CoorsTek Amazing Solutions®

WHITE PAPER

HYBRID MATERIALS

THE NEXT GENERATION FOR LOW FRICTION AND WEAR

PolyGlyde® Materials offer exceptionally low heat and friction properties – especially effective in dry-running situations

Introduction

In today's fast-paced worldwide market, the mechanical sealing industry has not only learned to cope with offshore suppliers and competition, but has developed specialty materials and mechanical seals to go the next step beyond standard designs. The requirements for these mechanical seals are more stringent than ever, as they need to be more efficient while operating with less power consumption. CoorsTek® developed their family of PolyGlyde® materials to meet the ever growing demands of mechanical seal designs and their applications.

Development

CoorsTek is a privately owned materials company headquartered in Golden, Colorado with design and manufacturing business units located throughout the world. Their material design team is comprised of technical wear and friction materials experts. CoorsTek Benton, Arkansas and El Segundo, California operations have jointly developed a new generation of dry-running, low-friction materials designated as the PolyGlyde® range. Comprised of four material designations (PolyGlyde 1000, 2000, 3000, and 5400), all have been tested in a tribology lab as seals in mechanical pumps.

Testing

For this article, the main focus of discussion will be on PolyGlyde 1000. The initial tests were conducted on a 1-inch shaft seal under the following parameters:

Rotating Seal Material:	PolyGlyde 1000
Stationary Seal Material:	AD995 (99.5% Alumina)
Seal Size:	1-inch Shaft
Shaft Speed:	3600 rpm
Contact Pressure:	10 psi
Media:	Air
Temperature:	Ambient
Test Duration:	50 hours

This test rig is a fairly simple design – utilized to conduct dry running tests with various seal mating pairs. The shaft is driven by an electric motor located in very close proximity to the seal. The rig is designed in this manner to reduce shaft deflection and vibration to minimize energy consumption. During the 50-hour test period, heat generation and coefficient of friction are monitored continuously every 3 seconds and recorded to a database. Initially, 3 tests were conducted with the parameters specified above. Once the results were reviewed, a forth test was conducted for a period of 250 hours to view friction and wear properties of this mating pair over a longer period of time.

Test Results

Test results for each test are located in Table 1, below:

Table 1

Test Number	Seal Face Wear (inches)	Mating Face Wear (inches)	Coefficient of Friction	Heat Generation (°C)
1	0.0020	0.00000	0.04	3.0
2	0.0005	0.00000	0.04	2.8
3	0.0010	0.00000	0.04	2.7
4	0.0015	0.00000	0.04	2.9

A graphical representation of the heat generation and coefficient of friction for each test specified above can be found below in figures 1 and 2, pg 2.

Results and Discussion

As can be seen by the friction and wear test results and the heat generation graphs presented in this article, PolyGlyde 1000 performs very well in non-lubricated/dry running applications that are lightly loaded. The overall wear is minimal for non-lubricated applications and the heat generation is more than 50% less than that of standard resin impregnated carbon graphite materials. To prove this point, additional tests were conducted under the same conditions with a standard carbon used in mechanical seal applications. It compares test results with PolyGlyde 1000 mated against 99.5% alumina oxide and also testing with resin impregnated carbon graphite mated against 99.5% alumina oxide under the same test conditions.

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(continued)

Conclusion

The results in Figure 2 clearly indicate that PolyGlyde® 1000 material outperforms standard carbon graphite from a friction and heat generation standpoint. The wear is comparable, but the heat generation and low coefficient of friction make PolyGlyde 1000 the material of choice for non-lubricated applications. This material is designed and patented by CoorsTek and is commercially available for use in your mechanical sealing or pump applications.

