Carbo Ferrum Case Study

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Carbo Ferrum – Driving Local Manufacturing In SA's Energy Sector

LSF
PROUDLY SUPPORTING LOCAL INDUSTRY

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The Localisation Support Fund NPC (“LSF”) was established as a non-profit company in 2021, funded by private sector contributors committed to localising manufacturing in South Africa. The LSF is a network orchestrator within the localisation ecosystem facilitating the connection between supply and demand participants, enhancing the value of the interactions by funding industry research and the deployment of technical expert resources to accelerate or unblock opportunities for localisation and growth in the manufacturing sector.

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Executive Summary

The Localisation Support Fund (LSF) partnered with Carbo Ferrum, a 51% black-owned steel manufacturer in the Eastern Cape, to unlock efficiencies in the production of transmission towers for Eskom's Transmission Development Plan (TDP). This intervention has already delivered significant operational improvements, positioned the company to potentially double production within a year, and demonstrated a scalable model for South Africa's localisation agenda.

Context and Opportunity

- South Africa's energy crisis and Eskom's TDP presented a strategic opportunity for local transmission infrastructure manufacturing.
- Carbo Ferrum, a 51% black-owned steel manufacturer in Eastern Cape, was acquired by Siyavuya Power Projects (SPP) in 2018 to produce monopoles and then later lattice towers for transmission and distribution networks.
- The LSF was established in 2021 to promote local manufacturing, with one of the focus areas being in improving the country's infrastructure and the competitiveness of manufacturers servicing the rollout.

LSF Action

- Guided by a study into the local transmission and distribution value chain, the LSF took a decision to engage with and support local manufacturers in steel tower manufacturing – which emerged as a key opportunity for localisation.
- Based on that study, further research was conducted to explore how competitive the local market was in relation to imports. The comparative study showed imported towers were cheaper, but high-volume and consistent local orders (such as those from TDP) could improve local cost competitiveness.
- Recognising Carbo Ferrum's potential role in meeting national energy infrastructure goals through Eskom's TDP, the LSF agreed to provide the company with technical support to improve efficiencies especially in relation to the production of monopoles.

Results

- The technical support provided has been instrumental in unlocking operational efficiencies—particularly in material handling—that have directly improved capacity utilization. As a result, the company now possesses a robust, actionable blueprint that, if fully implemented, positions it to potentially double production within the next year.
- Significant improvements have already been realised, including streamlining workflows, reduced bottlenecks, improved safety and strengthened quality and

traceability systems. In addition, vastly improved housekeeping has led to significant asset recovery and waste reduction, resulting in financial savings valued in the millions.

Broader Lessons

- The Carbo Ferrum intervention offers a potential model for reinvigorating South Africa's manufacturing base through lean production, technical upskilling, a well-resourced management team to drive change and integrated support mechanisms for the short, medium and long term.
- Unlocking demand from both public and private sectors is vital but of equal measure if not more so is ensuring local efficiency and competitiveness.
- LSF plays a critical enabling role by improving manufacturing efficiency and identifying localisation-ready value chain segments.
- This case study demonstrates that localisation is possible with structured technical support which is targeted and aligned with national priorities. It also surfaces the need for consistent demand and capacity-building as well as the importance of strong collaboration between public-interest organisations like the LSF, local industry, and state entities to drive industrial transformation and ensure the success of South Africa's localisation agenda.

Introduction

Seven years ago—at a time when South Africa's energy crisis was becoming evident with the start of loadshedding —a group of entrepreneurs took a strategic decision to take advantage of the opportunities presented by Eskom's Transmission Development Plan (TDP)[1]. As Eskom's initial TDP outlined a plan for the expansion of South Africa's power grid which would amount to a spend for powerlines in excess on R140bn in transmission and R25bn in distribution in the next 10 to 15 years, the opportunity for locally produced transmission infrastructure became clear. This led to the acquisition of Carbo Ferrum by Siyavuya Power Projects (SPP) Holdings, with the goal of manufacturing both monopoles and lattice towers for the country's transmission and distribution networks.

Whilst these developments were unfolding, the LSF was established in July 2021 to promote strategic localisation in relation to manufacturing with one of the focus areas being critical infrastructure. By 2023, the transmission and distribution sector approach the LSF to conduct a mapping of manufacturing capability and capacity in the South African market. This initiative was very central to the work of the LSF to identify opportunities for localisation and in this case the transmission and distribution value chain based on the potential demand which would emerge from the TDP[2]. Based on that mapping exercise, the production of steel towers was identified as a potential opportunity for increasing local production.

