

Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

Name of the Factory	: Digital Sweater & Composite Ltd.
Address of the Factory	: North Kanchanpur, Baraipara, Kaliakoir, Gazipur, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: VEC
Date of Structural Inspection	: 25 th March, 2015
Fire Assessment Conducted by	: VEC
Date of Fire Inspection	: 25 th March, 2015
Electrical Assessment Conducted by	: VEC
Date of Electrical Inspection	: 25 th March, 2015
BGMEA Membership No.	: 5727.

BASIC INFORMATION:

The assessed factory building was a 4 storied RCC structure. The structural system of the building was RCC beam column frame and beam slab floor system. All floors of the building occupied by Digital Sweater & Composite Ltd. The following general information were noted:

- i. Building Usage Type : Garment Factory.
- ii. Structural System : RCC beam column frame system.
- iii. Floor System : RCC beam slab floor system.
- iv. Floor Area : Total floor area is 42705 sft.
- v. No. of Stories : 4 Storey.
- vi. Construction Year : 2012.
- vii. Foundation Type : Isolated column footing foundation.
- viii. Design Drawings : Available- Approval plan, structural design drawing, architectural design drawing.
Not Available- Material test report and floor load plan, as built Machine layout plan.
- ix. Soil Investigation Report : Available.
- x. Construction Materials : Brick aggregate. (Identified by removing plaster)
- xi. Generator : Separate structure.

RECOMMENDATIONS FOR CORRECTIVE ACTION:

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

- Short Term (Immediate) :
- Areas near the overstress columns should not to be used for storage so that the overstress of the column might be less. Reduce building loading including storage to 2.0 KN/m²
 - Factory Engineer to review design, loads and columns stresses in the area identified above.
- Mid Term (6-weeks) :
- Factory Engineer to review design, loads and columns stresses in area identified above.

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- Verify insitu concrete stresses either by 100mm dia. cores or existing cylinder strength data for [the identified columns] or [100mm dia. cores from 4 columns].
- Long Term (6-months) :
- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.
 - Structural engineer to prepare full set of documents and prepare/update calculations showing the structural adequacy of the floor system taking into account the factory design imposed loading and the as built structure.
 - Provide protective coating to cover the exposed rebar from corrosion. Carry out ongoing maintenance works.

The recommendations for **Fire & Electrical Safety** corrective action are:

(A): Recommendations for Fire Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • None.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Fire drill shall be conducted quarterly (4 times a year) under the Fire Safety Plan. A record of such drills shall be kept in writing for at least 3 years for the inspection of fire brigade whenever called for. • Factory has to install exit sign in all exits way so that it is visible from all position in floor.
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Needs to have as built drawing with floor machine layout showing means of escape with proper dimension. • Fire manager/Director need to have safety training from proper authority & worker of the factory should as far as possible be trained for use fire equipment. • Factory need to have proper testing plan & record of fire safety equipment. • Factory need to be fitted fire rated doors with self-closing mechanisms, which shall open in the direction of travel and that allowable to easy opening from inside, also having minimum widths according Table 4.2 • Provide handrail on both sides of stairways. • Illuminated emergency light in floor, exit and stair-case

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	<p>landing need to be installed.</p> <ul style="list-style-type: none"> • Ensure adequate illuminated emergency lighting in floors, exit & stair. • Need to install portable fire extinguishers in all floors 1 number for every 550 m² or 1 number after every 100 feet distance.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Factory needs to have a proper pre-plan for fire service & civil department. • The escape route need to provide protected paths of travel from the stair entrance at each floor level, all the way to the final exit to outside of the building for this Storage area need to be protected with 2 hours rated construction & 1.5 hours rated opening or doors. • Storage area need to be protected with 2 hour rated construction & 1.5 hour rated opening or doors. • Stairs need to be protected with fire and smoke resistant enclosures, and provide a protected route from all though the stairway to the final exits or Install 2 hour rated fire door with 2 hr rated lobby at all the exits leading to the staircases of each floor. • Need to 2 hour fire separation in partition wall between office and production floor in ground floor. • Each bay shall be considered as separate compartment and detectors shall be installed considering each bay an independent compartment. • For Low rise building An auto AFD and alarm system need to be installed. For High rise building The factory with shall be equipped with manually operated electrical fire alarm system and automatic fire alarm system. Manually operated electrical alarm system shall be installed in a building with single or multiple call boxes located on each floor. • Install automatic fire and smoke detection system throughout the building to cover every portion in that building. • Install suitable public address system having communication to all floors as well as facilities to

