1. Mini ring machine with core yarn attachment

Specifications

Mini ring frame with drafting mechanism for processing cotton, man-made fibres and blends	
Number of spindles	6
Spindle gauge	75 mm
Tube length	200 mm
Ring diameter	45 mm flange 1
Spindle speed	up to 18000 rpm
Drafting system	Drafting system for short-medium and long staple fibres
Break draft	1 to 6
Total draft range	From 15 to 100
Total twist range	270 to 2000 tpm (6.8 to 50.8 tpi)
Creel	For suspension of 12/24 roving bobbins
Attachment	CORE YARN DEVICE for soft and hardcore yarn including accessories
Energy Supply	220/50 Hz
Monitor display	Spindle speed, break draft, total draft, twist and front roller delivery
Accessories	All parts / accessories required to make machine operational on site

2. Mini ring machine with slub yarn attachment

Specifications

Mini ring frame with drafting mechanism for processing cotton, man-made fibres and blends	
Number of spindles	6
Spindle gauge	75 mm
Tube length	200 mm
Ring diameter	45 mm flange 1 mm
Spindle speed	up to 18000 rpm
Drafting system	SKF drafting system for short-medium and long staple fibers
Break draft	1 to 6
Total draft	10 to 70 in cotton or long fiber drafting system
Twist in cotton or long fibre drafting system	270 to 2000 tpm (6.8 to 50.8 tpi)
Creel	For suspension of 12/24 roving bobbins
Attachment	Slub yarn device with multicount and multitwist programme
Operator panel	Be able to take the slub, multicount and multitwsit programs
Energy Supply	220/50 Hz
Monitor display	Spindle speed, break draft, total draft, twist and front roller delivery
Accessories	All parts / accessories required to make machine operational on site

3. Cone to cone yarn twisting machine

Specifications

- All in one, assembling-twisting and covering
- Hybrid cone to cone yarn twisting machine (2 spindle)

	Spindle 1	Spindle 2
Twisting speed	750 to 8.500 twist / minute, independent each spindle	750 to 14.000 twist/minute, independent each spindle
Twisting range	3 to 1.700 twist / meter, independent each spindle	4 to 2.000 twist/meter, independent each spindle
Take-up speed	Up to 82 meters / minute	Up to 200 meters / minute, independent each spindle
Twisting speed and twist range adj.	Programmable with 1 twist/min and 1 twist/meter adjustment	Programmable with 1 twist/min and 1 twist/meter adjustment
Twisted Yarn Count	1 NeC to 50 NeC	1 NeC to 50 NeC
Number of Spindles	1	1
Mains voltage	200-240V 1-Phase	200-240V 1-Phase
No. of friction points on the yarn	0 lateral + 0 axial	0 lateral + 8 axial
Take up winding method	Parallel winding with precision direct traverse	Cross winding with ceramic coated precision winding drum
Take-up cone size	160 mm length, double flanged tube	170 mm length 4.20° conical cone or cylindrical cone
Maximum take up cone diameter	160 mm	220 mm
Take-up cone softness adjustment	N/A	Adjustable with cone pressure and with yarn feeding system
Bobbin holders (creel)	Servo Feeder	Standard 8 bobbin holders per spindle
Yarn break sensors	On optional external creel. Wiring is provided for custom creels	8 sets standard optical sensors and optional capacitive sensor for elastane
Take-up cone size sensors	N/A, size of bobbin is adjustable with encoder system	Reflective electronic type. Size of bobbin is adjustable
Supply bobbin size	Any size	Any size
Max. yarn plies to be twisted	Unlimited	Unlimited
Threading method	By air jet	By air jet
Individual operation of each unit	Yes	Yes