Having identified this, the LSF then conducted further research to analyse how competitive local production was in relation to imports[3]. The study found that South Africa has the potential to compete in steel tower manufacturing if domestic demand is stable and strategic interventions are made. The study further highlighted that continued reliance on imports poses significant risks for South Africa, particularly in terms of supply chain disruptions and the loss of domestic manufacturing capability.

Based on the two studies, the LSF decided that to ensure sufficient local capacity was developed to match demand emerging from the TDP, it would need to engage with local manufacturers who have the potential to produce for the emerging demand. And that is where there was a meeting of minds between the LSF and Carbo Ferrum when the company approached the LSF for technical support. Carbo Ferrum was clearly focused on contributing to the roll-out of new transmission and distribution infrastructure and as such wanted to scale up its operations and strengthen its technical capabilities to meet the growing demand for infrastructure that's critical to stabilising and expanding South Africa's power supply. And for the LSF, Carbo Ferrum

[1] Eskom's TDP covering 2018-2027 (which has subsequently been updated as loadshedding intensified) provided a plan for the expansion and development of the country's transmission network. The TDP aimed to ensure the network could handle new power generation from both conventional and renewable sources and maintain the required reliability and adequacy of the transmission grid.

[2] https://www.lsf-sa.co.za/reports/value-chain-mapping%3A-local-manufacturing-capability-in-the-transmission-%26-distribution-sector.

[3] Khan, M, Van Der Mescht, N and Vajeth, R: Price Benchmarking Study for Transmission and Distribution Steel Lattice Towers, September 2024. Prepared by Rhythm Power Solutions (Pty) Ltd. https://www.lsf-sa.co.za/post/publication-of-the-price-benchmarking-on-steel-towers-in-south-africa

provided the platform to assist in improving its manufacturing capacity.

This case study seeks to showcase the type of companies such as Carbo Ferrum which are seeking support from the LSF so that they can improve their manufacturing abilities by embracing lean manufacturing principles to meet local demand, reduce reliance on imports and more importantly, contribute towards improving the country's infrastructure. In turn, the case study seeks to highlight the type of technical support that companies can benefit from through the services offered by the LSF – if implemented – could contribute to higher levels of efficiency and productivity in order to compete with cheaper imports.

Ultimately, this case study provides some insight into what is needed to begin to reinvigorate the country's manufacturing capacity. It is no easy road. It requires both strong management with capacity to drive change and coherent and co-ordinated support from support agencies.

Background and context

Carbo Ferrum, a 51% black-owned company based in the Mdantsane[4] industrial area of the Eastern Cape, is a steel manufacturing company within the SPP Group. Carbo Ferrum was acquired by SPP Holdings in 2018 as part of a strategic move to further enhance their capabilities in the energy sector where SPP has a proven twenty-year track record in the construction of high voltage transmission lines and the like[5].

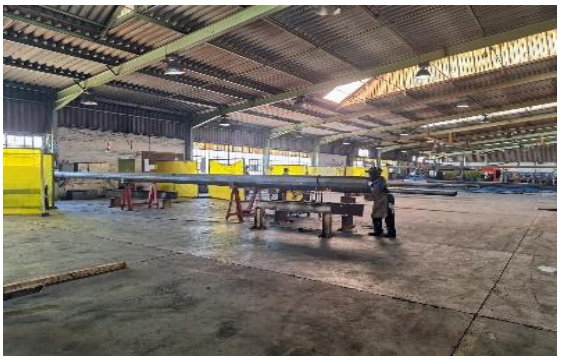

Figure 1: Factory upkeep at the Carbo Ferrum

Since the acquisition of Carbo Ferrum, the business has sought to focus on being a key manufacturer of lattice towers and monopoles for overhead transmission lines and substations (such as through the Independent Power Projects). To achieve this, the company has sought to expand its product offering by producing not only its existing distribution monopoles to manufacturing transmission monopoles and lattice towers. The shift from producing distribution monopoles to manufacturing transmission monopoles and lattice towers requires significant upgrades in engineering, manufacturing processes, and workforce skills as the designs are significantly different to the distribution monopoles.

In line with Carbo Ferrum's growth strategy which requires the enhancing of its in-house engineering capability to support the expansion of its product offering, Carbo Ferrum's general manager and SPP shareholder Pat Nokwali explains, "we approached the LSF to address some efficiencies on the production line which included amongst other issues around welding, quality and traceability." At around the same time, the company sought a loan from the IDC to finance the purchase of new equipment and machinery such as a laser cutting machine; a CNC punching and Shearing Machine and pulse welding machines.

