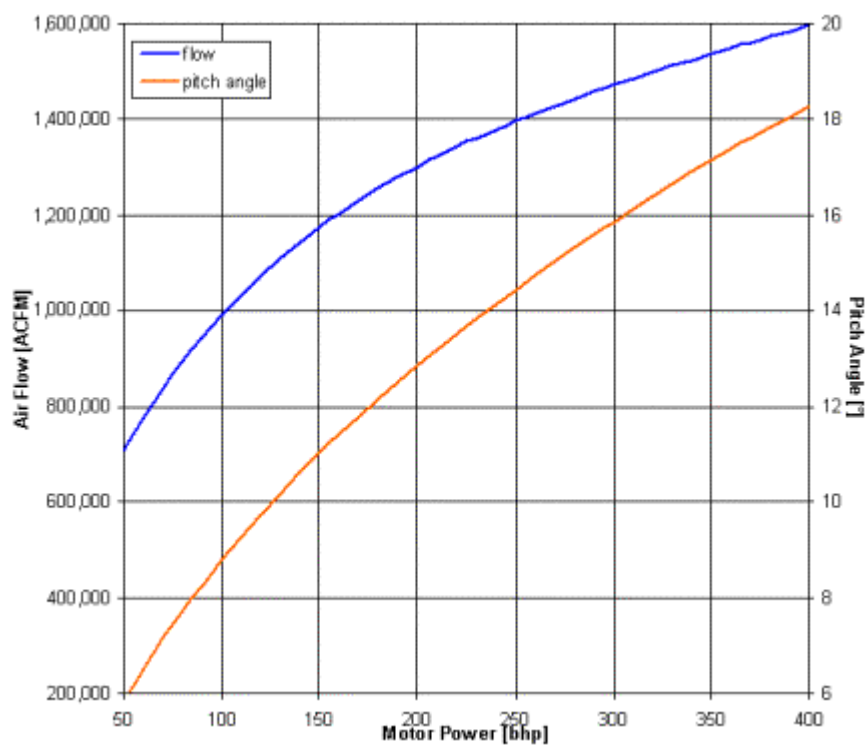
	A	B	C	D	E	F	G	H	I	J	K	L
1	2°pitch		6°pitch		10°pitch		14°pitch		18°pitch		22°pitch	
2	V/Vs	Es	V/Vs	Es	V/Vs	Es	V/Vs	Es	V/Vs	Es	V/Vs	Es
3	59.4%	98.6%	46.5%	96.3%	38.2%	92.1%	31.5%	75.3%	28.2%	63.5%	25.0%	54.6%
4	7											61.7%
5	8											59.3%
6	9											75.5%
7	9											78.8%
8												83.1%
9												86.5%
10												95.1%
11												96.5%
12												99.8%
13												99.8%
14												98.0%
15												96.5%
16												94.2%
17												85.9%
18												83.6%
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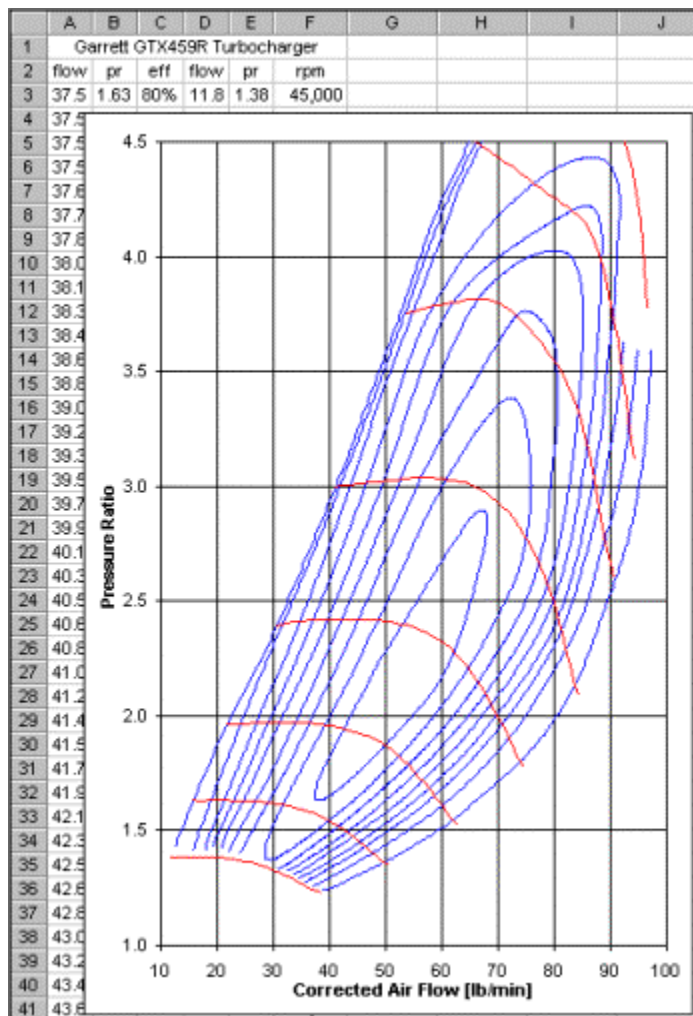


