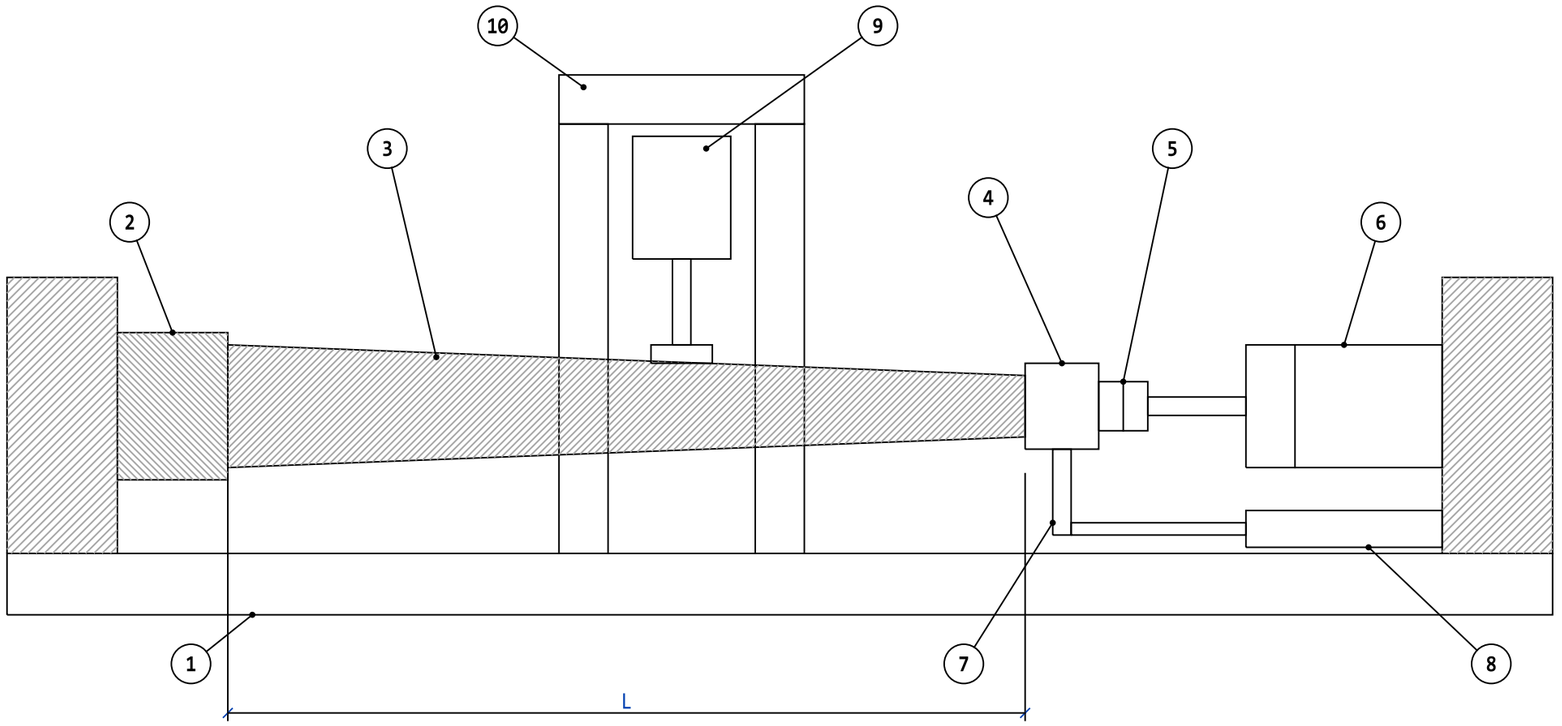
SIDE ELEVATION - BLADE ROOT FACILITY

NOT TO SCALE



THE PULL, THE TWIST AND THE BENDING ARE APPLIED TO THE BLADE ROOT TOGETHER; THE TENSION ACTUATOR PULLS ALONG THE AXIS, IN FORCE CONTROL
THE TORSION ACTUATOR TWISTS THE SPECIMEN BY THE TORQUE ARM; THE BENDING ACTUATOR PRESSES FROM THE GANTRY; THE REACTION FRAME CARRIES EVERY LOAD
L IS THE LENGTH OF THE SPECIMEN BETWEEN THE ROOT FIXTURE AND THE ADAPTER