Nokwali explains that the company was making monopoles for Eskom and the IPP projects, "but new markets have opened up for the production of lattice towers as Eskom put out an expression of interest for companies to produce lattice towers. There is only one other company in the country which is manufacturing lattice towers and Carbo Ferrum would like to become the other key supplier". In order to become one of the suppliers, Carbo Ferrum

[4] Mdantsane is the second biggest township in South Africa after Soweto,

[5] SPP has been involved in the construction of high voltage transmission lines, optic fibre cables, medium voltage distribution lines, overhead low voltage, cable reticulation, high mast installations, street lighting and auger and pneumatic drilling and focusses on the installation of high-tension electrical transmission cables.

went through the process required by Eskom to be in a position to supply lattice towers in line with the potential demand emerging out of the TDP (see picture below).” As part of Carbo Ferrum’s approach to the LSF, the company indicated that it wished to increase turnover by attracting more projects, improve production capacity and quality of its products. “This will then enhance our manufacturing capacity and capabilities for local demand and help us to export.” In turn, for the LSF, providing support to Carbo Ferrum would ensure that it could assist in supporting capability improvements which were required to ensure the company could begin to produce for the emerging demand presented by the TDP.

Figure 2: Operations at the Carbo Ferrum Factory

In its motivation to the LSF, the company requested “LSF to assist by deploying technical experts to help with the development of procedures, correct welding methods to deliver quality product, be efficient, develop plan of production line to be able to manufacture and produce in time. Moreover, we purchase our steel locally and supply our products locally (and in nearby African countries) which we would like to expand and export at some point.”

LSF approach for technical support

Carbo Ferrum's vision aligns with that of public benefit organisation such as the LSF which was established through private sector support to help grow and strengthen local manufacturing capacity and support the broader national objective of reindustrialisation.

Carbo Ferrum's request for assistance to improve its manufacturing capacity to boost its production to take advantage of Eskom's TDP fits firmly within the LSF's mandate. The Fund – a non-profit public benefit organisation – funded by the private sector was established in 2021[6] to assist manufacturers (and various sectors) to increase their capacity and improve their competitiveness, with the aim of reducing reliance on imports and producing optimally for exporting. The LFS's mission is to accelerate industrialisation by unlocking competitive localisation opportunities. Through targeted industry research[7] and strategic interventions for example through the deployment of technical experts, LSF's head of operations Leon Naidoo explains, "we help businesses scale, innovate, and integrate into global markets—strengthening local manufacturing and driving economic growth."

In the case of Carbo Ferrum, Naidoo points out that the company's approach was welcomed as their vision "ties in with our mandate of promoting localisation" in a strategic sector such as the energy space. But more importantly, the LSF had already taken a decision that it wanted to work with local manufacturers within the transmission and distribution value chain who had the potential to produce steel towers. This very targeted strategy of support to companies such as Carbo Ferrum was based on several factors: The LSF had identified the potential demand which could emerge from Eskom's TDP[8] which could result in the spend for powerlines exceeding R140bn in transmission and R25bn in distribution over the next 10 to 15 years.

Coupled with that, the LSF was approached in 2023 by the sector to conduct a study[9] to understand the local manufacturing capability for components used in the Transmission and Distribution network. This involved a mapping of the transmission and distribution

[6] At the launch of the LSF, former Trade, Industry and Competition Minister Ebrahim Patel explained that the LSF was designed to address the demand and the supply side constraints to industrialisation. He said the localisation concept was similar to industrialisation. "The economic argument is about expanding the size of the South African economy. The commercial arguments have become more important as corporations recognise the price they pay for disruptions in supply and, conversely, the advantages of a more flexible supply."

[7] Such as the most recent report on Price Benchmarking on Steel Towers in South Africa: https://www.lsf-sa.co.za/reports

[8] The Transmission Development Plan (TDP) is published to inform stakeholders about the proposed developments in the Eskom Transmission network. These plans are subject to change as and when better technical solutions are identified or when more accurate developmental information becomes available.

[9] https://www.lsf-sa.co.za/reports/value-chain-mapping%3A-local-manufacturing-capability-in-the-transmission-%26-distribution-sector.

manufacturing capability value chain which looked at the structure and the key role players involved in bringing the manufactured products or services to market; the local manufacturing capabilities and specific trends, challenges and opportunities to promote increased localisation.

Having identified potential local manufacturing capacity, the LSF did a further study[10] to compare prices of locally manufactured vs imported steel towers. As part of this comparison, the study analysed the cost structures and factors affecting the competitiveness of South African tower manufacturing. The study found that economies of scale commensurate with the demand projected by the TDP, locally manufactured towers would be cheaper than imported towers, particularly those from India, South Korea and Türkiye.

