MANUFACTURING AND ASSEMBLY OF FIBER-OPTIC CABLES

This page has been left blank intentionally.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF DEFINITIONS, ABBREVIATIONS, ACRONYMS

COVID - 19	Corona Virus Disease
EMI	Electromagnetic Interference
EMP	Electromagnetic Pulse
EPC	Engineering, Procurement and Construction
EV	Electric Vehicle
FOC	Fibre Optic Cable
FTTX	Fibre To The X
GCC	Gulf Cooperation Council
GDP	Gross Domestic Production
GEC	Global Emirates Cables
GFRP	Glass Fibre Reinforced Polymer
GI	Graded Index
GRP	Glass Reinforced Polymer
HS	Harmonised System
HTGD	Hengtong Optic-Electric Co., Ltd
IEC	The International Electrotechnical Commission
IRR	Internal Rate of Return
ISO	International Organization for Standardization
ITU	International Telecommunication Union
KPIs	Key Performace Indices
LSzH	Low Smoke Zero Halogen
LTE	Long Term Evolution
MEFC	Middle East Fibre Cable Manufacturing Co.
MM	Multimode
NPV	Net Present Value
OFO	Oman Fibre Optic
OM	Optical Multimode
PA	Polyamide
PBT	Polybutylene terephthalate
PC	Polycarbonate
PE	Polyethylene
PMI	Purchasing Managers' Index
POF	Plastic Optical Fibre
PP	Polypropylene
PVC	Polyvinyl Chlorine
Q2, Q3	Quarter 2, Quarter 3
QA/ QC	Quality Assurance/ Quality Check
QAR	Qatari Riyal
QICC	Qatar International Cables Company

QP	Qatar Petroleum
RFI	Radio Frequency Interference
SM	Single Mode
TIA	Telecommunications Industry Association
TIR	Total Internal Reflection
TV	Television
UAE	United Aram Emirates
UK	United Kingdom
UN COMTRADE	United Nations International Trade Statistics Database
USA	United States of America
UV	Ultraviolet
VDSL	Very high bit rate digital subscriber line
YOFC	Yangtze Optical Fibre and Cable

1. EXECUTIVE SUMMARY

The firm [redacted] proposes to establish a manufacturing facility at [redacted] free port zone to assemble Fibre Optic Cables in Qatar. The Optical Fibre will be procured from [redacted]., the global market leader in the manufacturing of Fibre Optic Strands and Cables. This report gives a detailed feasibility study for the establishment of a manufacturing facility to assemble fibre optic cables in Qatar and broadly includes the following topics:

1.1. Market Assessment

The Fibre Optic Cable market is expected to grow at [redacted]% CAGR globally with APAC and European Union region dominating the growth chart. The global market demand is primarily driven by the Telecommunication segment ([redacted]%), followed by Oil and Gas ([redacted]%), Military and Aerospace ([redacted]Medical ([redacted]%) and others. The market leaders in this segment are Corning Inc., YOFC, HTGD, Furukawa Electric, Prysmian and others.

[redacted]. With the onset of 5G technology and FTTX services in Qatar, the Telecom segment is the dominant demand driver for fibre optic cables accounting to about [redacted] of the entire Qatari demand, followed by EPC and Oil and Gas industries.

The major companies that assemble fibre optic cables located in Middle East region are Oman Fibre Optic, Global Emirates Optic and Middle East Fibre Cable Manufacturing Co. These companies cater to the Middle East and North African demand and have joint ventures or associations with the global market players.

This report gives a detailed study of the market dynamics in the Fibre Optic segment at global, regional and local scale in Section 5.

According to the market study conducted, we conclude that there is a large void and potential to fulfil the needs of Qatar's fibre optic cable demand.

1.2. Technical Assessment

Fibre Optic Cables are broadly classified under two categories – Single mode and Multimode fibres. Single mode fibre is used for long distance communication application as it has the least attenuation and finds application in the Telecommunication segment.