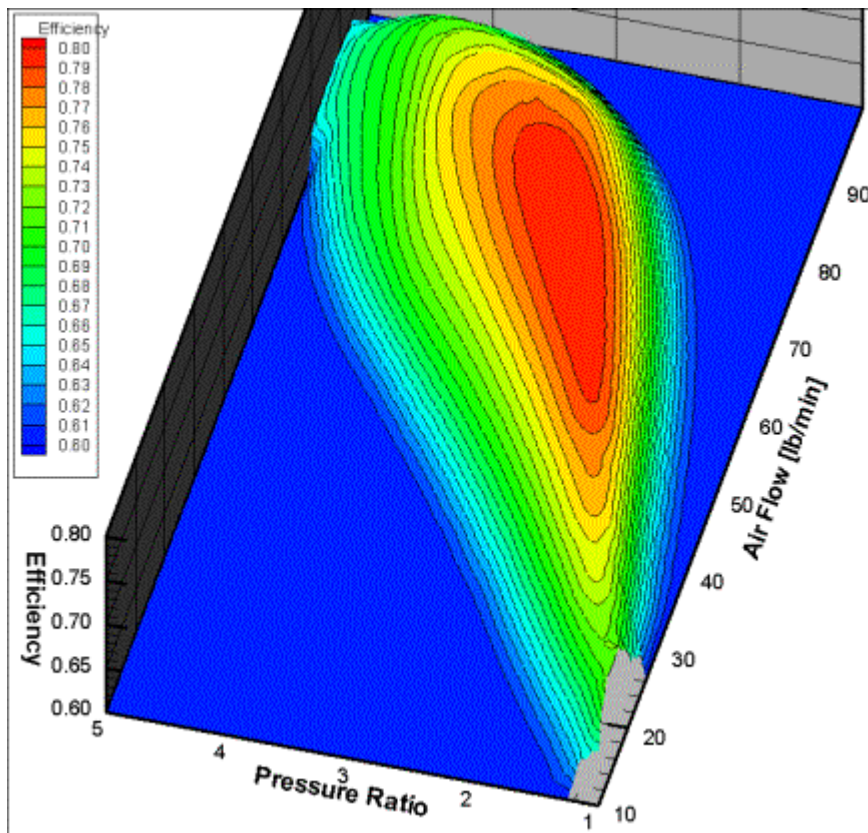




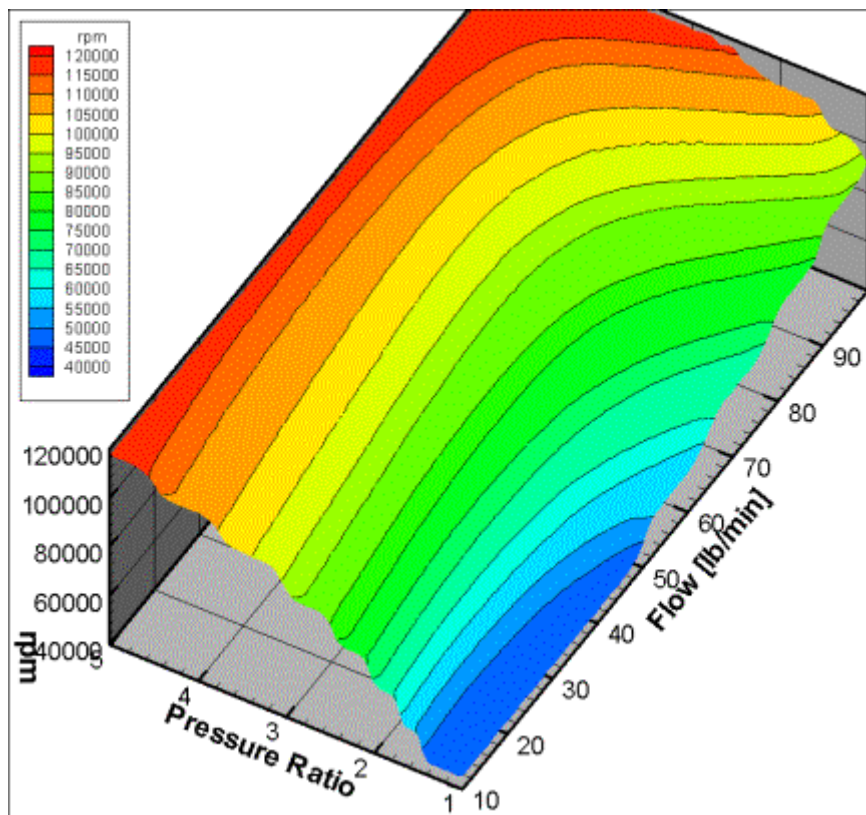


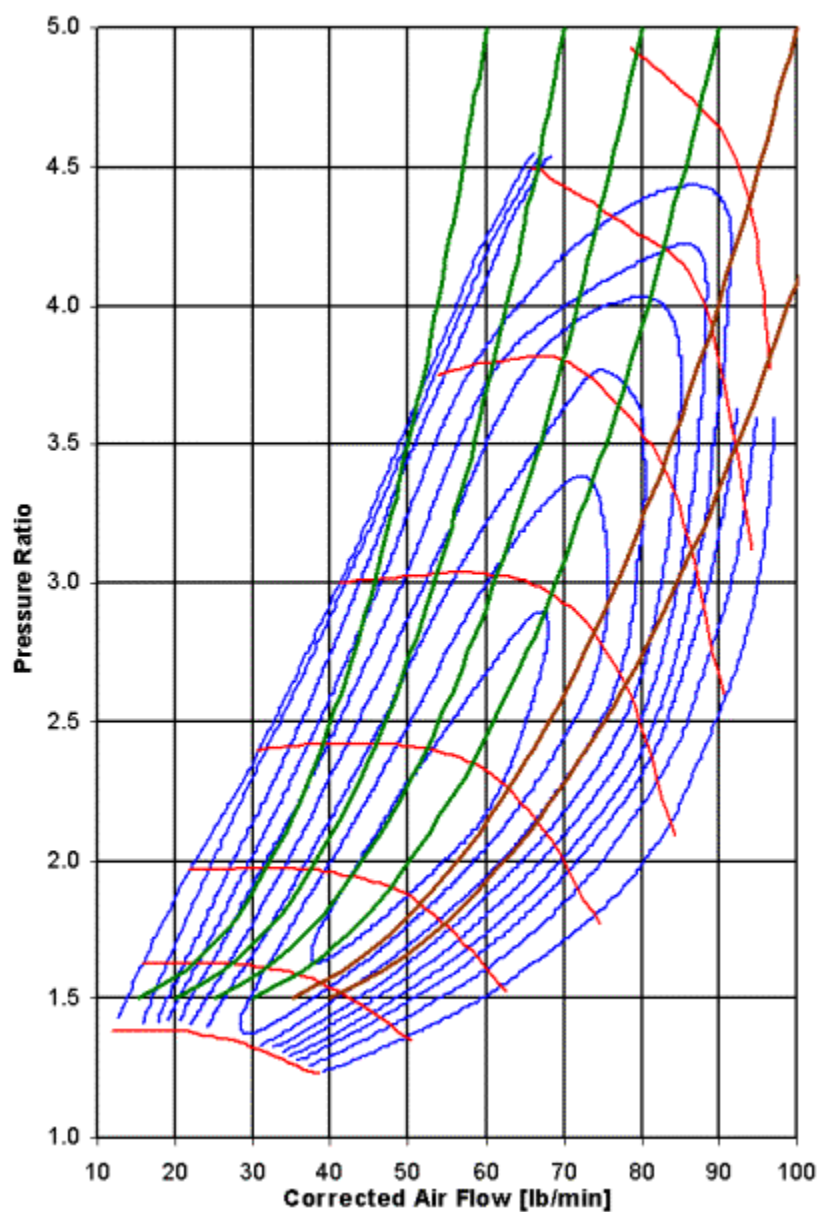