As such Eskom's TDP could provide such demand but the study noted that this would require policy intervention for consistency. Recognising that local manufacturers could compete with cheaper imports if consistent large-volume orders were available, the LSF viewed its support of Carbo Ferrum as a vital intervention.

LSF CEO Irshaad Kathrada explains, "one of the core strategies of the LSF is to leverage domestic demand to unlock the economies of scale and innovation that can make South African industries globally competitive. In the case of steel towers, we identified that the rollout of the TDP could create the kind of predictable, large-scale demand needed to support local production. Our support to Carbo Ferrum has sought to prepare a capable local firm scale effectively to meet that opportunity."

An additional consideration for the LSF, Naidoo noted, was the opportunity to test the central tenet of promoting localisation through state procurement — a strategy widely regarded as a powerful tool for inclusive and sustainable economic development. The underlying idea is that by strategically directing public spending, governments can stimulate local production, build national capacity, and foster resilient economies. Achieving this, however, requires coherent policies, strong institutions, effective stakeholder collaboration, and transparent implementation.

[10] Khan, M, Van Der Mescht, N and Vajeth, R: Price Benchmarking Study for Transmission and Distribution Steel Lattice Towers, September 2024. Prepared by Rhythm Power Solutions (Pty) Ltd. https://www.lsf-sa.co.za/post/publication-of-the-price-benchmarking-on-steel-towers-in-south-africa

Key Interventions and Improvements

Starke Industries, with a track record in localisation and industrialisation working across several key sectors in the economy, was awarded the contract to provide technical support to Carbo Ferrum. As such, Starke was expected to:

- Provide a diagnostic review of the current manufacturing process for both the transmission monopoles and lattice towers to identify opportunities for process improvement.
- Provide specialised metallurgical assistance to ameliorate and improve the welding process around flanges with the aim of eliminating service failures and re-work processes.
- Consult on the manufacturing optimisation of lattice towers in order to manufacture products that meet the market requirements.
- Complement the existing technical and engineering expertise in the factory to develop and codify correct welding methods.
- Complement the existing technical and engineering expertise in the factory to optimise the production process for both transmission monopoles and lattice towers to improve efficiency and quality outcomes.

To achieve these deliverables Starke's project manager Fritz Moolman explains that "we needed a cross functional team with different abilities and skills." In view of that the team included Moolman (with over 30 years of experience in automation, mechanisation and digitisation), an industrial engineer (10 years' experience and part of a team which turned around Bell Equipment), a welding specialist (with services provided by RBI Tech who are specialists in welding and are involved in the inspection of most of the Telkom towers) and a quality engineer (16 years' experience in plant management). Moolman added that in terms of Starke's deliverables, "we will also insure that LSF's vision of localising components is met. We will also address the connection between supply and demand in the industry."

At the outset of the intervention which kicked off in September 2024, Moolman was hopeful that "we can improve capabilities to such a level that Carbo-Ferrum will improve production, save costs, increase safety of employees and expand into the market". The team visited the facility to understand the company's KPIs and timelines and to become familiar with the processes, layout and products. During this process of review and assessing the capabilities, the team had to ensure that the processes, products and quality were aligned to Eskom's stringent requirements. Each specialist spent two weeks on site and then a week away to review and analyse what they had learnt in terms of the key areas of intervention. Based on this, each specialist developed an implementation plan

which was the subject of intense engagement with the relevant Carbo Ferrum teams. Emerging out of these processes, the following areas were addressed:

1.1 Production Optimisation

In terms of exploring how to improve efficiencies in terms of production, the team did a mapping of the entire production process and the facility itself (in terms of its design and layout) to identify areas of waste and inefficiencies through a Value Stream Mapping (VSM)[11] with the aim of improving workflow design and eliminate bottlenecks. This process included reviewing all equipment with a view to determining their level of performance through the Overall Equipment Effectiveness (OEE) approach**;** evaluate material supply and tooling; compare material supply to drawing; material flow; housekeeping and improve plant layout; identify and list improvements on materials and equipment; advise on jigs fixtures and welding implementation and support on budgeting for equipment.

Some of the key findings emerging from this review process—several of which were already known to the company—highlight several challenges. Operational inefficiencies were prevalent, particularly in areas such as tooling, material flow, and equipment utilisation. These inefficiencies were compounded by significant safety and compliance risks, as poor housekeeping and unmanaged waste created hazards that could jeopardise ISO audits. In addition, some existing infrastructure gaps limited the potential for improvement, largely due to uncertainty surrounding the planned relocation of the manufacturing facility which emerged as a factor during the process.