Electronic S and Z twist selection	Individual operation for each spindle	Individual operation for each spindle
Multi - end twisting	Individual operation for each spindle	Individual operation for each spindle
Single - end twisting	Individual operation for each spindle	Individual operation for each spindle
Yarn covering	Individual operation for each spindle	Individual operation for each spindle
Jog function	Individual operation for each spindle	Individual operation for each spindle
Programmable elastane feeding device	YES (1 Qty)	YES (1 Qty)
Connectivity to Pre-Twisting unit	Ready wiring and functions for Pre-twisting units (01 Qty)	Ready wiring and functions for Pre-twisting unit (01 Qty)
Connectivity to Servo-Feeder unit	Ready wiring and functions for Servo-Feeder units	Ready wiring and functions for Servo-Feeder units
Fancy yarn twisting	N/A	Individual operation for each spindle
Length control	Individual operation for each spindle feedback from encoder	Individual operation for each spindle, feedback from winding drum
Waxing device	N/A	YES (01 Qty)
Yarn feeding device	N/A	YES (02 Qty) Synchronized positive yarn feeding system
Yarn brakes	On the optional Creel Unit (01 Qty)	8 precision yarn brake spring-disk tensioners for every feeding yarn
Control method	Latest generation microprocessor control	Latest generation microprocessor control
Program input interface	High resolution, color touchscreen operator panel	High resolution, color touchscreen operator panel
Program memory	50 user memory + default parameters	50 user memory + default parameters
Programmable parameters	Twist / min, Twist / meter, S-Z twist types, Elastane on/off, Elastane feed %, fancy yarn on-off, fancy yarn parameters, optional Pre-Twisting direction and twist/min. parameters. yarn break timer, language selection, acceleration & deceleration times, fine-tuning, copy functions, memory functions, reset to default etc.	Twist / min, Twist / meter, S-Z twist types, Elastane on/off, Elastane feed %, fancy yarn on-off, fancy yarn parameters, optional Pre-Twisting direction and twist/min. parameters. yarn break timer, language selection, acceleration & deceleration times, fine-tuning, copy functions, memory functions, reset to default etc.

Automatic stop	Yarn break, bobbin full, cover open, emergency, overload, etc. Lots of additional protective functions	Yarn break, bobbin full, cover open, emergency, overload, etc. Lots of additional protective functions

4. Autoclave

Specifications

- For manufacturing of carbon/epoxy (pre-preg) composites materials

Pressure Vessel Structure	Closure: Quick Closure clamp. Chamber seal: O-ring type. Chamber: 500mm x 1500mm Operating Pressure: 15 kgf/cm^2 or higher. Operating Temp.: with multiple ramp-up to 200°C or higher
Heater unit	Power: 220/380VAC, 3-Phase Type: Kanthal Heater Thermocouple unit: Type: "T" Type, " T " Type Plug ("+", "-") & Data saving connector (TC profiler)
Control system - automatic control	PLC Based control, CPU Module/power module, I/O Module / base module/A/D module, PLC Logic program, Autoclave Temp. PLC Control, Programable controller, RS Communication & Analog output, Autoclave Over Temp., Indication & alarm interlock Touch Panel Wiring work (complete) Cooling Coil Unit & Cooling tank & Feed Pump Vacuum System
Power back-up	Power back up for emergency shut down in safe mode
Data acquisition	Real time data acquisition / analysis system (fixed)
Accessories	All parts / accessories required to make machine operational on site

5. Hydraulic Compression Press

- Compression force: 5 - 30 ton (adjustable)
- Platen size: 12 inch × 12 inch
- Maximum operating temperature: with multiple ramps and up to 250 ^{o}C or higher
- Insulation between platen and bolster
- Digital temperature controllers (separate for each platen)
- Opening: 0" – 12" (adjustable)
- Self-contained hydraulic system, including:
    - Reservoir with gauge for oil level and temperature indication
    - Water-cooled heat exchanger
    - 3 inches per minute or more pressing speed
- Power back up for emergency shut down in safe mode
- Real time data acquisition / analysis system (fixed)
- All parts / accessories required to make machine operational on site

6. Filament winding Machine

- Materials: Glass fiber/epoxy
- Cross-sectional: circular, Shape: cylindrical (CNG cylinder)
- Winding Process: Wet
- Mandrel size: up to 1.0 meter
- Mandrel dia: up to 400 mm
- Spindle rotating speed: 0-150 RPM
- Max capacity: 400Kg
- Braking method: E brake 0.01s-0.02s
- Soft start time: 0 - 1 sec
- Axes: 2 or more (preferably 4 axes)
- Creel capacity: 6 bobbins, with self-braking
- Epoxy reservoir with hot water bath
- Power back up for emergency shut down in safe mode
- Real time data acquisition / analysis system (fixed)
- All parts / accessories required to make machine operational on site

