



SIMSITE® IMPELLERS WILL IMPROVE EFFICIENCY OF YOUR EXISTING PUMP

The Impeller is the heart of any Centrifugal Pump. Like a human heart, a pump impeller is the most loaded pump component, constantly stressed by hydrodynamic forces, fatigue, corrosion, erosion abrasion, chemical attack and cavitation.

The overall Efficiency of a Centrifugal Pump is in direct correlation to the Efficiency of the Impeller. The Impeller's hydraulic design must correspond to the hydraulic design of the pump Casing and to the Operating Conditions of the pump in service (In the Plant) in order to maximizing efficiency.

SIMS is a leader in design and manufacturing of Premium Efficiency Simsite® Structural Composite Impellers. Any Centrifugal Pump fit with the Premium Efficiency Simsite® Structural Composite Impeller will save a tremendous amount of money for the pump Owner and Operator in repair and maintenance costs as well as in energy consumption. This saving comes from Electrical Saving, (a higher efficiency pump consumes less energy), and from Saving on Maintenance and Repair (the pump fitted with a Simsite® Impeller will have a much longer life and a smoother run time), because the Structural Composite Impellers will never corrode.

Trouble Free Performance

Simsite® Structural Composite Engineered Impellers offer tremendous advantages over traditional products cast from metal because they do not corrode, are light weight, can run with tighter clearances, are designed for high efficiency, and are not subject to casting defects, or imperfections. Structural Composite Impellers also offer perfect balance, both mechanically and hydraulically, tremendous mechanical strength, and corrosion, erosion & cavitation resistance. Many of these Impellers and Casing Rings have been used successfully since 1955, in the Marine, Navy, Waste Water, Industrial & Chemical markets. Structural Composite Impellers, like SIMSITE® Impellers, have outlasted and outperformed products manufactured from bronze, stainless steel, duplex steel, monel, and even titanium.



Simsite® Structural Engineered Composites Offer an Improvement in Performance over Time



Because of the self-lubricating characteristics of Simsite® Structural Composites, and because Simsite® Structural Composite Impellers and Pumps do not wear, corrode, or cavitate like metallic pumps, the performance curve will actually increase over a period of time. The performance curve below shows test performed by Warren Pumps on an actual US Navy Standard Fire Pump manufactured from Titanium with Simsite® Structural Composite Impellers & Casing Rings. A 1000 hour Endurance Performance Test was performed on this pump. After only a 1000 hour endurance test, the performance curve clearly showed a substantial increase in the H-Q (Head-Capacity) Curve — a 2.5% increase in performance curve with the Simsite® Structural Composite Impeller and Casing Rings!

Simsite Impeller Endurance Test

46 1472

CURVE NO. 1 - A -

WARREN ORDER NO: E-4050

PUMP SERIAL NO: (none)