Taking a deeper dive into the management of resources such as material handling and storage, it emerged that there was a lack of storage systems (no racking or shelving); no identification, tracking, or tracing of new materials; inefficient internal material delivery whilst materials were scattered around the facility in different states of completion.

Figure 3: Factory upkeep at the Carbo Ferrum

In relation to equipment utilisation and safety, equipment utilisation was relatively low and the reliance on forklifts (instead of an overhead crane system as highlighted in the picture above) for both material handling and assembly is inefficient (time wasted waiting for the forklift) and unsafe. Safety concerns focused on poor handling practices and housekeeping which raised concerns about ISO 9001 compliance.

1.1.1 Critical interventions

Emerging out of discussions between the Starke team and Carbo Ferrum management the following included amongst others, some of the interventions proposed:

- *Material handling and storage:* The Starke team made several recommendations which were addressed such as the appointment of a logistics manager to assist in this regard and especially in managing the purchasing and tagging of new materials; materials not used are either scrapped and/or sold.
- *Strengthen housekeeping:* Various measures were proposed including the introduction of skip bins on the floor to

[11] A VSM is a visual technique to analyse and improve how Carbo Ferrum's products are produced and delivered to its customers.

place all the offcuts and rejects which are no longer lying on the floor.

- *Improvement in plant layout and design:* A significant amount of time was spent between the Starke team and Carbo Ferrum to understand the material flow and layout (which was inefficient) and a new layout was designed and revised following further discussion (see picture below). Pending the relocation of the plant, some initial improvements were made such as relocating the bender; installing a new cable and servicing the machine; removing all unused equipment; designing and implementing a new overhead gantry and installing extraction fans, as fumes proved to be a major safety and operator risk.

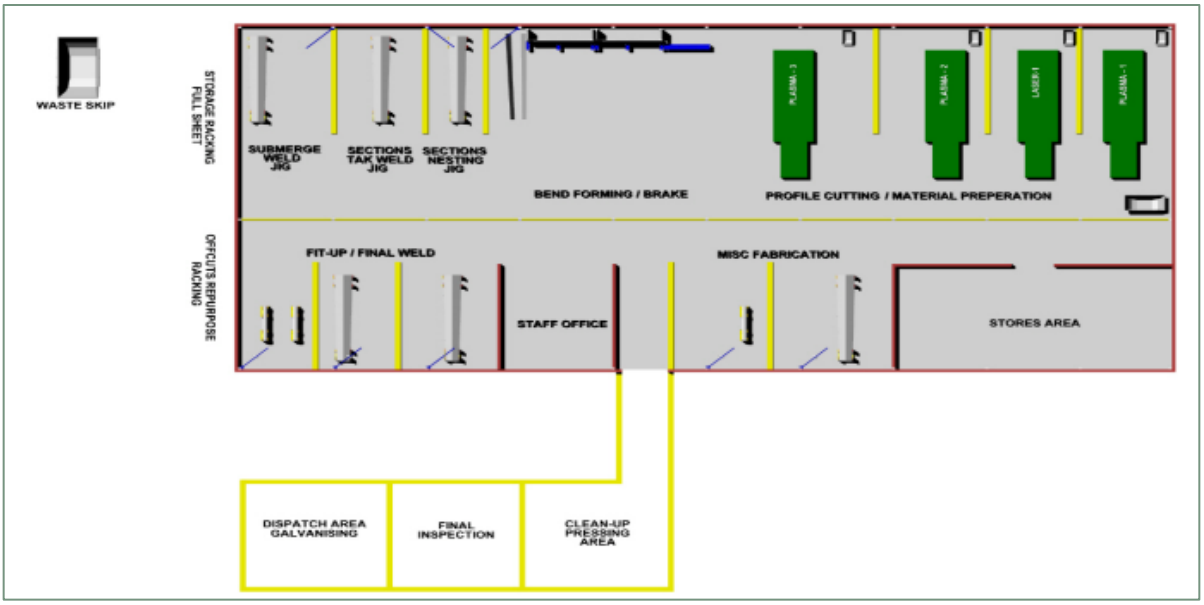

Figure 4: Carbo Ferrum Plant layout

Some additional recommendations relating to improving the layout and design of the facility made by the Starke team will be implemented when the company moves to its new facility. These include introducing trollies for the transfer of poles and plates after bending to reduce material handling by forklifts and the challenges connected to that and to increase flow and throughput of materials and strengthen health and safety. The Starke team also suggested areas where jigs can be used to increase quality and handling.