7. High speed Camera

Specifications

- Resolution: 1920 X 1080 or higher
- Frame rate: 12,742 fps at 1080 resolution
- Maximum frame rate: 1,000,000 fps
- Memory: 288 GB or higher on-board memory for long recordings
- Internal or external SSD drive for fast data transfer
- Battery: 1 hour or more
- Compatible with all F and EF mount lenses
- Frame synchronization: flexible from 10 Hz to 200 kHz
- Micro-lens sensor for exceptional light sensitivity
- Global electronic shutter to 289 ns
- Real-time health monitoring system
- Real time data acquisition / analysis system (fixed)
- All parts / accessories required to make equipment operational on site

8. Digital Jacquard weaving machine

Item A: Digital Jacquard Sampling Loom

- Nominal Working Width: 900 mm or higher
- Electronic Let-Off and Cloth Take-Up
- Weft Color Selectors: Electronic Controlled (8)
- Beat–up: Driven by Servo Motor
- Weft Insertion: Single Rapier
- Touch Screen
- Shedding system: Electronic Jacquard (with software)
- Number of hooks: 2688 or higher
- Jacquard Drive (Servo Motor)
- Double Comber board
- Spare Solenoid Board for Jacquard: 1 pc
- Spare Blades for Weft Cutter: 10 pcs
- Power back up for emergency shut down in safe mode
- Real time data acquisition / analysis system (fixed)
- All parts / accessories required to make machine operational on site

Item B: Single-end Sizing Machine

- Speed up to 200 m / min or higher
- Electrical-heating in sizing tank
- Hot air drying
- Yarn break sensor
- Power back up for emergency shut down in safe mode
- Real time data acquisition / analysis system (fixed)
- All parts / accessories required to make machine operational on site

9. Sample Warping Machine (Pilot Scale)

Specifications

- Nominal Working Width: 900 mm or higher
- Drum Circumference: 2500 mm or more
- Automatic Colour Selectors: 4
- Touch Screen Panel
- Integrated Beaming Unit
- Stationary Creel 4 accumulators
- Power back up for emergency shut down in safe mode
- Real time data acquisition / analysis system (fixed)
- All parts / accessories required to make machine operational on site

10. Multiaxial Weaving Machine (3D weaving)

- To weaving 3D multilayer fabrics
- Machine width: 5~30 cms
- Yarn type: Filament yarn produced from fiber like Carbon, Kevlar, Glass etc.,
- Fabric weight: 500~3000 gms / m^2
- Fabric thickness: 1~20 mm
- Number of layers= upto 20
- Picking system: Rapier picking
- Shedding system: Jacquard
- Weft selection: 4
- Yarn tex: 200~2000 tex
- Speed: 50~100 picks per min.
- Creel capacity: 1024
- Selvedge: Leno
- Number of warp threads: upto 3000
- Power back up for emergency shut down in safe mode
- Real time data acquisition / analysis system (fixed)
- All parts / accessories required to make machine operational on site

11. Sample Rapier Loom (Pilot Scale)

Specifications

- Working width: 500 mm or more
- Number of frames: 20 or higher
- Shedding system: Dobby (electronic)
- Electronic let off and take up
- Weft insertion: Rigid Rapier
- Weft Color Selectors: Electronic Controlled (4)
- All parts / accessories required to make machine operational on site

12. Compression Hosiery Knitting Machine

Specifications

Feeds	4-6
Diameter	3"-6"
Gauge	16-40
Feeding Mechanism	Positive
Creel Capacity	32-40
End Products	Stockings, Panty hose, Medical socks etc.
Accessories	All parts / accessories required to make machine operational on site

13. Whole garment knitting machine

Specifications

Feeds	6-8
Diameter/Width	12"-20" / 20"-50"
Gauge	12-40
End Products	Hats, Mufflers, Neck-ties, Children wear, Leggings, Tank tops, Underwear, Outerwear, Swimwear, Sanitary Garments etc.
Attachments	Compression, Natural Yarn, Lycra
Accessories	All parts / accessories required to make machine operational on site