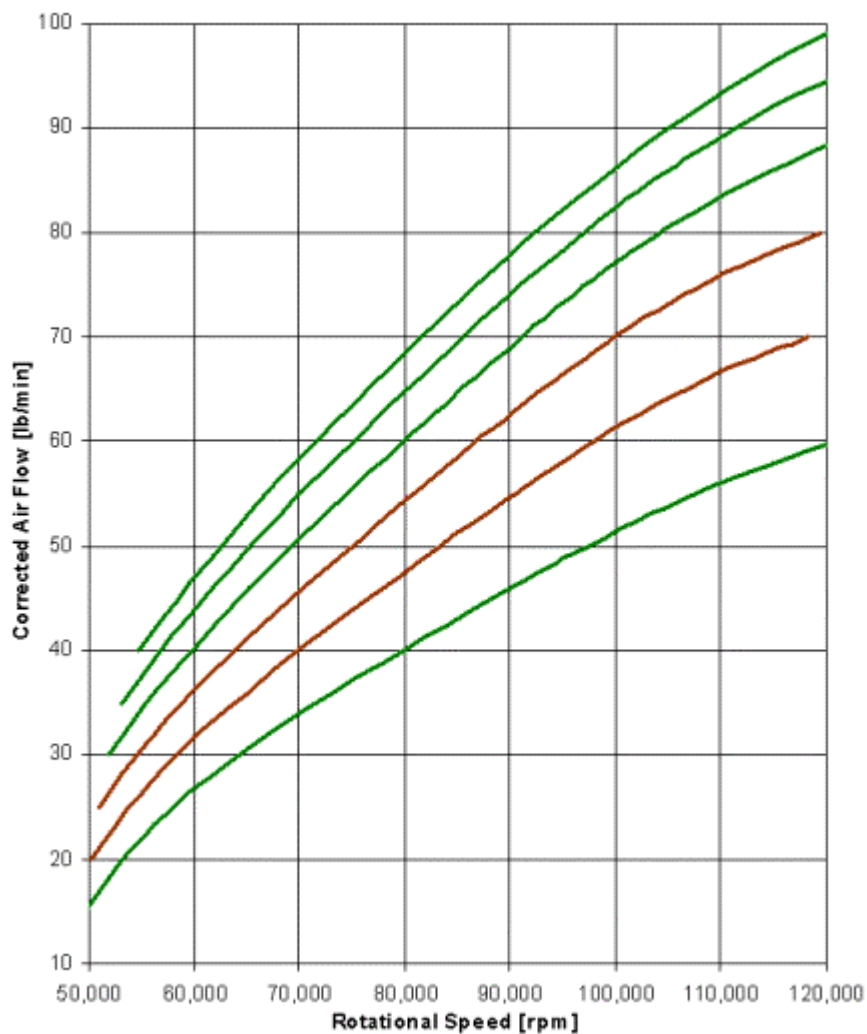


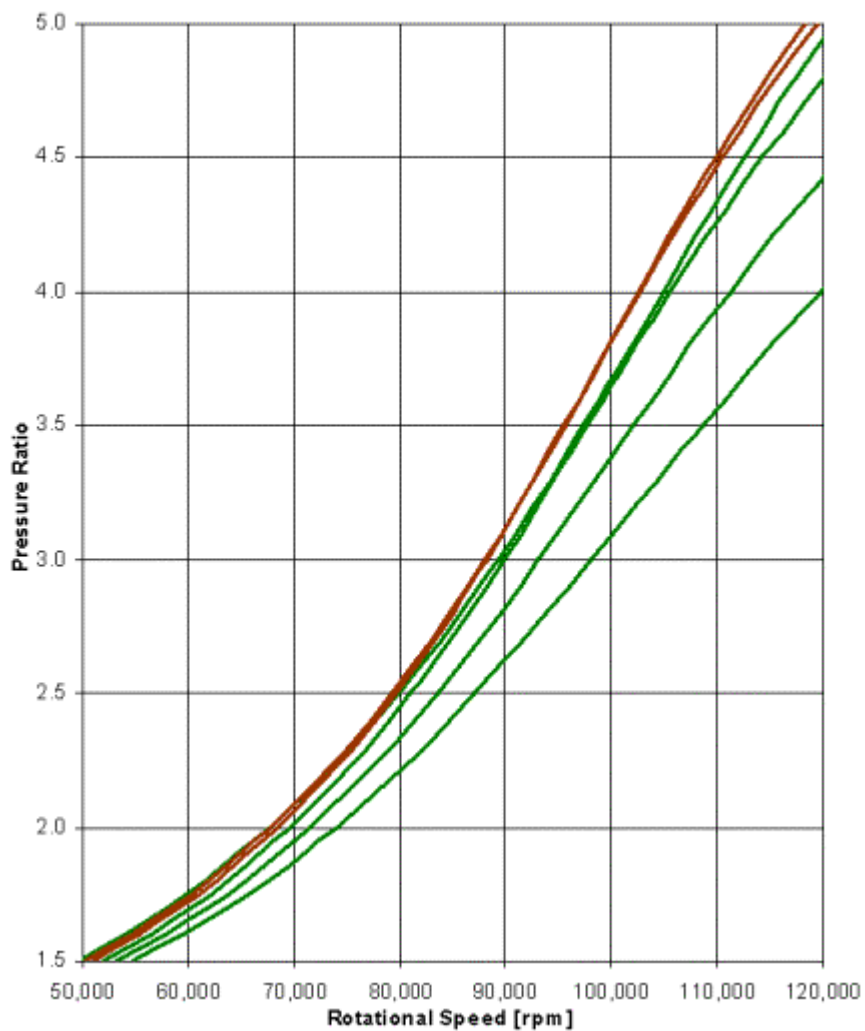


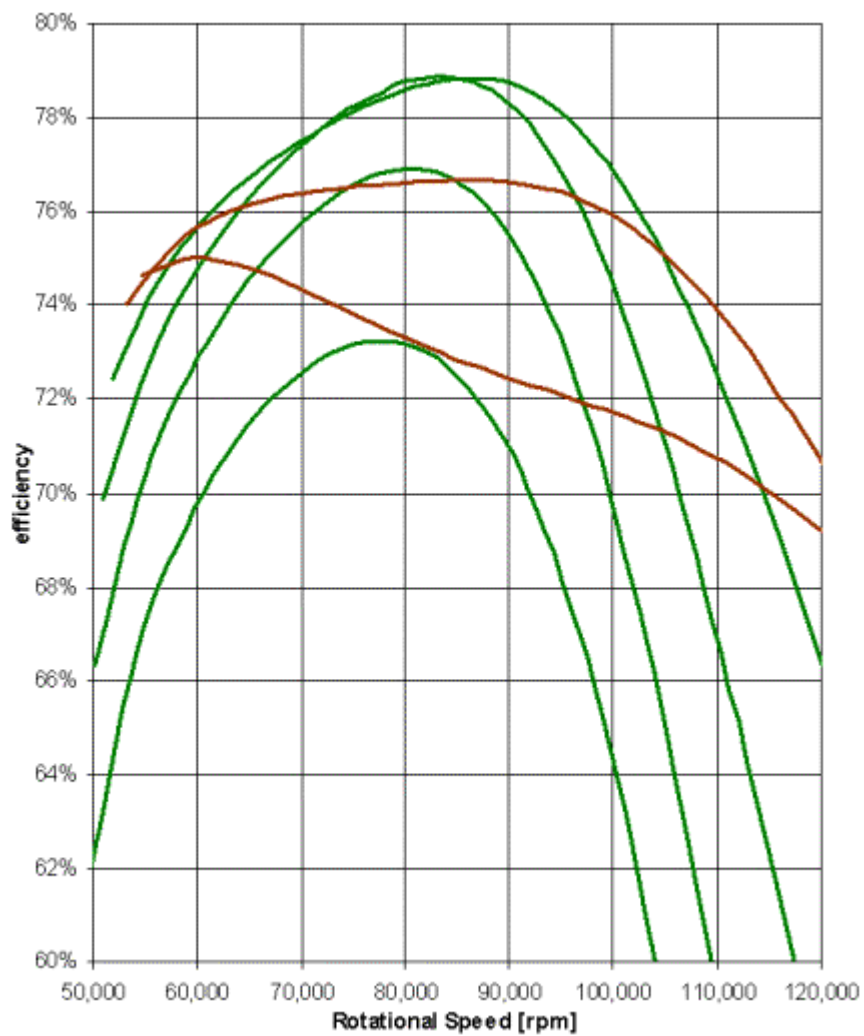




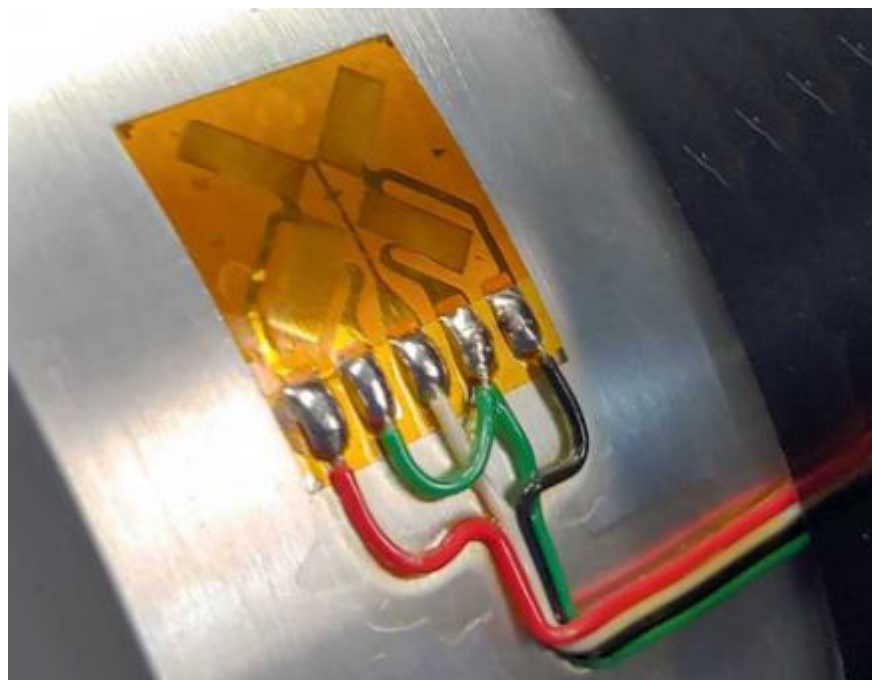