NOTES

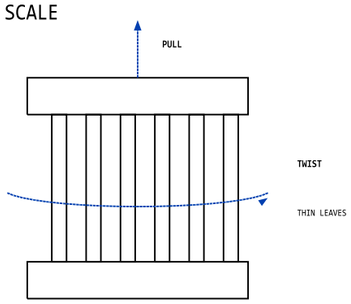
1. REFERENCE ARRANGEMENT OF A ROTOR HUB AND BLADE TEST FACILITY. LETTERS ARE DIMENSIONS SET BY DESIGN: NO LOAD, TORQUE, FORCE, ANGLE OR SIZE VALUE IS GIVEN.
2. THE SIDE ELEVATION SHOWS THE REACTION FRAME, THE ROOT FIXTURE HOLDING THE THICK END OF THE BLADE ROOT SPECIMEN, THE ADAPTER AND THE LOAD CELL AT ITS FREE END, THE TENSION ACTUATOR ON THE AXIS, THE TORQUE ARM WITH THE TORSION ACTUATOR, AND THE BENDING ACTUATOR ON THE GANTRY. L IS THE LENGTH OF THE SPECIMEN.
3. DETAIL A: THE TENSION-TORSION STRAP PACK BETWEEN TWO END FITTINGS, WITH THE PULL AND THE TWIST. DETAIL B: THE HUB PLATE RIG IN PLAN, ONE ACTUATOR ON EACH ARM. DETAIL C: THE ROOT FIXTURE IN SECTION.
4. THE CONTROL CHAIN AND THE CURVES OF TORQUE AGAINST TWIST AND OF THE PULL DURING A TWIST ARE ON SHEET 002. THE LOAD CELLS, THE SERVO VALVES, THE FRAME STEEL AND THE FASTENERS ARE CATALOGUE ITEMS, BOUGHT IN. NOBODY STANDS NEAR A LOADED SPECIMEN.

ITEMS

ITEM	DESCRIPTION
1	REACTION FRAME
2	ROOT FIXTURE
3	BLADE ROOT SPECIMEN
4	ADAPTER
5	LOAD CELL
6	TENSION ACTUATOR
7	TORQUE ARM
8	TORSION ACTUATOR
9	BENDING ACTUATOR
10	GANTRY

DETAIL A - THE STRAP PACK

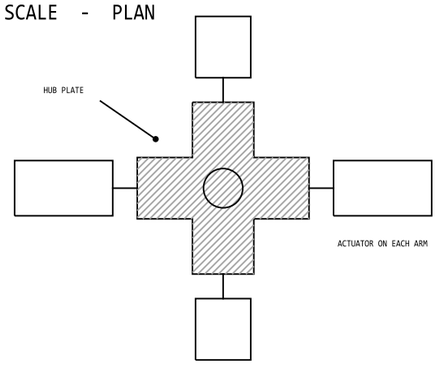
NOT TO SCALE



THE STRAP CARRIES THE PULL OF THE BLADE AND TWISTS FOR PITCH; THE PULL STIFFENS IT IN TORSION, SO TENSION CHANGES THE TWIST

DETAIL B - THE HUB PLATE RIG

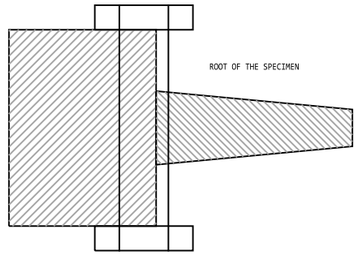
NOT TO SCALE - PLAN



THE ARMS STAND IN FOR THE BLADES: EACH ARM IS PULLED BY AN ACTUATOR, SO THE LOADS COME FROM THE ARMS AND NOT FROM A SINGLE AXIS

