

Q&A

Saving costs with DLC coatings

Michael De Maegt – Mark Boghe Bekaert

With the industry exploring new ways to 'go green' and trim costs, the cost-saving properties of Bekaert DLC coatings are causing a stir. We got Bekaert's Michael De Maegt, General Manager, Bekaert DLC, and Mark Boghe, Product Market Manager DLC worldwide, to the table to get their two cents on the automotive and racing industry and discover how we can all save costs.

1. The outlook for the automotive and racing industries is very pessimistic. What is Bekaert's response to this grim projection, and how and when does the company envisage a recovery?

Mark Boghe: Despite the current economic crisis, it is essential for the industry and market leaders to start contemplating the recovery. They need to determine how their company and products will be profiled during the recovery to make sure they are back on track when business picks up again.

DLC coatings have brought valuable cost-efficient benefits to engines in both the racing and automotive markets, and as such we anticipate that we will see DLC coatings used more and more in both of these industries.

Although most companies are cutting their R&D and testing budgets, they will have to restart investing in innovation soon if they want to safeguard their current market position and improve it in the future. When this time comes, making sure they capture the benefits like those afforded by DLC coatings will be high on the agenda.

2. Another hot topic in the industry is the "green approach". How can Bekaert DLC coatings contribute not only in terms of cost savings, but also from a green perspective?

Michael De Maegt: The European Commission has recently developed a program to reduce vehicle CO₂ emissions, which motor manufacturers must adhere to. Failure to meet these emission limits will in the future result in financial penalties of at least €95 per gram above the limit set by the EC.

Using DLC coatings reduces the friction losses, which translates into reduced consumption and, subsequently, lower emissions. Essentially, this means that DLC coatings will be one way to help meet future CO₂ limits.

PSA Group recently conducted a test to measure the actual value of DLC coatings in this process. It revealed that Bekaert DLC coatings applied on tappets reduce overall fuel consumption by 1-2%, which equates to a saving of somewhere between 2-3g/km of CO₂.

Mark Boghe: The biggest advantage of DLC coatings is that they reduce CO₂ emissions in existing engines, so there is no need for a drastic redesign of the engine. For example, tappets

can be coated, which can lead to a 1-2% reduction of emissions without a redesign of the valve-train.

If a manufacturer wants to take full advantage of this technology, however, these coatings need to be integrated from the start of the design. Parts or systems can be designed differently so cheaper, lighter parts can be used.

DLC coatings can help manufacturers comply with the industry's demand for greener existing engines, and at the same time deliver a valuable contribution to the design of new engines. Plus by investing in DLC coatings, manufacturers can cut costs on other engine parts.

3. What are the current cost-saving measures taken in the racing industry?

Mark Boghe: Unfortunately, budgets are being cut so teams are trying to adapt their spending according to reduced budgets. This often involves cutting back on personnel, but also it often means making savings when it comes engines. This usually translates into making the engine run for longer periods without cutting back on the performance..

Michael De Maegt: And this is where Bekaert DLC coatings come in. Applying DLC coatings to components not only increases the lifetime of the components, but also extends the lifetime of the entire engine. So not only do you save on components, you also save on time spent checking the different components after every race. It's a win-win situation that can save you valuable time and money – which is very useful during an economic downturn.

4. Which measures could be eliminated by investing in DLC coatings?

Mark Boghe: By using DLC coatings you can increase wear resistance and, therefore, the lifetime of various parts. In doing so, you enjoy considerable savings, as the parts can be run for additional races without taking the risk of a breakdown during the race.

Michael De Maegt: Today DLC coatings are being used in diesel injection systems for normal road cars, which clearly proves that these coatings are reliable over a long lifetime.

In normal road engines, the various parts need to last longer than a few trips. Reliability and stability are key – and these are the extra touches DLC coatings bring to an engine.

5. How can investing in DLC coatings benefit companies that are trying to trim costs?

Mark Boghe: Investing in DLC coatings essentially buys you two major benefits. First of all, the hard and low friction layer will improve the wear resistance of the component. This results in a considerably longer life for your engine and its parts, and a stable performance for the lifetime of the coated component. A perfect example is the camshaft: by applying a DLC coating, the profile of the cams is protected against wear (longer lifetime) but it also guarantees that, as long as the coating is applied, the performance of the camshaft is consistent (no gradual deterioration in performance).

Secondly, the low friction properties of the DLC coating reduce the friction losses, resulting in more power available at the wheels.

6. What is a practical example in terms of camshafts and/or tappets? What would be the typical investment and when would it pay off?

Mark Boghe: The cost of DLC coating depends on, among other things, the size of the part to be coated. But as a general rule, we estimate the cost of the coating to be approximately 30% of the cost of the component.

The main advantage of the coating is that it immediately extends the lifetime of the component. You can use it longer and it will wear less. In general, the lifetime is increased by a minimum of 50%. This means that an investment of 30% is offset by an immediate 50% gain – not a bad deal, especially in the current climate.

Michael De Maegt: Another use for DLC coatings is to refurbish components. By refurbishment we mean taking back coated and used components and recoating them. This way, there is no need to buy a new component.

When you apply the DLC coating to any component, you are protecting it against wear and all the stress put on it, no matter how significant the impact during performance. Which means it remains perfectly usable.

Bekaert is providing this service to racing teams so that they do not need to continually invest in new components – we simply recoat existing ones for them.

It is worth adding that recoating is slightly more expensive. This is because you first need to remove the old coating to guarantee perfect performance of the new coating, which inevitably increases the total cost. Nevertheless, over time this still proves more cost effective than buying a new component.

7. Many motor manufacturers are leaning towards adopting the same cost-saving technologies used in motorsport trials. What cost savings (running costs) could this bring to the car driver in their everyday life?

Mark Boghe: In day-to-day use, most engines do not suffer any excessive wear. But DLC coatings still have an important role to play as they allow a reduction in friction losses and therefore consumption. A good example is coating tappets in small gasoline cars. By coating the tappets, the friction losses are reduced by no less than 40%, which translates into a reduction in fuel consumption of around 1 to 2%.

As DLC coatings are thin and adopt the structure of the component, the engine design does not need to be altered in any way, so no major investments in R&D are required.

Michael De Maegt: Nevertheless, the application of DLC coatings does prompt a rethink of the existing engine and might generate new ideas in terms of R&D. The properties of DLC coatings strengthen the component underneath it. The coating itself is so strong that not even the highest stresses will not strain the component underneath.

By coating your components, you can create alternative and lighter component designs, bringing down the total weight of the engine, which is an important consideration nowadays. The increasing pressure to downsize will increase the loads and stresses on individual components – all problems that can be solved by using DLC coatings.

For all the reasons explained above, we are predicting significant opportunities and growth in the application of DLC coatings – not only on the racetrack, but also on the road.

***ends**