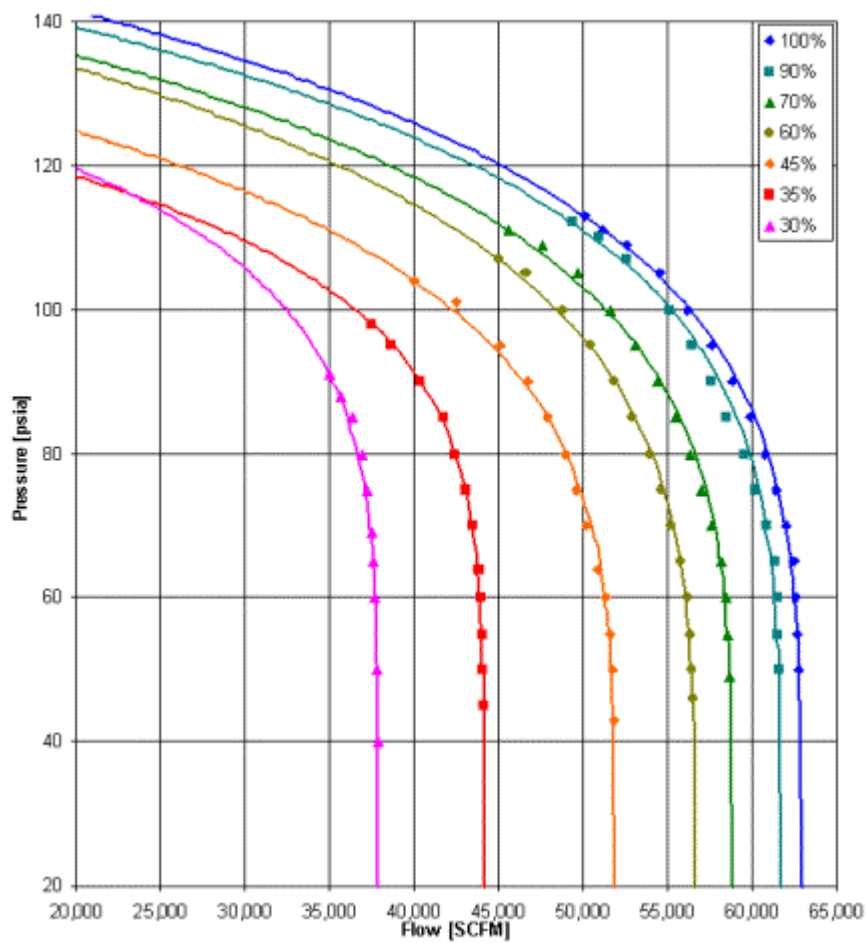




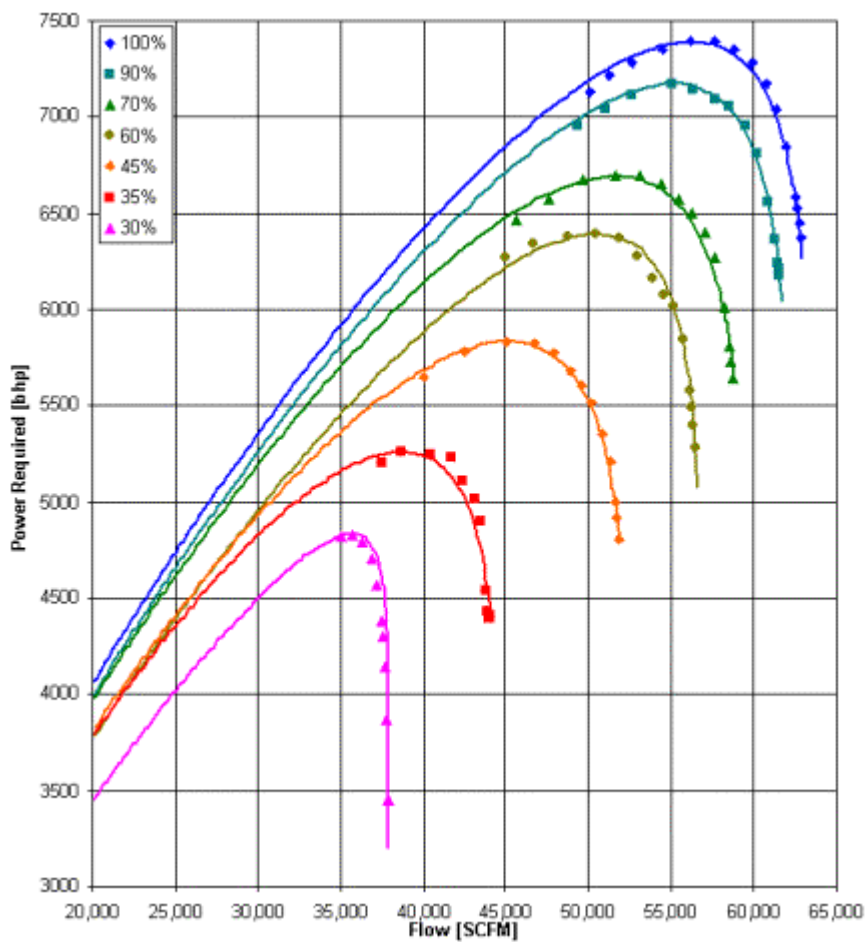


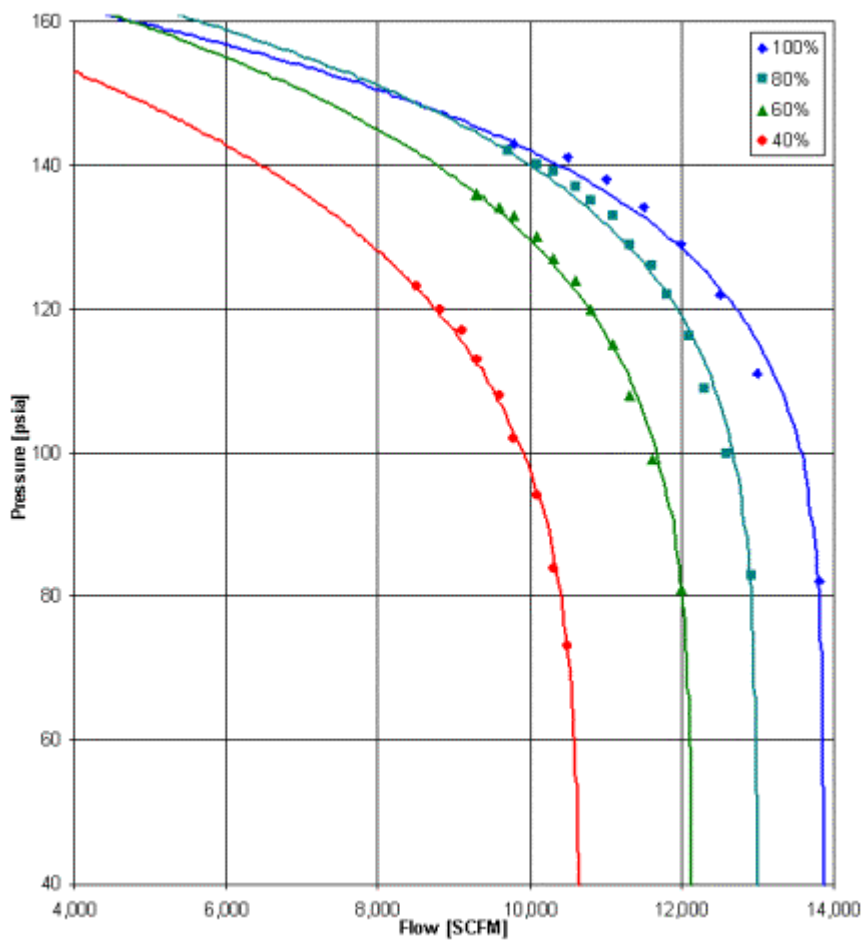


