

# Case Study

## OEM Repair and Overhaul Site



### The Challenge

The city of Montreal and its surrounding area has long been recognized as Canada's hub of aerospace production, repair, and research and development. It follows that many of the major aviation turbine engine OEMs have multiple sites and partners in this area. One of these OEMs, a company with roots in the UK, began its journey with Green Belting Industries thermal spray masking products in an effort to realize time and cost savings while maintaining the highest levels of quality, safety, and consistency.

*"The new supervisor recognized that he needs to take measures to control the masking costs at the facility."*

Initially, this OEM was not looking to replace the leading plasma spray masking tape it had been using for many years, but further to some initial investigation, entered into a product review process, led to a quote request for Green Belting™ silicone-coated fiberglass plasma spray masking tape. When the pricing came in significantly higher than what they were accustomed to with their current supplier, the company was concerned. To further complicate the situation, the OEM was locked into a multi year Supply Agreement.

After a couple of months had lapsed, the company hired a new supervisor (Michael) to oversee the Montreal coating facility. Michael had extensive industry experience, and, just happened to have worked with Green Belting masking products in the past. Not long after starting his new role, he recognized that he needed to take measures to control the masking costs at the facility. Based on his past experience, he reached out to Green Belting as he was well aware of the performance qualities of Green Belting tapes and the potential for time and cost savings.

Previously, Michael had carefully evaluated Green Belting™ 170-10S Green against all other leading thermal spray masking tapes including the OEM's current tape.

Michael and his team discovered that not only was the 170-10S Green the strongest tape in terms of performance (no residue and perfect coating lines), but also that it had the added benefit of consistently surviving the thermal spray masking process using one single layer of tape.

*"Every part was being masked with three layers of tape."*

While reviewing procedures at the Montreal OEM, Michael was alarmed to see that throughout the entire facility every technician and operator was using multiple layers of tape on high volume parts. In fact, every part was being masked with three layers of tape. When he asked why it was necessary to use three layers of tape, the responses he received ranged from needing three layers to survive the heat and abrasion, to concerns about the tape having a tendency to lift (requiring multiple layers to increase the chances that at least one layer will be intact to prevent catastrophic overspray). Considering how expensive thermal spray masking tape can be, Michael knew he had to take action fast to keep expenses down.

Michael's first step was to find out how much money was being spent on masking tape. Just the tape alone was well above \$100,000, not even counting the time and labour associated with masking the various combustor components. The OEM had always assumed this high expense was a cost of doing business. They were intrigued when Michael told them that he knew of a company that could cut their masking expenses and time in half (or more).

As Michael was collecting information, one of the production managers mentioned another area of concern for the OEM: they were under intense pressure to meet deadlines to get engines disassembled, repaired, reassembled, inspected, and back to their customer. One of the "log jam" areas was the thermal spray masking department, so any time-saving solutions would be a blessing.

### The Solution

The management team wanted to test Green Belting™ 170-10S Green for themselves and the first step was to evaluate the tape in a controlled manner. Everyone involved was focused on what the tape samples could do, rather than the cost of the tape. It was decided that tests would be conducted in three different plasma spray work areas, and input would involve twelve different operators as well as the supervisors and managers.

Along with the three different work areas, the team selected three common parts (combustor components) that would be masked and coated. These three components were each masked and coated three times. As this was a new experience for everyone, Michael had to coach the team on applying one layer of tape instead of the three layers that they were used to.

*"...tear strength is a key reason why only one layer of 170-10S Green is required for masking."*

The first step of the testing process was to apply masking tape to targeted areas of the component. The operators immediately commented on how much stronger the adhesion was on the 170-10S Green. The tape gripped the surface and stayed in place. Some operators with decades of experience were impressed with the apparent strength of the material. They tried tearing the tape by hand and soon realized they were working with a very strong material as the tape would not tear. This tear strength is a key reason why only one layer of 170-10S Green is required for masking.

After the parts were masked, they were grit blasted with aluminum oxide at 60 grit at approximately 60 psi. This stage is known as the abrasive blasting process which is necessary to etch the surface in preparation for the coating.