1.2 Quality Management Systems

The focus of the team in relation to this issue was to ensure quality engineering[12] and management systems are in place. This translates into measures to ensure there is a standard operating procedure (SOP) in place for consistency, efficiency and quality across the production process by ensuring there is a clear guide which outlines how tasks and processes are performed. Secondly, introducing quantifiable measurements to assess and track the quality of Carbo Ferrum's products and processes as well as quality audits which evaluate if the company's operations and products meet specific quality standards. They help identify areas for improvement, ensure compliance, and verify the effectiveness of quality controls.

The Starke team conducted a comprehensive audit of Carbo Ferrum's manufacturing processes and Quality Management System (QMS), aiming to align the current system with

[12] Quality engineering is essential because it ensures that products meet high standards of reliability and performance, which are critical in a competitive market. By integrating quality processes throughout the product lifecycle, quality engineering minimizes defects, reduces costs, and enhances customer satisfaction.

ISO9001[13] standards. The Starke team also evaluated where the company is in relation to IAFT 16949 which is the quality management system applicable for the automotive sector. It emerged that with a few interventions, the company would be aligned to those standards. Other key activities included a QMS gap analysis, a review of existing policies and procedures, and recommendations for improvements across supply chain planning and quality control. The team also proposed the design of physical jigs, fixtures, and Go/No-Go gauges to enhance quality checks.

1.2.1 Critical interventions

Some of the interventions embarked upon include:

- Following the QMS redesign, a full ISO9001 compliant audit was facilitated by an external auditor. In addition, training was provided to facility staff on system usage and quality control measures.
- The Starke team sought to assist Carbo Ferrum in setting up a comprehensive Quality Control (QC) system covering the entire process from stock-in to product-out, including ongoing monitoring of required materials to ensure traceability. This is of high priority for the company. The company, with the support of SPP and Sage has been trying to include the Sage Distribution and Manufacturing Operations (SDMO)[14]system alongside the Sage system but this has proved to be very challenging. However, work to address this is continuing.
- The Starke team stressed the need to ensure there is consistent monitoring and enforcement of the quality system which is in place. As part of this, the team proposed that staff should be briefed on an ongoing basis around the SOPs whilst the Starke team also engaged with the quality people to understand their job descriptions and to reinforce people's functions, stressing issues around quality.
- The Starke team emphasised the importance of daily "Gemba"[15]walks to review the production line which it was hoped would lead to tighter coordination between production and quality.
- The team suggested the welders should be reminded to set gas regulators to pre-described settings as it was found that on most of the machines the gas flow rate was set fully opened and causing unnecessary losses. In addition, the gas bottles were left opened during lunch breaks and with leaks, also causing losses. Linked to this issue of cost and quality saving, the team advised that the company should implement bulk gas supply instead of bottles which could be considered in the new facility.

4.3 Welding Capabilities

Improving the quality of Carbo Ferrum's final products as well as expanding its product offering to new markets required a review of its welding capabilities which included upgrading welding techniques and equipment coupled with further training and process controls. The Starke team reviewed current welding procedures; identified and addressed gaps and codified correct welding methods and provided specialised metallurgical assistance – to look at alternatives to material type of quality.

Moolman explains that a lot of time was spent assessing different welding procedures and taking samples of each welding process to

[13] A globally recognized standard for quality management. It helps organizations of all sizes and sectors to improve their performance, meet customer expectations and demonstrate their commitment to quality.

[14] SDMO is a cloud-native ERP solution designed specifically for mid-sized distributors and manufacturers. It aims to streamline and automate business processes, improve operational efficiency, and enable digital transformation for these companies.

[15] A Gemba walk is a lean management practice approach where management visit the actual workplace (the "Gemba") to observe processes firsthand and identify areas for improvement. This involves managers physically going to the production line where work is done to gain a deeper understanding of how things operate.

evaluate existing welding standards. For example, the team took one machine and looked at the quality of the parts and "we looked at the supply chain of welding equipment and the company has very good support from their equipment and consumable suppliers." Overall, "we compared what they were doing and did some minor tweaks but overall, the welding capability was good." Moving forward, the company, he stated, "needs to ensure processes are there and that these processes are checked."

4.3.1 Critical interventions

Some of the interventions embarked upon included:

- The retraining of the welders on the qualified welding procedure (where required and where difficulties were experienced in welding different processes and materials) as well as on the Procedure Qualification Record (PQR) to ensure ranges and values are adhered to and categorise welders according to their welding capabilities.
- A calculation of the costing of every welding process was conducted at the request of the company.

1.3 Additional interventions

During the process, some additional issues emerged which led to some engagement between the Starke and Carbo Ferrum teams.