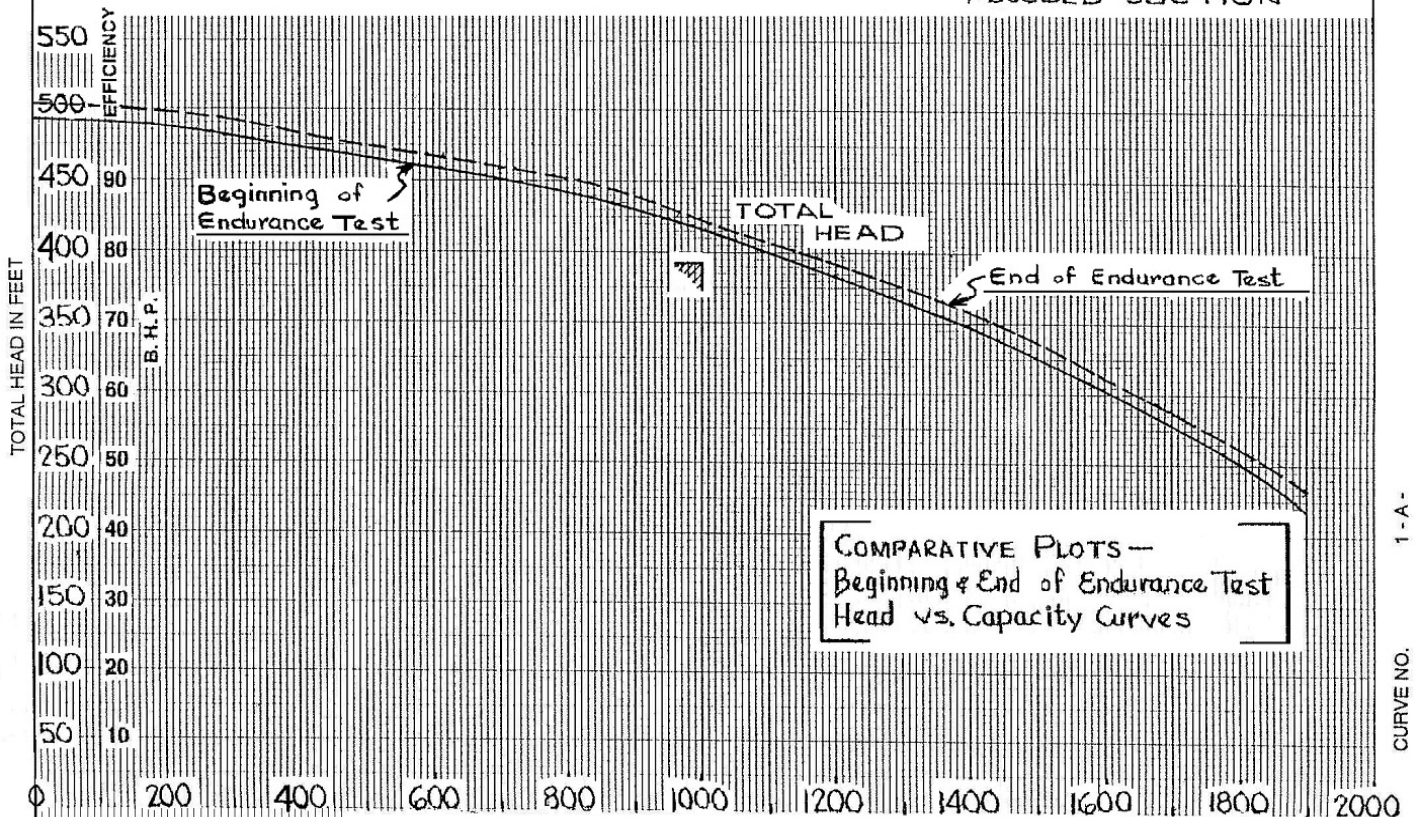
IMPELLER

PATT. NO. - n/a
 DWG. NO:
 PATT. DIA. - n/a
 FIN DIA. Angle Cut
 10.411" - 9.885"
 IMP. MAT'L: SIMSITE,
 Grade SMS-302

Imo Industries Inc.
 Warren Pumps Inc.
 Warren MA 01083-0969

PERFORMANCE CURVES

SIZE AND TYPE: NAVY STANDARD (Titanium)
 FIRE PUMP (750-1000 GPM)
 R.P.M: 3584 - 3594
 FLOODED SUCTION

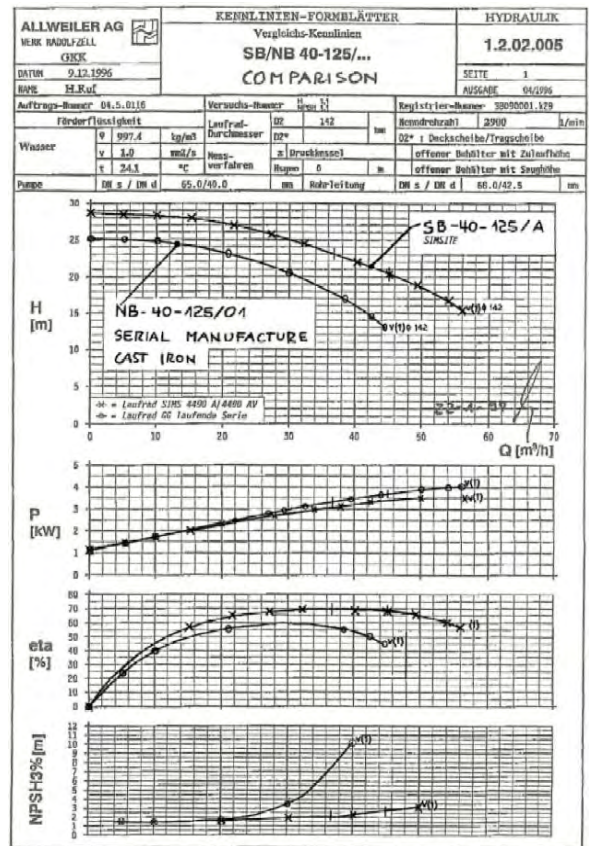


1 - A -
 CURVE NO.