*“By changing just one process material, thermal spray masking tape, this OEM was able to reduce their annual production costs by over \$270,000.”*

## The Result

It is also during this stage where most plasma spray masking tapes begin to break down and fray due to high abrasion. When using their existing tape, operators noted significant fraying of the edges during abrasive blasting. The team was very impressed to see that a single layer of 170-10S Green could survive with no frayed edges or surface damage.

*“The team was very impressed to see that a single layer of 170-10S Green could survive with no frayed edges or surface damage.”*

The next step was the coating phase. At this point, various coatings of nickel aluminum, TBCs, chrome carbide and others were applied via plasma spray. In each trial, the Green Belting™ 170-10S Green survived perfectly. The operators observed that there was no lifting at the overlap during the spray process. But even though everyone was impressed at this point, the evaluation was far from over.

*“The team saw a perfectly clean surface. They also observed perfectly straight and clean coating lines.”*

A key measure of any masking job is the removal phase. At this point, the component surface and coating lines are revealed and if there is any overspray, chipping, or cracking, it can mean hours of rework and incur extra time and cost. Some tapes, such as the OEM's existing tape, can occasionally leave adhesive residue. This residue can also result in added time, cost, and frustration as the silicone adhesive must be removed by abrasives and/or solvents. For this reason, the evaluation team was eager to see what lay beneath the 170-10S Green. Upon removal, the team saw a perfectly clean surface. They also observed perfectly straight and clean coating lines.

Green Belting Industries is a leading manufacturer of specialty-coated performance fabrics, tapes and belts used in a wide range of manufacturing, packaging, maintenance and repair environments around the world. From the aviation industry to consumer products, we supply performance materials and technical expertise to 21 different industries for use in over 100 applications.

At this point, the controlled testing demonstrated that the Green Belting material could survive the existing processes in a single layer while providing excellent surface characteristics. The team learned from Michael that the 170-10S Green could also survive the part cleaning phase, which is essentially a degreasing phase. In total, the testing demonstrated that a single layer of Green Belting™ 170-10S Green would survive the following:

1. Degreasing / part cleaning
2. Abrasive blasting
3. Base coat applied via plasma spray
4. Additional cleaning with use of high temperature and chemicals
5. Application of a top coat of TBC using plasma spray

*“Use of the Green Belting 170-10S Green could save the OEM hundreds of hours per month.”*

One single layer of Green Belting's 170-10S Green tape performed exceptionally well against three layers of the current tape.

It is always a good thing if the production floor has the ability to mask faster and consume less tape but what did this really mean? At the start of the testing, the OEM knew that the Green Belting™ 170-10S Green thermal spray masking tape was 20% more expensive per roll than what they were currently using.

Michael helped the OEM discover the following benefits:

1. Using Green Belting™ 170-10S Green for masking could save the OEM hundreds of hours per month. For example, assuming six employees are involved in masking, they could achieve 240 hours of gained production per week equaling \$4,800/week savings in the cost of labour. This translates into \$20,000 in cost savings per month and a whopping \$240,000 savings per year.

2. Masking with one layer of the Green Belting™ 170-10S Green versus three layers of the Incumbent tape gained the OEM extra days of production each month.
3. Using a single layer of masking not only reduced the total dollars spent on tape but also reduced the amount of tape consumed and reduced the number of purchase orders.
4. Having locations in both the USA and Canada meant Green Belting could quickly deliver tape to the OEM's locations in North America, which lowered the total cost of inventory the OEM needed to maintain.

After an extensive ROI / Cost analysis was completed, the OEM made a permanent switch to the Green Belting™ 170-10S Green. The tape solved several serious issues at the OEM and played a key role in allowing the OEM to achieve some of their efficiency targets on a global basis.

## Conclusion

As a direct result of the controlled testing done by the OEM, they were able to determine that using Green Belting's 170-10S Green for plasma spray over the OEM's current tape would result in yearly savings of around \$70,000 on the tape cost alone. Additional savings of \$200,000 per year were attributed to reduced labour costs, and tape inventory required to be on hand at any one time decreased. So, by changing just one process material - the thermal spray masking tape - with one that was 20% more expensive, this OEM was able to reduce their annual production costs by over \$270,000.

*Due to confidentiality considerations, we are not able to publish the name of the Aviation OEM in this case study.*