- Some discussion focused on new products and what services Carbo Ferrum could provide to other companies in the Eastern Cape. Moolman points out that the company was geared up to offer a range of services for example, in relation to cut steel, manufacturing smaller poles and other steel structures for factories etc. In addition, because their quality system had been strengthened the company was nearly compliant with the automotive sector's quality standards which meant it could hence position itself to offer its services.
- By the time the Starke team came onboard the company had made significant progress in producing lattice towers and had already been approved by Eskom. The team did, however, provide some support in assessing the production process and to strengthen systems such as material handling, storage and mechanisms around the delivery of lattice towers to sites around the country. Nokwali indicated that the company was concerned about ensuring that the delivery of lattice towers as a unit to sites was done correctly. He indicated that "packaging the lattice towers" correctly was key so that the people on site did not have to struggle. The Starke team made several suggestions to digitize the process to ensure that lattice tower units arrived on site intact. Discussions around this are continuing.
- At the end of the process, the Starke team brought in a change management specialist to engage with the Carbo Ferrum management team. This process surfaced what emerged during the Starke team's intervention and created a space for all parties to engage.

Impact of the LSFs support

As part of the LSFs strategy to ensure sufficient capabilities existed in the transmission and distribution value chain to meet the emerging demand, it began to work with manufacturers such as Carbo Ferrum. In this case, the focus was on supporting the company to improve efficiencies in the production of monopoles. The company identified inefficiencies in the manufacturing process including amongst others, the need to ensure traceability, correct pricing and proper monitoring of quality and welding issues.

In terms of impact, Nokwali believes that the company has benefitted in numerous ways and has learnt so much whilst the external validation provided by the Starke team reinforced internal priorities and drove momentum for change. After having visited the operation months later, Moolman has witnessed the changes and the improvements in operational efficiencies such as in relation to material handling. He says, the production area looks vastly different to the first time he visited. The LSF-supported process, he says, helped the company understand its strengths and weaknesses, and emphasized the effort to integrate purchasing, engineering, and manufacturing to foster cross-departmental collaboration.

Whilst the support led to a range of improvements such as improved production throughput; reduced defect rates; enhanced employee skillsets; better documentation and traceability; daily practices more embedded and systematised and improved plant appearance and cleanliness, there have been cost savings such as asset recovery amounting to a few million rand. More importantly, Moolman emphasises that if all measures are implemented, the company could double its production in the next year.

Recapping on some key focus areas, for example, in relation to product optimisation, Nokwali stressed “when we began talking about product optimisation, we realised that our production line was not appropriately laid out. During the Starke team's visit, we started implementing layout changes, which led to noticeable improvements in production. We're now seeing reduced time wastage and the elimination of several potential risks.” This process also led to improvements in general housekeeping (by implementing better housekeeping practices, the company was able to store and pack away materials that had been laying around the production line, resulting in the recovery of assets amounting to millions of rand, also contributing to further operational efficiency.

Figure 5: Maintaining a Safe and Clean Workplace

Other important aspects of this intervention related to reduce material handling by forklifts (reducing fuel and maintenance costs); improved OEE as bottlenecks were removed; enhanced material flow and improved health and safety conditions.

In terms of addressing quality management systems, Nokwali indicated that the company had strengthened its existing system and was now trying to introduce the SDMO to improve traceability. Linked to addressing quality issues, several interventions were introduced to improve health and safety in the facility such as changes around material handling which has significant spin off on safety.

In terms of enhancing welding capabilities, Nokwali indicated that the Starke team helped to significantly improve welding quality, leading to greater reliability and performance of the final product.

A by-product of Starke's support (but was not part of the original deliverables) was a change management engagement process to ensure that the changes proposed and introduced filtered down to the production line. This engagement process also created a space for the Carbo Ferrum team to understand as Moolman says "the bigger", picture. Whilst this was not a huge intervention it was significant as it created the space for the Carbo Ferrum team to sit together and talk and share views around the technical support process as well as get an understanding of where the company is heading and the potential benefits from the TDP. Nokwali indicated that the session was really positive and was attended by the team leaders and supervisors so that the key learnings could filter down to the production line.

Finally, some of the interventions proposed have yet to be implemented as the company indicated during the process that it was planning to relocate its operations which are going to be near a recently acquired galvanising facility (by SPP Holdings). This, the company argued, is expected to further enhance efficiency, particularly for transmission line products.

Key learnings

Exploring the LSF's support of Carbo Ferrum has surfaced several key insights into the implications for localisation efforts in South Africa; market and organisational challenges and implications for support programmes such as the LSF.