14. Nanofiber Electrospinning Equipment (Lab-scale)

Specifications

Nozzles	Minimum 50 electrospinning nozzles
Nozzle movement	Capable of to and fro movement
Voltage (KV)	Upto Minimum 50 KV
Substrate speed (mm/min)	Upto Minimum 100 mm/min
Effective Substrate width (mm)	Minimum 500
Dual polymer spinning	Minimum with two solutions
Temperature controller	IR heater to control temperature
Substrate movement	Possibility to wind/unwind substrate
Nanoweb layer	Nanoweb layer should be even along the length and with
Accessories	All parts / accessories required to make machine operational on site

04/08/17

15. Dynamic Mechanical Analyser (DMA)

- DMA should measure the viscoelastic properties using either transient or dynamic oscillatory tests. A sinusoidal stress (or strain) should be applied to the material and a resultant sinusoidal strain (or stress) is measured. Also measured is the phase difference, δ, between the two sine waves. Transient tests include creep and stress relaxation.
- Materials: solids, fibers, films, polymer composites and pastes
- DMA should have a maximum force loading, allowing for a wider array of materials to be studied, including the stiff samples.
- DMA must support option to add relative humidity control, with performance meeting or exceeding specifications detailed in the section below.
- DMA must support option for Automated Liquid Nitrogen control and automatic filling of cooling accessory from large tank using level sensor. DMA should be able to perform automatic filling of accessory during a run when not cooling

Specifications

Modulus Range	1000 to 10e12 Pascals
Modulus Precision	+/- 1%
Frequency Range	0.01 to 200 Hz in 0.01 increments at lower frequencies, 1.0 Hz at higher frequencies
Maximum Force	Up to 20 Newtons
Minimum Pretension (for tensile)	0.001 Newton
Force Resolution	0.0001 Newton
Tan d Range	0.0001 to 10
Tan d Sensitivity	0.0001
Tan d Resolution	0.00001
Dynamic sample deformation Range	+/- 0.5 to 10,000 microns
Amplitude Resolution	1 nanometer (0.001 micron)
Temperature Range	-150 to 600°C
Heating rate	0.1 to 20°C/min in 0.1°C/min increments
Cooling rate	0.1 to 10°C/min to -100°C
Isothermal Stability	+/- 0.1°C
Automated Furnace Movement	Yes

Relative Humidity (RH) Controller Specifications

Temperature Range	5°C–120°C
Temperature Accuracy	±0.5°C
Heating/Cooling Rate	Up to ±1°C/min over entire temperature range
Nitrogen Cylinder	One completely filled
Power back up	Power back up for emergency shut down in safe mode
Accessories	All parts / accessories required to make machine operational on site
Data acquisition system	Real time data acquisition / analysis system (fixed)

16. Thermo-Mechanical Analyser (TMA)

- The TMA must be able to measure sample dimensional changes with high quality data in the compression, tension, and 3-point bending modes of deformation, under conditions of controlled temperature, time, force, and atmosphere. TMA should measure intrinsic material properties like expansion coefficient (CTE), glass transition, Young's modulus, plus processing/product performance parameters like softening or melting points. The TMA features should include additionally Stress/Strain, Creep, Stress Relaxation, Dynamic TMA, and Modulated Temperature TMA modes as described below.
- Materials: solids, fibres, films, polymer composites and pastes

TMA must have the following features:

  - Automated furnace movement
  - Automated probe movement
  - Automated probe zeroing
  - Automated sample length measurement
  - Automated force loading
- The TMA must be able to perform dynamic TMA tests and generate material viscoelastic properties (storage modulus, loss modulus, tan delta i.e A sinusoidal force (stress) is applied during a temperature ramp. Analysis of the resulting strain and phase data provides viscoelastic property parameters e.g., E', E" tan δ).
- The TMA must be able to perform Temperature Modulated TMA: Temperature is programmed linearly, and simultaneously modulated at constant stress to generate signals relating to total displacement, CTE, and their reversing and non-reversing components. These permit detection of thermal transitions, and separation of overlapping events (e.g., Tg and stress relaxation).
- The TMA must be able to perform stress and strain steps / ramps at constant temperature
- Ability to perform creep and stress relaxation measurements, with capability to compute creep and stress relaxation data in rheological units (%strain, creep compliance, recoverable compliance, relaxation modulus.