Multimode fibres are used for short distance communications such as data centres, servers, and inter and intra-building communications. The difference between the two fibres is the number of light waves that can be passed through at any given instance. This attribute influences the size of the core for the fibre.

These cables are governed by stringent standards and certifications. These certifications are regulated by four international institutes – **ISO**, **ITU**, **IEC**, and **TIA**. The industry norm for single mode fibres is defined by the ITU standards – G.652 to G.657 and for multimode fibres is defined by ISO-IEC, IEC and TIA standards – OM1 to OM5.

Depending on the type of fibre optic cable to be assembled, it requires from two to five manufacturing lines which includes – Secondary Coating Line, SZ Stranding, Sheathing line, Tight buffering, and Jacketing line. Section 4.3 describes in detail the type of equipment required in each manufacturing line in a flowchart.

The funding requirement to establish the manufacturing facility is estimated at [redacted]. This investment includes the cost of purchasing equipment and machinery, industrial building construction, utilities setup and furnishing of office space. The established manufacturing facility will have the capacity to produce assembled fibre optic cables at the approx. rate of [redacted]m/min with the production capacity about [redacted] km per annum. The estimated

The materials required to assemble the cable at the manufacturing facility has been described in detail in Section 4.5. Also, the mechanism for handling and disposal of waste is compliant with the Qatari Law No. 30 of 2002.

It is estimated that the total number of workforce required to run the manufacturing plant at full capacity to be [redacted] which includes [redacted] managers, [redacted] supervisors, and the rest in administration, maintenance and logistic operations.

1.3. Financial Assessment

The weighted average variable cost of production per kilometre is estimated to be [redacted] and the weighted average selling price of [redacted] for the first year. The variable cost and selling price are weighted average for seven different product offerings.

The weighted average contribution margin per kilometre of cable is amounting to [redacted]

The weighted average breakeven volume has been calculated to be 8,032 km of cables which is below the minimum capacity of [redacted] that the plant can produce. The total fixed cost for year 1 is estimated at [redacted]

The initial funding requirement to set up the plant is estimated at [redacted]. The plant once established has the capacity to generate 12000 km of cables in a single year with a revenue of [redacted] in year 1. The net income in year 1 is estimated at [redacted]. The Internal Rate of Return (IRR) of this project for a 5 year projection is estimated to be [redacted] and the Net Present Value (NPV) of the project for the same duration at a discount rate of 12% is [redacted]

The 5 year projections of the financials, balance sheets, breakeven analysis, fixed cost and variable cost have been descried in detailed in Section 6 of the report.

1.4. Implementation Roadmap

The project will be implemented over a [redacted] month time frame. This timeline includes [redacted] milestones and [redacted] major tasks to be completed.

The primary task and the first milestone is to secure the capital funding for the project from Qatar Development Bank (QDB) and others. It is followed by establishing [redacted] as a business legal entity in Qatar. Later, the company will establish business partnership with [redacted] for the supply of optical fibre strands. Additionally, the company will establish raw material agreements with other sourcing partners located in Qatar and other countries. This will be followed by approaching the QFZA authorities to facilitate the site for the project and to establish the facility for the execution of the project.

After receiving confirmation from QFZA, the company will initiate the acquisition and recruitment of the management team. This team will be responsible to spearhead the Engineering Planning and Construction drawings task, and recruitment of workforce needed to operate the plant at full capacity.

The construction of the industrial facility will begin after completing the second milestone – Finalisation of Engineering drawings. This task is followed by the Procurement of equipment, machinery, utilities and cables for the factory. After the completion of the construction of the facility and the procurement of equipment and manufacturing line, installation of the equipment will follow. As a parallel activity, a marketing campaign will be run for creating awareness among the Qatari business community regarding the Fibre Optic product offerings and delivery timelines. After installation of the equipment, the factory and the manufacturing line will be commissioned, followed by the plant operations start-up.

For detailed Gantt chart and timeline, kindly refer to Appendix E.