Promoting localisation is not simply a matter of policy—it requires integrated and coordinated implementation across government, state-owned enterprises (SOEs), and industry. Unlocking demand from both public and private sectors is essential, but as Naidoo argues what remains central is ensuring that local manufacturers are efficient and competitive. This is where organisations like the LSF become critical enablers.

Whilst stressing the need for improving competencies and efficiencies in terms of manufacturing, the LSF has also focused - through its research and engagement processes - on identifying which elements of a value chain may be more- or less-suited to localisation. The LSF believes that efforts should be directed to areas where there is potentially a strong comparative advantage which was highlighted in the case of lattice

towers through the LSF research. This raises some questions then around how our industrial policy can support such interventions making sure to factor in sector dynamics, scalability, and competitive advantage and ensuring greater coordination among key institutions (LSF, DTIC, IDC, ITAC) to ensure interventions are coherent, adequately funded, and aligned with market conditions.

While Eskom's TDP presents an opportunity for localisation, especially in areas such as lattice tower production, companies like Carbo Ferrum can only truly compete if they operate at sufficient scale and with high levels of operational efficiency. Without this, imports will continue to outstrip local supply, even when quality standards might differ.

In terms of market and organisational challenges, the case study highlights that whilst becoming positioned for the TDP, Carbo Ferrum has not yet secured orders, and as Naidoo points out that with the absence of guaranteed offtakes, there has yet to be any benefit for localisation. Secondly, Moolman notes that the production cycles of companies such as Carbo Ferrum remain vulnerable due to fluctuating orders and reliance on a single dominant client (SPP) which requires some additional thinking around what services the company can offer others in the area such as automotive. Thirdly, such companies also face steel price volatility, and the lack or limited application of tariffs can place local manufacturers at a pricing disadvantage. In addition, it has been suggested that less expensive imported monopoles, which may not fully align with local standards, continue to dominate the market largely due to their lower costs.

The case study also highlighted some organisational issues which are not limited to companies such as Carbo Ferrum. One of the key challenges facing companies in South Africa is the limited capacity within middle management, particularly in technical and supervisory roles. While senior leadership often brings strong entrepreneurial and strategic capabilities, there appears to be a gap in the technical and operational expertise required at the middle management level. For example, in the case of Carbo Ferrum, the Starke team raised concerns around the lack of a dedicated production manager, which has placed significant strain on existing senior managers. This also has implications for sustaining improvement measures to ensure greater levels of efficiencies and capabilities within the company. The absence of a well-resourced team to embed changes is key to realise the full impact of support measures.

The Starke team carried out a small intervention to align middle management and the supervisors and team leaders with the proposed changes, ensuring these could be effectively communicated to the workers on the production line. This raises some issues for further reflection in terms of the need for companies to consider ensuring that such interventions form part of a change management process so that they embed changes and build capabilities which are sustainable.

Concluding remarks

South Africa's localisation agenda will only succeed if local manufacturing becomes globally competitive. The LSF's work with Carbo Ferrum points to the potential value of targeted technical support which highlights not only typical operational challenges (such as plant layout, design inefficiencies, and quality control) but raises the importance of addressing human resource related issues. A holistic approach that combines technical upgrades with skills development and ensuring a well-resourced team is in place to drive change is key to achieving long-term impact.

Whilst promoting localisation is a key policy imperative to stop deindustrialisation and drive reindustrialisation, the LSF continues to refine its understanding of where localisation efforts can be most effectively targeted—whether in specific sectors or stages of the value chain. What is becoming increasingly clear is that enhancing the competitiveness of local manufacturing is essential for sustainable success.

Crucially, localisation also depends on stable and predictable demand. Here, SOEs such as Eskom and the NTCSA play a pivotal role as anchor customers, providing the volumes required to build economies of scale. The TDP sets out considerable demand for new infrastructure, which, if strategically leveraged, can support a vibrant domestic manufacturing industry in selected componentry. This would not only serve the transmission network but also contribute to the rollout of South Africa's broader energy transition, including renewable energy.

The Carbo Ferrum case demonstrates how targeted, structured support can be scaled and replicated across other industries, providing proof points that build confidence among policymakers, investors, and manufacturers. Sustained progress, however, will require strong partnerships between government, industry, and public-interest organisations to align demand signals, financing mechanisms, and technical expertise. As South Africa navigates its energy transition and broader industrial development goals, initiatives such as this will be critical in laying the foundation for a more resilient, competitive, and inclusive manufacturing base.

LSF

PROUDLY SUPPORTING LOCAL INDUSTRY

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