Specifications

Temperature range:	-150 to 1000°C
Temperature precision:	+/- 1
Heating rate range	0.1 to 100°C/min
Isothermal temperature control	0.1°C
Furnace cool-down time	< 10 minutes from 1000°C to 50°C
Measurement Precision:	+/- 0.1%

Sensitivity:	20nm
Resolution (digital)	0.15 nm
Force range:	0.001 to 2 N
Force Resolution:	0.001 N
Frequency range	0.01 to 2 Hz
Maximum sample size(solid):	26 mm(L); 10 mm(D)
Maximum sample size (film/fiber):	26 mm(L); 0.5 mm (T); 4.5 mm(W)
Power back up	Power back up for emergency shut down in safe mode
Accessories	All parts / accessories required to make machine operational on site
Data acquisition system	Real time data acquisition / analysis system (fixed)

17. Thermo-Gravimetric Analyser (TGA)

- The TGA should meet or exceed the following technical specifications when evaluated as described for each value:
- Materials: solids, fibers, films, polymer composites, liquids and pastes.
- Thermo-Balance Design: Symmetric Vertical Hang-down (Tru-Mass)
- Furnace type: Infrared heating with built in electromagnetic coil for automated temperature calibration
- The TGA shall include Modulated Temperature TGA as described below:
- The ability to apply sinusoidal temperature wave to a sample. Amplitude of sine wave ± 0.01 to 10°C; period from 100 to 1000 seconds.
- Calculates and displays the following kinetic parameters of decomposition on a continuous basis in real time,
    - Activation energy (kJ/mol)
    - Log (Pre-exponential factor) (1/min)
    - ln (rate ratio)
    - Weight amplitude (mg/min)
    - Modulated Temp (°C).

Specifications:

Temperature Range:	ambient to 1200 °C
Linear Heating Rates:	0.1 to 500 °C/min in 0.01°C/min increments
Furnace Cooling: Forced Air 1000°C to 35°C	< 10 min.
Sample Weight Capacity:	1000 mg
Dynamic Weighing Range:	1000 mg
Defined as the maximum measurable weight change (independent of pans)	
Weighing Precision:	± 0.01%
Temperature Accuracy:	±1°C
Dynamic Temperature Precision:	±1°C
Isothermal Temperature Precision:	±0.1°C
Power back up	Power back up for emergency shut down in safe mode
Accessories	All parts / accessories required to make machine operational on site
Data acquisition system	Real time data acquisition / analysis system (fixed)

18. Guarded Hot Plate

- Instrument must be able to measure thermal conductivity test samples in compliance to ASTM E 1530.
- Materials: cements, polymers, ceramics, composites, glasses, rubbers, some metals and other materials of low to medium thermal conductivity, paper or liquids, thin films
- Optional sample holders for pastes and liquids
- Sample holders to test liquids and samples through the molten state must be available
- To remove effects at the interface and optimize sample testing range instrument must allow the use of thermal compounds

Specifications

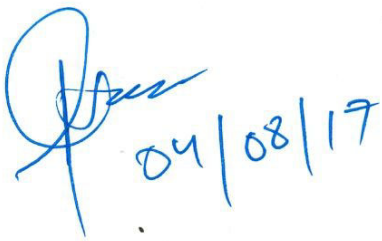
The Guarded Heat Flow Meter should meet or exceed the following technical specifications:

Thermal conductivity range of at least	0.1 W/mK up to to 40 W/mK
Thermal resistance range	0.0005 m2K/W up to 0.05 m2K/W
Sample Temperature range	Room temperature to 300°C
Measurement accuracy of	±3%
Measurement reproducibility of	±2%
Maximum user-adjustable sample pressure	4 atm (60 psi)
Samples thickness	0.1mm to 25mm
Samples diameter	50mm
Power back up	Power back up for emergency shut down in safe mode
Accessories	All parts / accessories required to make machine operational on site
Data acquisition system	Real time data acquisition / analysis system (fixed)