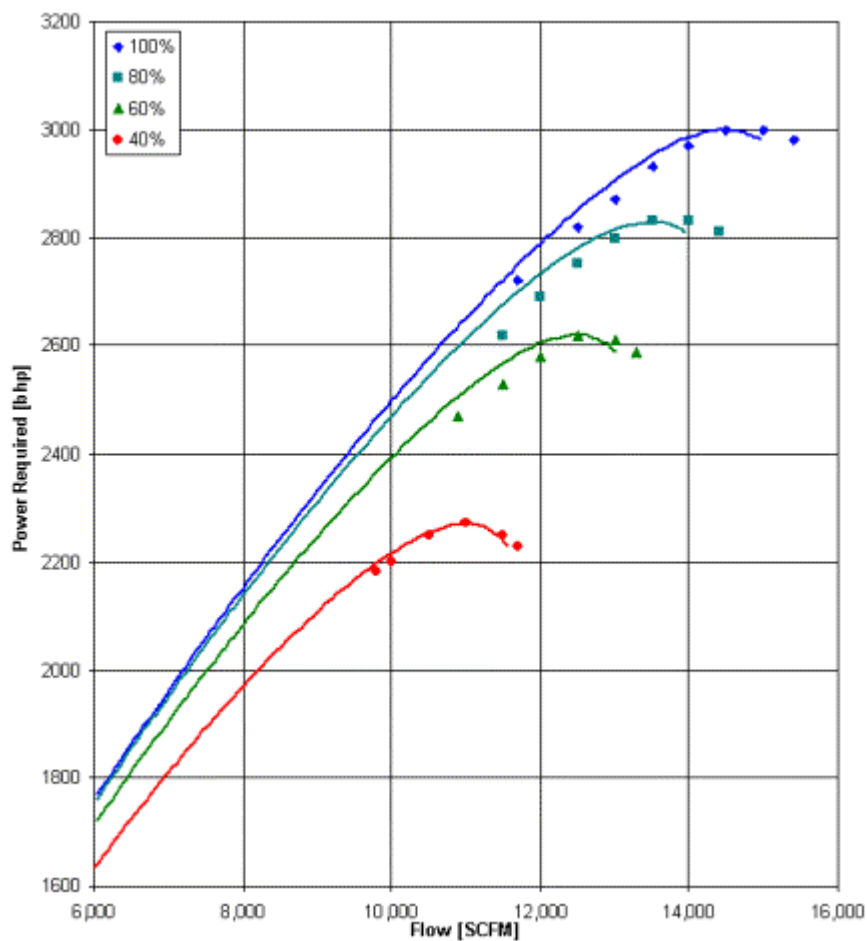


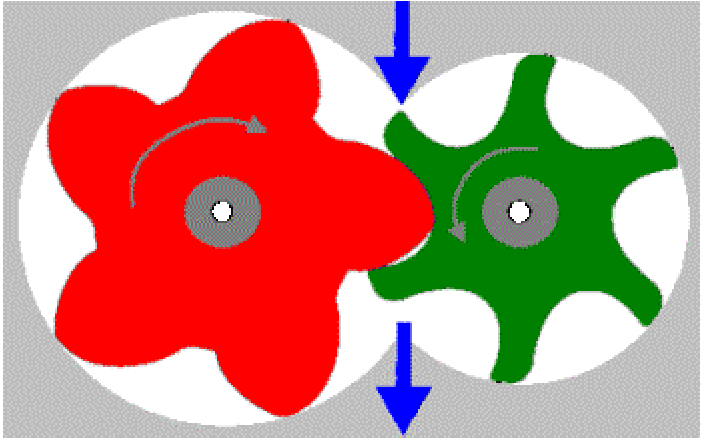
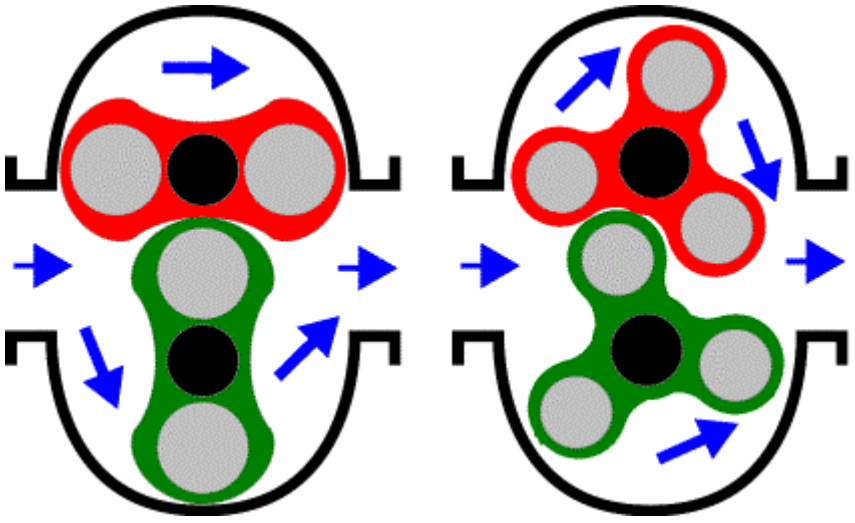