Designed for Superior Hydraulic Performance

Because the new alternative Simsite® structural composite Impellers are computer engineered, designed, and precision machined, the impeller vane geometry can be engineered utilizing CFD (Computerized Fluid Dynamics) techniques and programs to maximize efficiency and performance. Problems such as recirculation, radial thrust, and cavitation can be minimized, or eliminated, by using Simsite® structural composite impellers instead of the traditional metallic ones. Impeller vane shapes can easily be modified to provide the best vane shape for specific applications and performance requests.

In this comparison test performed by the Allweiler Corporation, the SIMSITE® Structural Composite Impeller, manufactured by the SIMS Pump Company had an efficiency of 70% while the metallic impeller manufactured by Allweiler Ag had an efficiency of only 60%. Notice the reduction in the NPSH required by the composite impeller. The difference is over 8 meters (26 feet)!



Below is a chart compiled by Kumho-Mitsui, which looked at the ROI of a standard production metallic impeller compared to a Structural Graphite Composite Simsite® Impeller obtained from SIMS Pump Company, an aftermarket centrifugal pump manufacturer. It is clear from the test report that the upgraded aftermarket impeller reduced energy consumption by 10%.

ACTUAL TEST REPORT AT KUMHO-MITSUI, M-GA 409 C

Item	Before	After	Remarks
Impeller + Casing rings / Material	Metal + Metal	Simsite + Simsite	With Simsite Casing Rings
Pump Data:			
• Dis' Pressure	6.0 kg/cm ² .g	6.0 kg/cm ² .g	—
• Flow rate	200.0 Ton/Hr Ambient	200.0 Ton/Hr Ambient	—
• Temp'			
Power Consumption	62.0 Ampere (44.8 KWH)	55.5 Ampere (40.1 KWH)	Calculation: 440 Volts × 62 Am p × 1.73 × 0.95/1 000 44.8 Kw
Power Saving	100% (Base)	90%	Efficiency — 62.0/55.5
Saving Money/Year		3,295 KRW/year	ROI — 1.3 Year

Advantage of Simsite® Structural Composite Impeller	Cause of Advantage	Most pronounced effect in
No Corrosion	Impellers machined from Simsite® Structural Composite, never corrode in salt water, waste water, chlorinated water, and many chemicals	Salt Water, Brine, Reverse Osmosis, Waste Water and other corrosive applications
No Electrolysis	Simsite® Structural Composite Impellers are Non-Conductive and will not support Galvanic Corrosion	Salt Water, Brine, and Reverse Osmosis.
Less Frictional Losses	Simsite® Composite Impellers have machined vane surfaces, which results in much smoother surface finishes. The Impellers have a low coefficient of friction with selflubricating characteristics	Low Specific Speed Impellers
Less Volumetric Losses	Simsite® Composite Impellers run on Tighter Ring Clearances	Mixed Flow Impellers
Less Mechanical Losses	Simsite® Structural Composite Impellers are 4–6 times lighter than Metallic Impellers	All Pumps
Less Vibration	Simsite® Composite Impellers are perfectly balanced, both hydraulically and mechanically. They remain balanced throughout the life of the pump	All Pumps
No Efficiency Degradation	Simsite® Structural Composite Impellers will not corrode; therefore there is no reduction in Efficiency and Performance	Sea Water, Chemicals Applications
Longer Life	Simsite® Structural Composite Impellers are Corrosion, Erosion, and Cavitation resistant. They are perfectly balanced and light weight. The average Life Cycle is 5 to 7 times longer than metallic impellers!	Salt Water, Brine, Reverse Osmosis, Waste Water and other corrosive applications
Average Expected Pump Efficiency Gain	Depends on Existing Pump Conditions, Operating Conditions, Temperature, and the Corrosive Nature of the Fluid Being Pumped	10–25%

$$\frac{\text{GPM} \times \text{FT} \times \text{S.G.}}{3960 \times \text{Eff.}} = \frac{440 \times 150 \times 1.03}{3960 \times .66} = 26 \text{ HP} \times .746 = 19.4 \text{ KW} \times 8760 \text{ Hours} \times .11/\text{hr} = \text{\$18,697.00 per Year}$$