19. Tumble dryer

Specifications

Controlled Exhaust Temperature	Maximum 80 °C
Drum Volume	Minimum 130 Litres
Drum Reversal	Yes
Drum Diameter	575 mm
Cool Down Period	Controlled Cool Down Period
Heating Input	3.1 kW
Software	Dedicated Drying Programs Specially for ISO 6330
Standard Compliance	ISO 6330, ISO 3758, ISO 3759, ISO 5077, ISO 15487, ISO 7768, ISO 7769, ISO 7770, ISO pr EN 16732, ISO 16322, H&M
The dryer must be fully compatible with Wascator FOM71 CLS	



20. 3-D Body Scanner for Apparel Design

- Operation Power: 220-240 V
- Changing area (with curtain)
- Full privacy scanning booth
- Recorded audio instructions played through speakers in booth
- Height-adjustable handholds (at least 2)
- Compact scanner footprint
- Scan in any color of close fitting garments
- 4D mode to visualize 3D movement
- Selectable hair-masking mode
- Supported to detect crotch and armpit points
- With self-scan mode
- MEP configuration to define desired set of extracted measurements
- Capable of batch process scans
- Sensors: Infrared depth
- No moving parts
- Scan in maximum 1 second
- Data processing time: <9 seconds (creation avatar, extraction measurements saving files etc)
- 4D mode
- Capable of taking at least 1000 different Measurements
- Point to Point Measurement
- Accessories and attachment
- PC table
- PC Chair
- CPU configuration: Intel 6, core i7, 16Gb RAM, 1Tb HDD
- 21" LED, keyboard, mouse, set of speakers
- Data cables & power cables
- Software to create virtual Avatar(s)
- Software for scanning, data extraction and data processing
- License for scanning software
- Software for poses, animation, size matching, virtual fitting, personalization, and styling advice
- Photo masking software
- Image Processing software

4.8.17

21. Newton thermal manikin system

Specifications

- Preferably it should be capable to determine:

Basic requirements	Amount of body surface area covered by textiles and amount of exposed skin
	Distribution of textile layers and air layers over the body surface (i.e. non-uniform)
	Looseness or tightness of fit
	Increase in surface area for heat loss (i.e. clothing area factor) due to the textiles around the body
	Effect of product design
	Adjustment of garment features (i.e. fasteners open, hood up, etc.)
	Variation in the temperature (and heat flux) on different parts of the body
	Variation in body position (i.e. standing, sitting, lying down); and Variation in body movement (e.g. walking, cycling).
Standards	ASTM F2370, ASTM F1291, ISO/DIS 15831, EN 13537, ENV 342
System	Shell: Thermally Conductive, preferably carbon epoxy
	Minimum 30 heating zones
	Ambient sensors: Temperature, windspeed and Relative humdity sensors
	Heating: Resistance wire, highly stable
	Sweating system: With fluid distribution, a reservior and fabric skin layer
	With a supplied PC along with window compatible free updatable software throughout lifetime of equipment
	Sensors: Should be present in all zone
	Standard walking motion stand
	Conditioning chamber with capability to simulate HOT, COLD, DRY and HUMID environments
	Operating humidity range: 0 to 100% R.H. including condensation
	Humidity accuracy: ± 3%
	Operating temperature range: Min. -15 to Min. 50 C
	Temperature accuracy: ± 0.1°C
	Cold capable for operation to -20° C
	Sweating system: Min 0 – 950 ml/hr
	External breathing system
	Capability to be converted to a femal manikin
Specs	Asian Male Manikin body form with height of Min. 160 cm and weight 27.5 Kg

04/8/17

Software	Can control the manikin completely
	Capable of calibrating the manikin
	Can diagnose the issues in system
	Equipped with data logging tools
	Possibility to display color coded results
	Possible to work with custom conditions
	Manikin control modes: temperature regulation, constant heat flux, and comfort equation
Warranty	One-year warranty of all components
	Start-up training at least two persons in a lab using the system