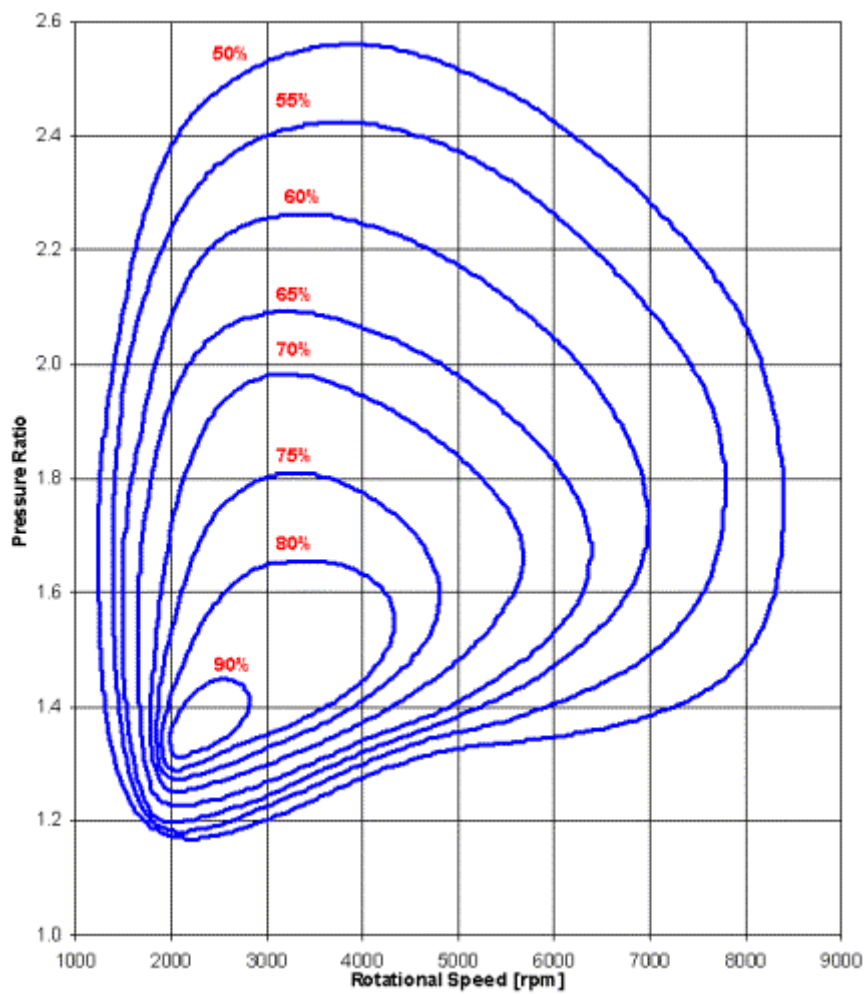


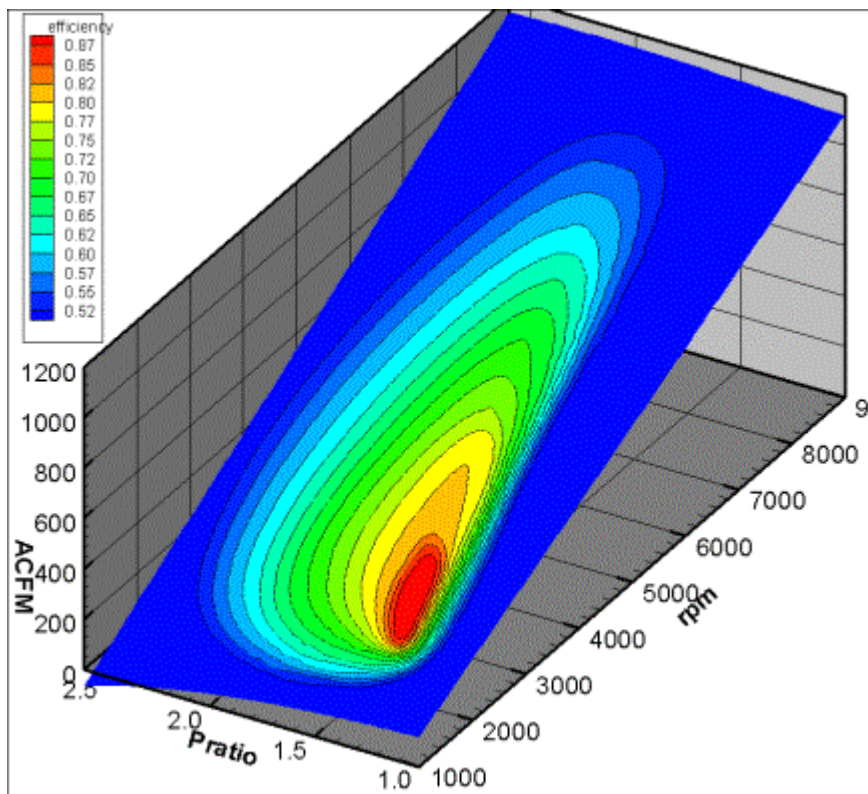


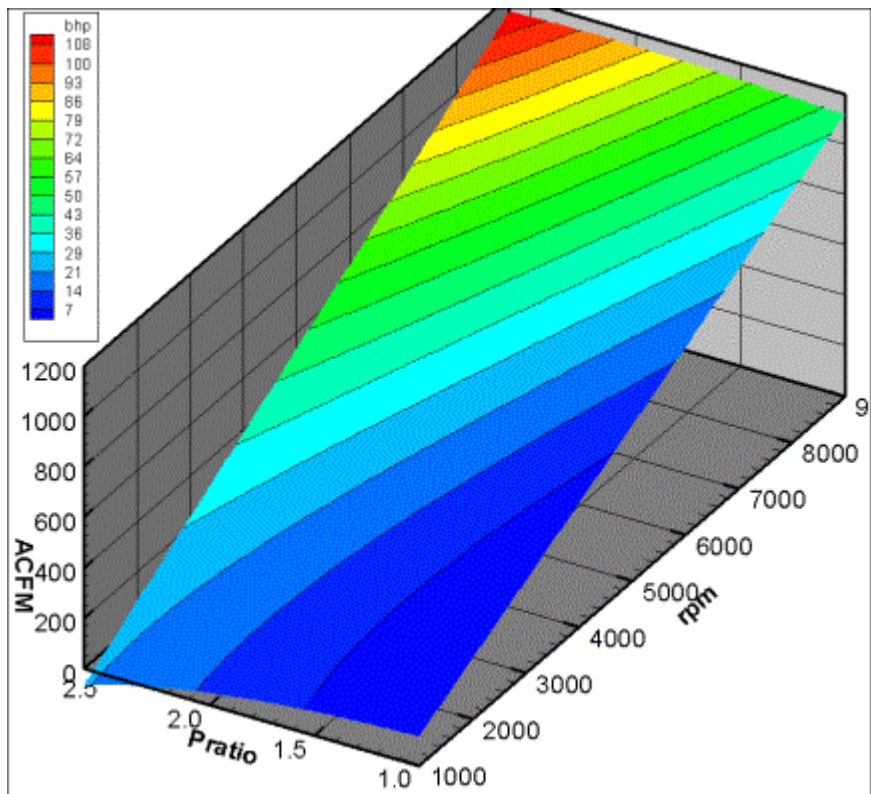




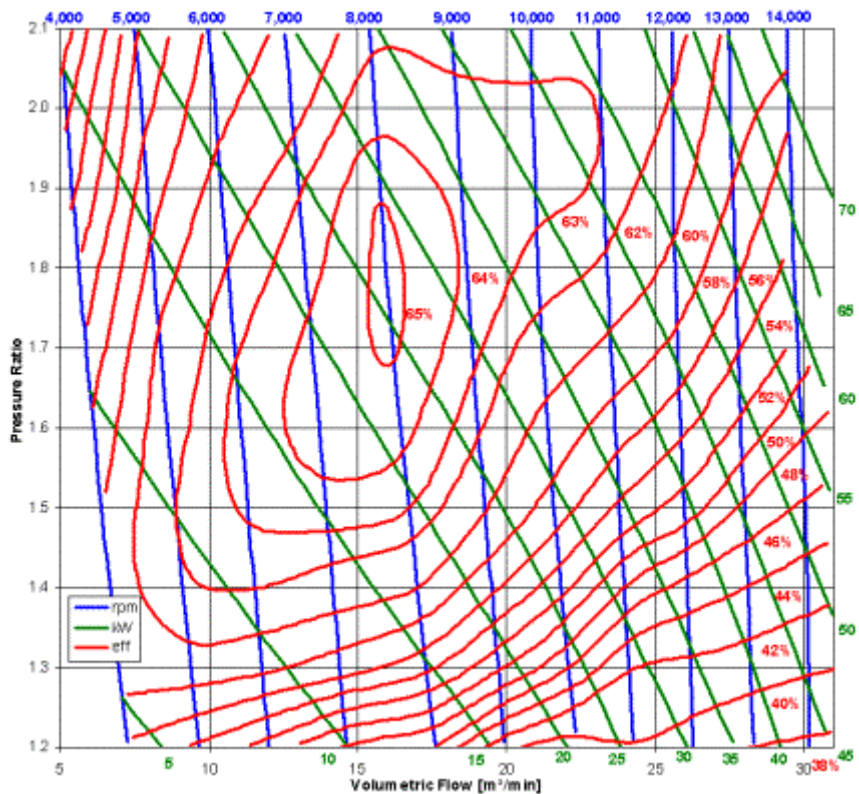