SIMSITE® COMPOSITE IMPELLER

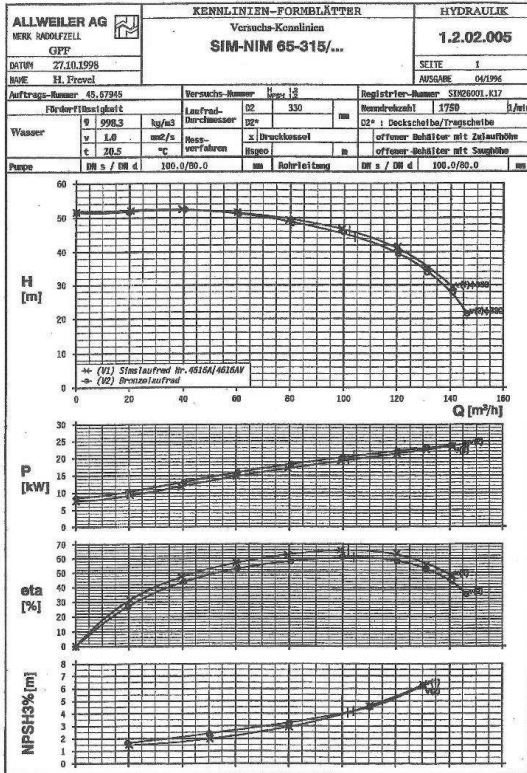
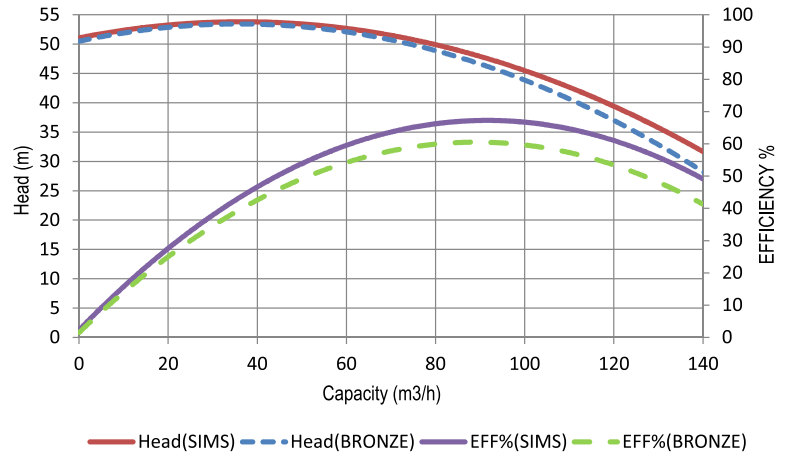
$$\frac{\text{GPM} \times \text{FT} \times \text{S.G.}}{3960 \times \text{Eff.}} = \frac{440 \times 150 \times 1.03}{3960 \times .59} = 29.1 \text{ HP} \times .746 = 21.7 \text{ KW} \times 8760 \text{ Hours} \times .11/\text{hr} = \text{\$20,916.00 per Year}$$

METALLIC IMPELLER

$$\frac{\text{GPM} \times \text{FT} \times \text{S.G.}}{3960 \times \text{Eff.}} = \frac{440 \times 150 \times 1.03}{3960 \times .54} = 31.8 \text{ HP} \times .746 = 23.7 \text{ KW} \times 8760 \text{ Hours} \times .11/\text{hr} = \text{\$22,852.00 per Year}$$

METALLIC IMPELLER AFTER 1 YEAR IN SALT WATER

Below is an example of the Efficiency Gain for Allweiler NIM 65-315 Pump with a SIMSITE® Impeller. The metal pump was fitted with SIMSITE® Impeller and tested by Allweiler Company. The test results show that the pump with a Premium Efficiency SIMSITE® Structural Composite Impeller outperformed the same pump with metallic Impeller by 5%.



The above graph shows that changing the Bronze Impeller to a Simsite® Structural Composite Impeller increased efficiency 15.8%! The efficiency on this 20 KW pump (26.8 HP) went from 57% with a metallic impeller to 66% with a structural composite impeller — an increase of 9 points or 15.8%! At 0.11 cents per kilowatt hour this translates into a yearly savings of **\$2,218.00 per year, per pump!**

After only 1 year of service in a corrosive environment such as salt water, the metallic impeller, which was originally bronze, begins to corrode, which further reduces efficiency. Depending on the service, and the temperature of the salt water, and how the pump was operating, the efficiency will be reduced by as much as 5% to 7%, or more, resulting in additional energy costs! Upgrading to a Simsite® Structural Composite Impeller will not only increase efficiency 15.5% from the start, but will also prevent the losses in efficiency as a result of corrosion resulting in a total saving to the Customer of more than 20%! This results in a yearly savings of **\$4,155.00 per year per pump!**



x 8760 Hours = 11/hr = \$18,697.00 per Year



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