DETAIL C - THE ROOT FIXTURE

NOT TO SCALE



THE FIXTURE HOLDS THE ROOT ON ITS OWN AXIS; THE ADAPTER AT THE FREE END CARRIES THE LOADS WITHOUT PLAY

REFERENCE CONFIGURATION - NOT FOR CONSTRUCTION

NEOMETRIX DEFENCE LIMITED
ENGINEERED IN NOIDA - INDIA

ROTOR HUB AND BLADE TEST FACILITY - REFERENCE CONFIGURATION

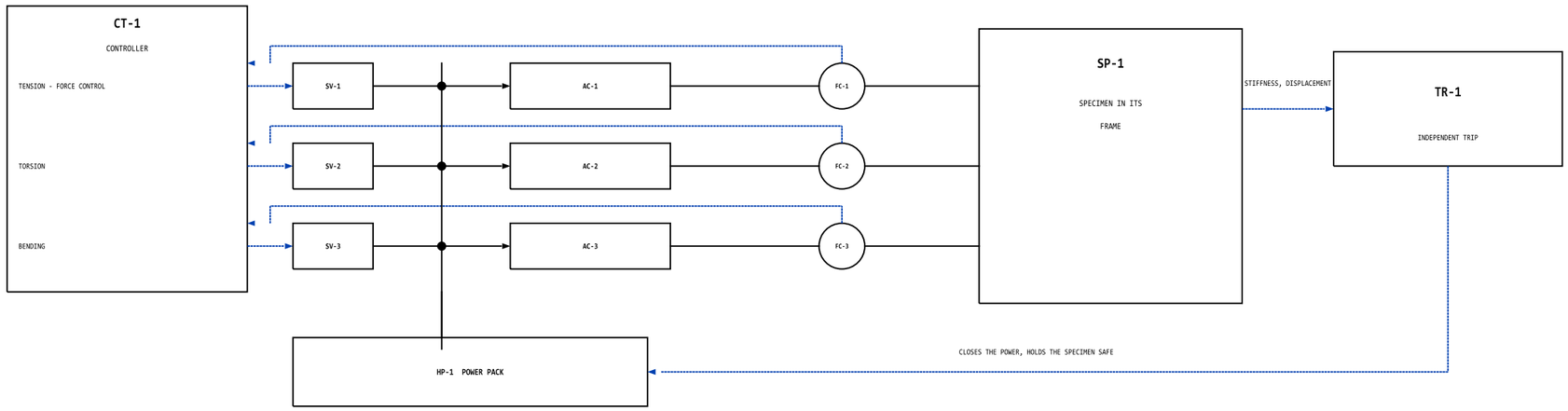
ARRANGEMENT AND DETAILS

THE FRAME, THE SPECIMEN, THE ACTUATORS AND THE DETAILS

DWG NO	SCALE @ A3	SHEET	REV
NMX-RBH-107-001	NTS	1 OF 2	A
DATE	UNITS	DRAWN	STATUS
17-11-2026	TAGS ONLY	NMX-DO	REFERENCE

CONTROL CHAIN - ROTOR HUB AND BLADE TEST FACILITY

NOT TO SCALE



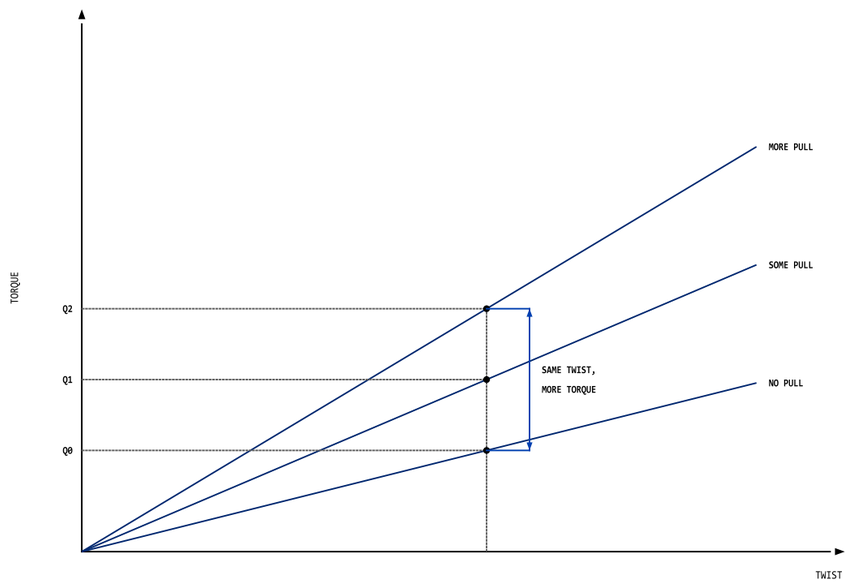
THE CONTROLLER CT-1 RUNS THE TENSION, TORSION AND BENDING CHANNELS TOGETHER, EACH THROUGH ITS SERVO VALVE SV AND ACTUATOR AC; THE TENSION CHANNEL IS IN FORCE CONTROL
THE LOAD CELLS FC FEED BACK WHAT WAS REALLY APPLIED; THE POWER PACK HP-1 FEEDS EVERY SERVO VALVE; THE TRIP TR-1 IS A CIRCUIT OF ITS OWN AND ACTS WITHOUT ASKING THE CONTROLLER