**belt driven  
supercharger**









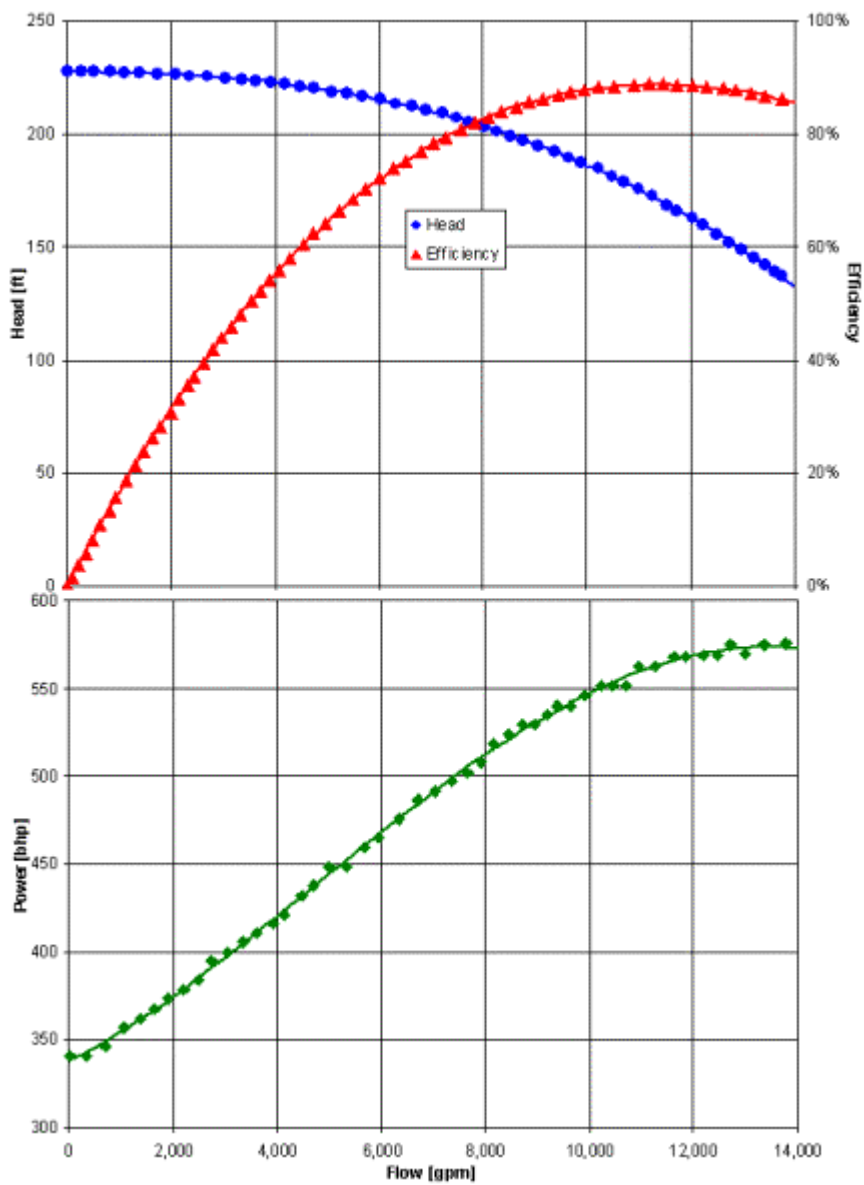


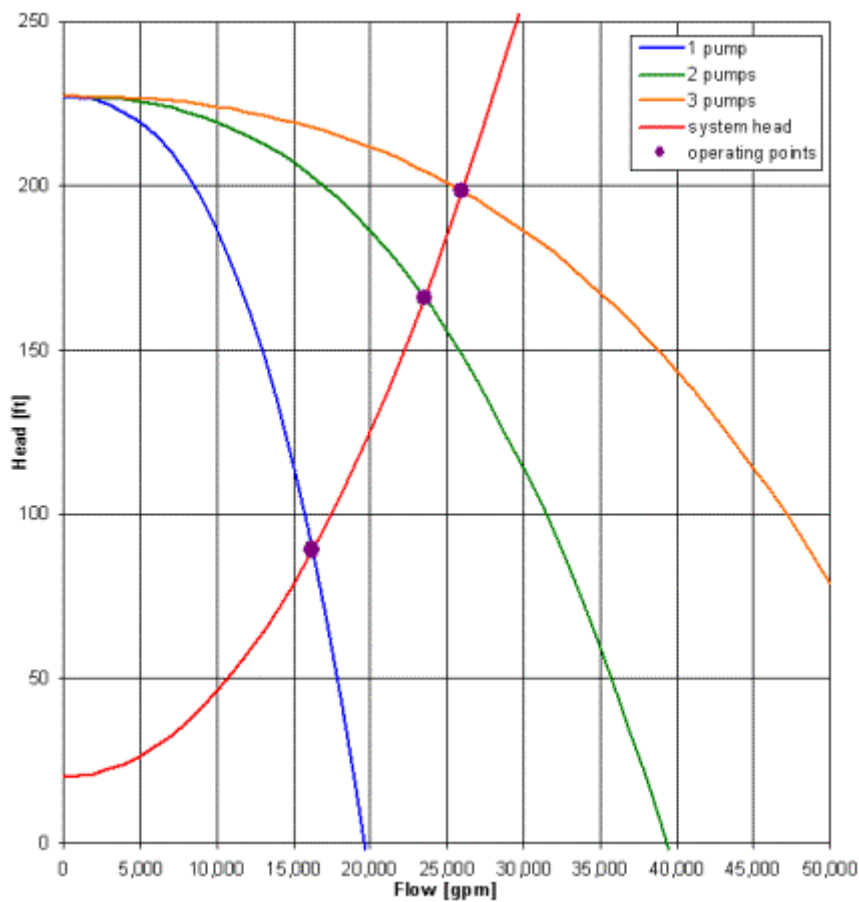