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	<p>receive messages from all floors.</p> <ul style="list-style-type: none"> • Need to Install 100mm dia Standpipe and hose system in the factory building. • Install 1 riser per 1000 m2 of floor area & 38 mm dia of hoses with variable nozzle need to be installed. • Provide the required flow of 1900 liter/min and minimum pressure of 200 kPa for supplying first aid hose (38 mm nominal) OR Hydraulically design the standpipe and hose system to get the required pressure. • Ensure Siamese connection for to the standpipe system located outside the building and accessible to the fire department connection • Install dedicated fire pump with backup power system & sufficient capacity for achieve required pressure in the remote place of the factory. • Factory needs to have sufficient water storage capacity to get adequate pressure to feed fire-fighting equipment.
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(B): Recommendations for Electrical Safety corrective actions:

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> • None.
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> • Provide two separate and distinct connections of earthing for each generator. • Ensure all panel boards are earthed properly using appropriate type and size of cables and the earthing cables have continuity up to main earth pit. • Remove all unused cables from distribution boards and make sure all necessary cables are properly terminated at its point of termination using appropriate size and type of lug. • Ensure overcurrent protection device (circuit breaker/fuse) for each circuit/branch circuit. • Provide provision for inspection of all earthing system and ensure inspection is being completed and documented.

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<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> • Ensure appropriate number and type of safety signage and fire-fighting equipment at substation room, and graded rubber mats in front of all distribution boards. • Provide Instruction board for first aid and artificial respiration in the substation room and generator room. • Provide dedicated & adequate size of earthing with proper identification for each circuit and ensure continuous earth path is back to main building intake. • Rewire to avoid the use of multiple cables from incoming and outgoing side of MCB's/MCCB's and bus bar. • Ensure all electrical cables are sized according to capacity of circuit breakers. • Avoid flexible cables for fixed wiring unless contained in an enclosure affording mechanical protection. • Ensure cable joints are made in respect of conductivity, insulation and mechanical strength. • Connect all metal in the building to the building earthing system. • Find out the cause (improper cable/over current selection, over loading, improper lug, improper cable joints, rusted connection, insulation damage, multiple cables at single point,) of overheating { ambient+(20⁰C-40⁰C)} and take proper action.
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> • Develop an electrical layout diagram and an as-built single line diagram detailing key components and capacity of the electrical system. • Establish a periodical Insulation and earth Resistance Measurement Program and record the related testing data. • Inspect electrical boards on an annual basis to ensure that the equipment is in good working condition. • Provide adequate means of ventilation for the substation room based on the installed equipment considering fire barriers. • Install security measures to ensure access to the substation is restricted.

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	<ul style="list-style-type: none">• Ensure underground cables for electrical distribution in the premises are encased in GI or PVC pipes and laid in earth trenches of sufficient depth as per mentioned standard.• Ensure all high tension cables are laid following standard cable laying techniques.• Provide adequate means of ventilation for the generator room based on the installed equipment and ensure that ventilation does not impact on fire barriers.• Ensure panel boards have no opening and all live internal components are concealed properly.• Provide dedicated & adequate size of neutral with proper identification for each circuit.• Ensure each distribution board is provided with a circuit list and means of identification is provided as per list.• Provide adequate and non-combustible covers on cable channel.• Provide proper cable terminator/connector for stranded conductors at its point of termination.• Install separate distribution boards for lighting and power circuits.• Install lightning protection system on the building confirming its requirements and adequacy.
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