NOTES

1. REFERENCE CONTROL CHAIN OF A ROTOR HUB AND BLADE TEST FACILITY. TAGS AND LETTERS ONLY: NO LOAD, TORQUE, FORCE, ANGLE OR SIZE VALUE IS GIVEN.
2. THE CONTROLLER CT-1 RUNS THE TENSION, TORSION AND BENDING CHANNELS TOGETHER, EACH THROUGH ITS SERVO VALVE SV AND ACTUATOR AC TO THE SPECIMEN SP-1. THE LOAD CELLS FC FEED BACK WHAT WAS REALLY APPLIED AND THE POWER PACK HP-1 FEEDS EVERY SERVO VALVE.
3. THE TRIP TR-1 IS A CIRCUIT OF ITS OWN: IT WATCHES THE STIFFNESS AND THE DISPLACEMENT OF THE SPECIMEN AND CLOSES THE POWER WITHOUT ASKING THE CONTROLLER.
4. DETAIL A: TORQUE AGAINST TWIST FOR NO PULL, SOME PULL AND MORE PULL. THE SAME TWIST NEEDS MORE TORQUE UNDER MORE TENSION: TENSION CHANGES THE TWIST.
5. DETAIL B: THE PULL DURING TWO CYCLES OF TWIST. WITH THE ENDS HELD STILL THE PULL CLIMBS TWICE IN EVERY CYCLE; WITH THE FORCE HELD IT DOES NOT, AND THE ENDS DRAW CLOSER. THE TENSION CHANNEL THEREFORE RUNS IN FORCE CONTROL.
6. THE CURVES ARE COMPUTED FROM SIMPLE MODELS OF A THIN STRAP, IN RELATIVE UNITS: A PICTURE OF THE IDEA, NOT A MEASUREMENT. THE ARRANGEMENT AND THE DETAILS ARE ON SHEET 001. NOBODY STANDS NEAR A LOADED SPECIMEN.

DETAIL A - TORQUE AGAINST TWIST

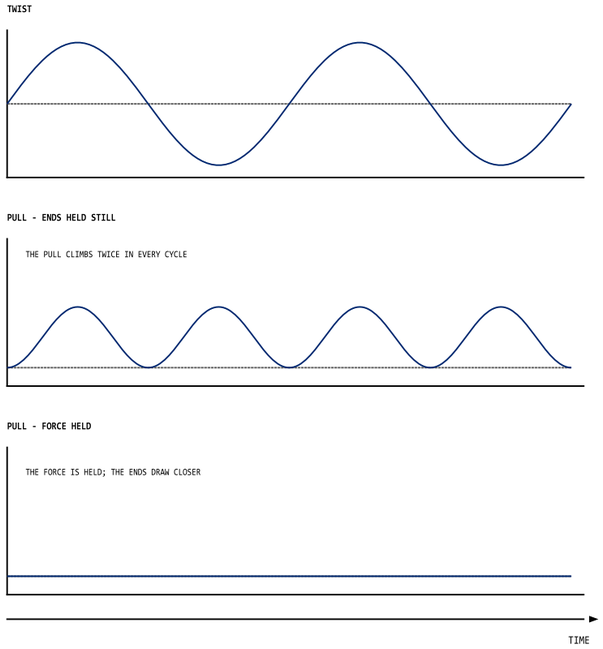
NOT TO SCALE - COMPUTED



Q0, Q1 AND Q2 ARE THE TORQUES FOR NO PULL, SOME PULL AND MORE PULL AT THE SAME TWIST
A STRAP IS STIFFER IN TORSION UNDER A PULL: TENSION CHANGES THE TWIST
THE LINES ARE COMPUTED FROM A STIFFNESS THAT GROWS WITH THE PULL: A PICTURE OF THE IDEA, NOT A MEASUREMENT

DETAIL B - THE PULL DURING A TWIST

NOT TO SCALE - COMPUTED



THE TWIST CYCLES TWICE; THE PULL IS SHOWN ABOVE ITS SET LEVEL (DASHED)
COMPUTED: A PICTURE OF THE IDEA, NOT A MEASUREMENT

REFERENCE CONFIGURATION - NOT FOR CONSTRUCTION

NEOMETRIX DEFENCE LIMITED
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ROTOR HUB AND BLADE TEST FACILITY - REFERENCE CONFIGURATION

CONTROL CHAIN AND THE CURVES

THE CONTROL CHAIN AND THE CURVES OF THE IDEA

DWG NO	SCALE @ A3	SHEET	REV
NMX-RBH-107-002	NTS	2 OF 2	A
DATE	UNITS	DRAWN	STATUS
17-11-2026	TAGS ONLY	NMX-DO	REFERENCE