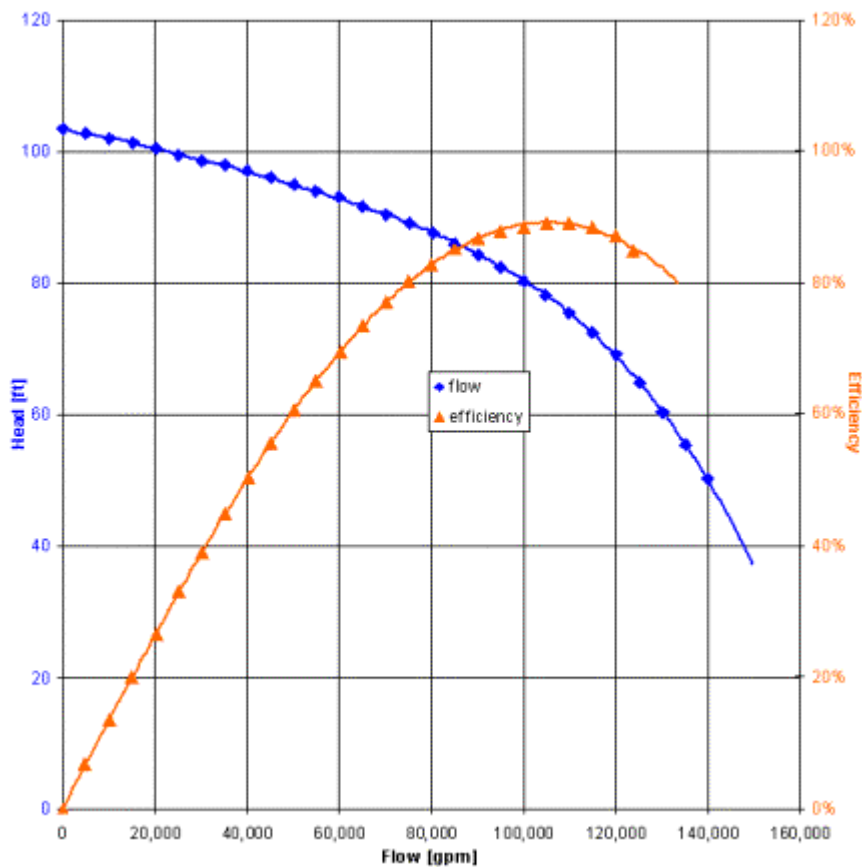


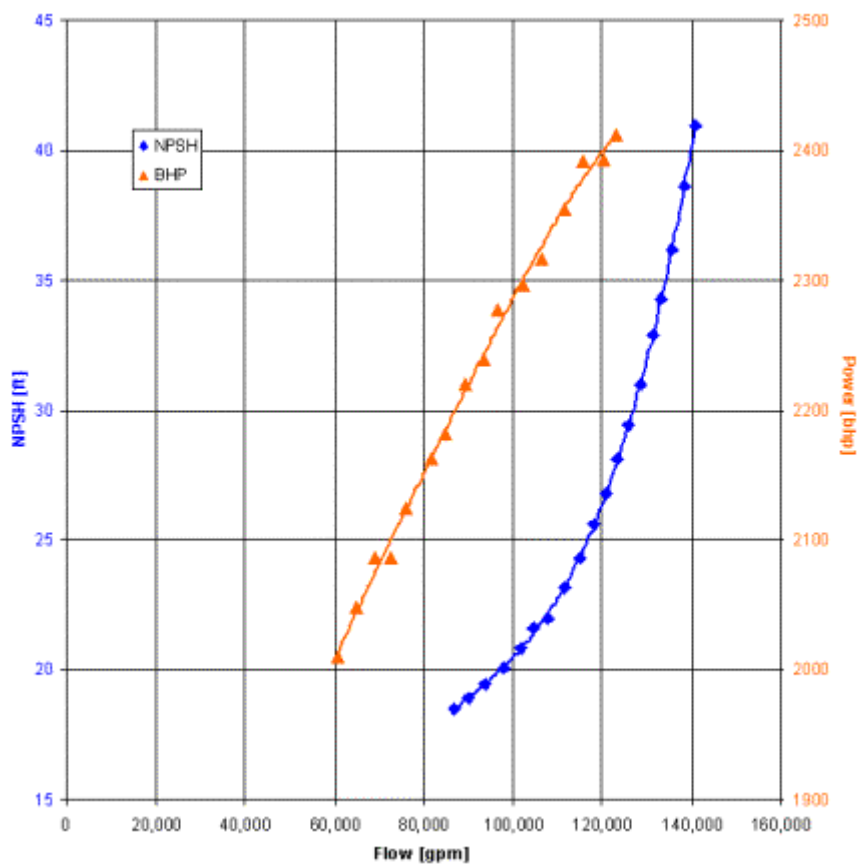












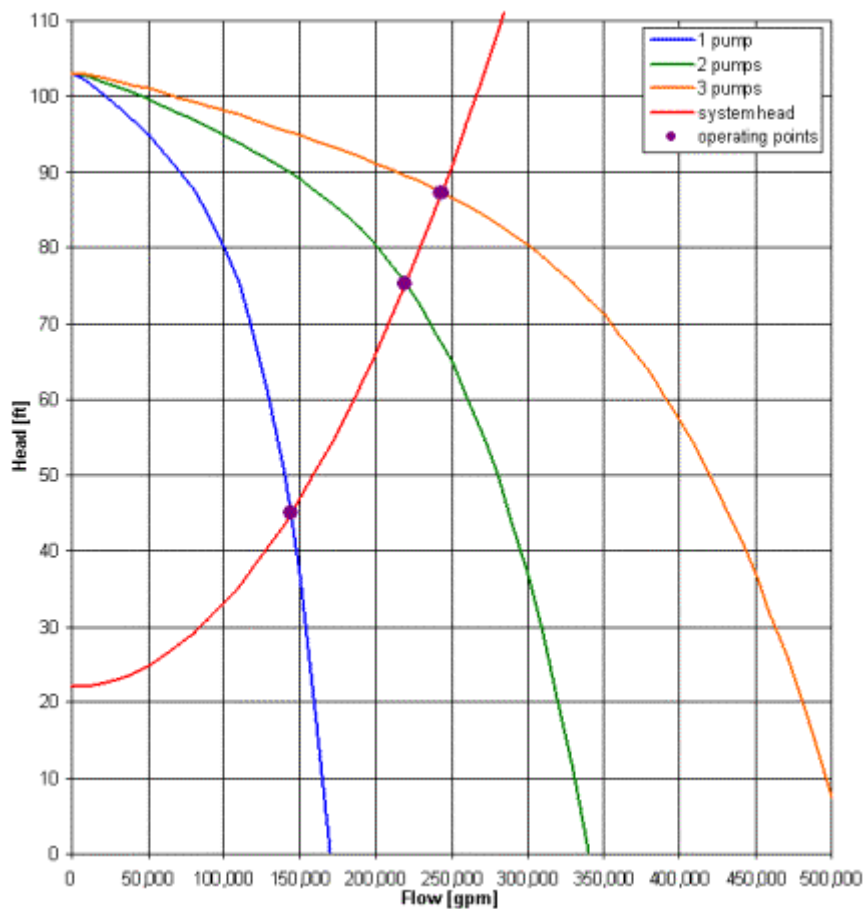




Figure 83. Horizontal Shaft Pump