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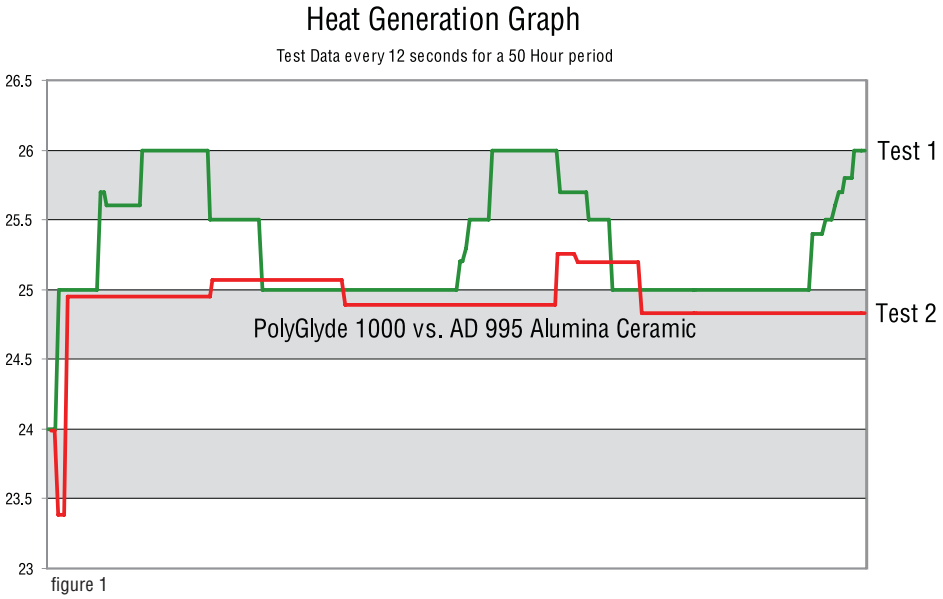

figure 1

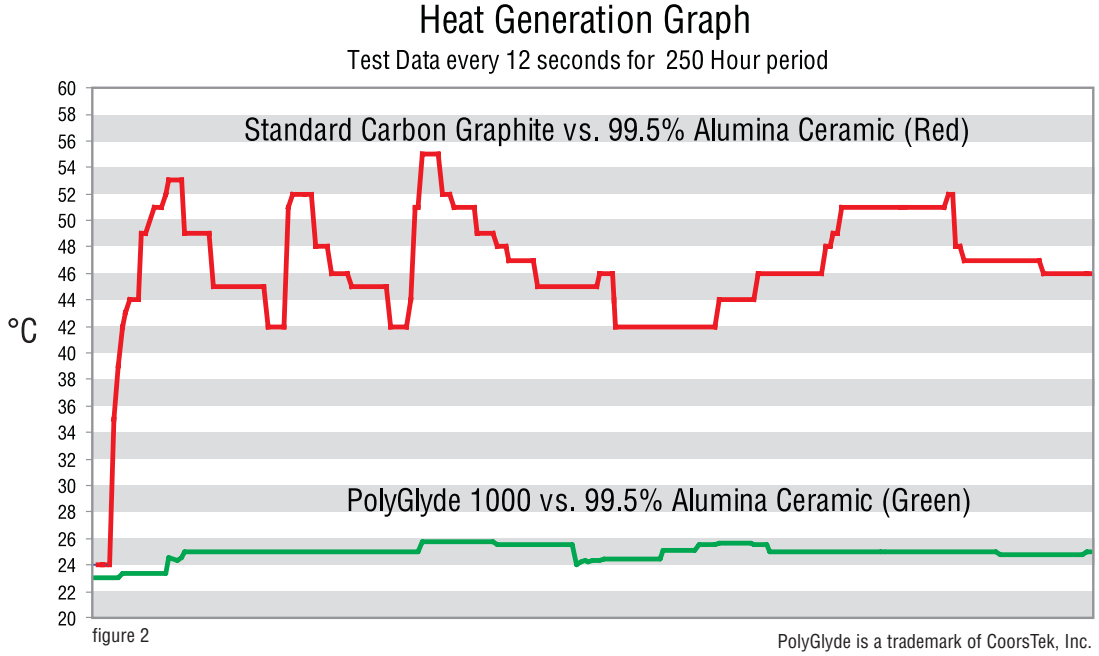

figure 2

PolyGlyde is a trademark of CoorsTek, Inc.

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