

HIGHLAND COLOUR COATERS

United Kingdom, www.higalv.co.uk

A low technology manufacturing company benefited from a researcher placement scheme, which led to the adoption of an improved manufacturing process and substantial cost savings. Over 30 months the research associate, who was based in-house, also helped to make improvements to other processes which were not the focus of the original project

Executive Summary

A metal finishing company based in Scotland identified a wide-spread problem of 'pinholing' in their industry. Initial research indicated no one solution would resolve the problem completely. The company approached a university to form a Knowledge Transfer Partnership (KTP) to investigate potential solutions. A solution was found that allowed the company to make changes to their internal processes leading to significant cost savings.



CASE N°: UKI17

SECTOR: MANUFACTURING

TECH INTENSITY: LOW-MEDIUM TECH

LIFE CYCLE STAGE: ESTABLISHED

INNOVATION VECTORS: PROCESS

OI PARTNERS: PSR, LARGE CORPORATION

KEYWORDS: Metal finishing, galvanizing, powder coating, Knowledge Transfer Partnership (KTP), new process

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BACKGROUND

Highland Metals Ltd, trading as Highland Galvanizers, was established in Elgin, Scotland in 1978 to provide manufacturing services to the oil industry. As a result of sustained growth over two decades, a second site was opened in Cumbernauld in 2002 leading to the creation of Highland Colour Coaters (HCC). This new factory offered galvanizing and also added a colour powder coating capability for galvanized steel.

While Highland Galvanizers and Highland Colour Coaters are two separate limited companies they operate as one. Highland Colour Coaters now offers hot dip galvanizing and polymer powder coating to a broad range of customers including those in the construction, civil engineering, security, aquaculture, agriculture, telecommunications, utilities, road transport and automotive markets.

Geoff Crowley, a metallurgical engineer, joined the company in 1995 and became managing director in 2003. In 2017, Geoff switched roles to become the company's development director.

The company's future plans include the further expansion of its manufacturing services in Northern England, with the possibility of building a new factory. The company also expects that the parent company will further enhance its capabilities at the Elgin site (near Inverness).

INNOVATION CHALLENGE & MARKET OPPORTUNITIES

In the metal finishing industry, there is a well-known but little understood phenomenon called 'pinholing' in which gas is thought to emerge from the galvanized zinc layer through the powder layer during the chemical curing process. This leads to bubbles forming then busting, leaving microscopic craters at the surface. These holes can appear over large surface areas and typically require reworking in the form of sanding the surface and adding another powder coat to the surface. This adds delays in the completion of the powder coating process and increases processing costs. A project to research pinholing and identify the causes, as a means to then reduce rework, was formulated.

Pinholing is a worldwide problem. Initial investigation by the company revealed that other organizations had only been partly successful in identifying the causes. Approximately 13 to 14 techniques had also been suggested to help reduce the problem. The company believed that this was a complex problem and required further research.

OPEN INNOVATION TRAJECTORY

Concept development

Interface, an organization set-up to promote innovative collaborations between Scottish PSRs and companies of all sizes, was approached by the company to discuss the project concept. Interface suggested a Knowledge Transfer Partnership (KTP) with a university partner might be a suitable approach. A KTP involves a university hiring a graduate to be based within a company to undertake research. It was unknown at the start of the project if pinholing was a polymer-related issue or a galvanized steel issue. The company therefore decided to find a university partner with expertise in both areas.

AkzoNobel, the world's largest manufacturer of coatings, was also approached and offered access to its research facilities for the project.

The development process, IPR and competition strategy

Glasgow Caledonian University was selected as a partner for the KTP project as it had staff with experience in polymers and also in metallurgical processes. A graduate (referred to as KTP Associate) was jointly selected by the company and university to be based on-site with the company for 30 months, as part of the KTP project.

The company reported that one of the project challenges was how long it took to set-up the KTP project, as it seemed a slow process. A further challenge highlighted was the potential delays introduced by university systems and procedures, for example purchasing equipment for the KTP Associate. The company reduced potential delays by purchasing lower value items for the KTP associate itself.

Commercialization and follow-up

In the rolling-out phase of the project new

production processes were introduced to reduce pinholing. These new processes had greater consistency with those they replaced. For example, production processes were performed for specific and set time periods. These new processes changed the way in which employees worked. By providing employees with greater ownership of the new processes this reduced any potential resistance to change.

As part of the marketing strategy, the company educates designers about the life-cycle of metals and encourages collaboration with customers in the customers' product design phases. The company also promotes and educates customers about the possibility of recycling their products through re-galvanization with a view to extending product lifetimes. An example of this is road 'crash' barriers.

Following the success of the KTP with Glasgow Caledonian University, Highland Colour Coaters formed a KTP with Edinburgh Napier University. The purpose of the project was to create a new coating for the oil and gas industry. The new coating was to be based on a ceramic material combined with zinc for mild steel to provide similar corrosion resistance properties to expensive duplex stainless steels, commonly used in oil and gas piping. This would have provided the ability to use mild steel in many applications which traditionally required duplex steel, thereby yielding substantial cost savings. Due to poor market conditions in the oil and gas industry, the company chose not to complete this project.

BUSINESS IMPACT

As a result of the project, the company now has a better process control to reduce pinholing and potential rework. The KTP associate introduced other new procedures during the project which have offered additional benefits by solving challenges that were not part of the remit of the original KTP project.

The company learned to do the following as a result of the project:

1. Where possible, adopt and follow industrial standards and where standards do not exist write their own.
2. Develop better internal processes that result in more consistent manufacturing outcomes.
3. Gain better understanding of the cultural differences between academic and commercial organizations to help improve the management of collaborative projects.

The introduction of the new processes to reduce

pinholing has reduced Highland Colour Coaters rework by 80-90%, yielding a cost saving in the region of £70 000-100 000 per year.

LESSONS LEARNED

Geoff advised that SMEs should carefully evaluate whether partnering with a university is more effective than employing an academic researcher, when trying to bring knowledge in-house. He noted that an academic researcher may not be motivated by money but instead by interesting technical challenges that need to be solved.

When working collaboratively with a PSR on a project, the SME should take into account that the PSR partner may operate to different time-scales from the SME. Organizations, such as Interface, that can direct SMEs to appropriate university researchers for assistance, are very useful. Interface's services have been used on several occasions by the company. A further comment suggested that companies could benefit from better awareness of what universities and government business support organizations can offer. Any action to raise awareness may have greater effect if targeting the general public as well, rather than SMEs alone.

This case shows how a low technology manufacturing company can access university expertise effectively to provide on-going cost savings through the adoption of better manufacturing processes. It is an example in which the company has obtained further unexpected benefits in having a research associate based in-house, i.e. improvements made to other processes which were not the focus of the original project.

This case raises the importance of organizations, such as Interface in Scotland, that liaise with PSRs and can direct SMEs to appropriate researchers to address their specific needs through collaborative projects, such as KTPs.

Main lessons learned:

1. The importance of organizations that can direct SMEs to appropriate PSRs to form projects.
2. The need to understand that PSR partners may operate to different timescales when undertaking tasks in open innovation projects when compared to SMEs.
3. Embedding a researcher in-house at an SME to undertake a collaborative project may yield unforeseen additional benefits for the SME.