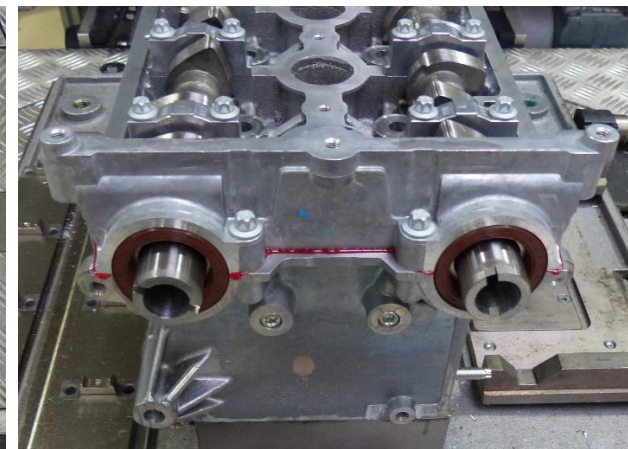
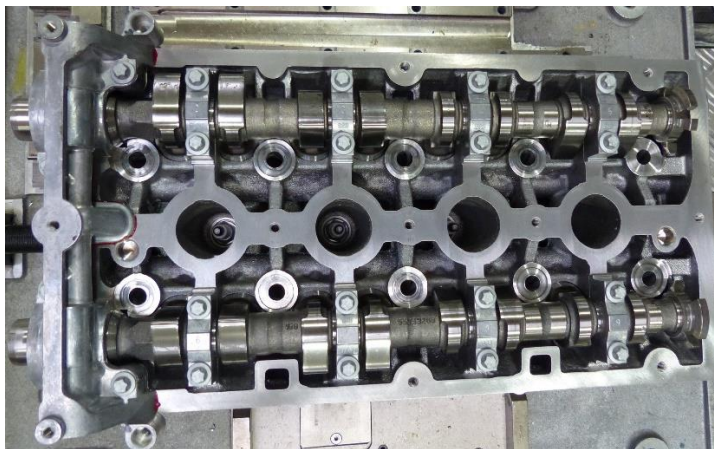
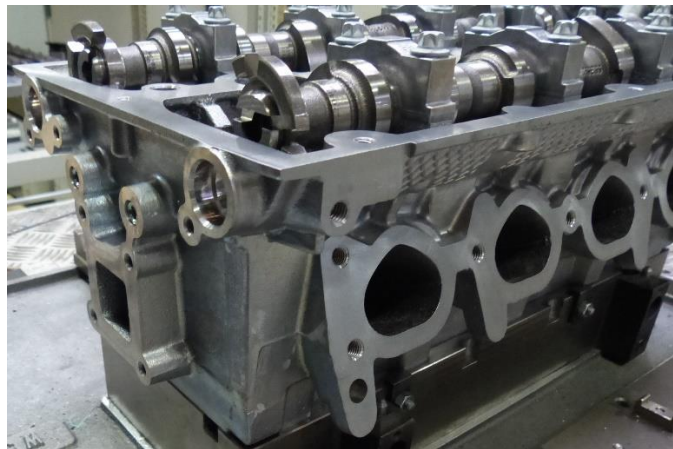
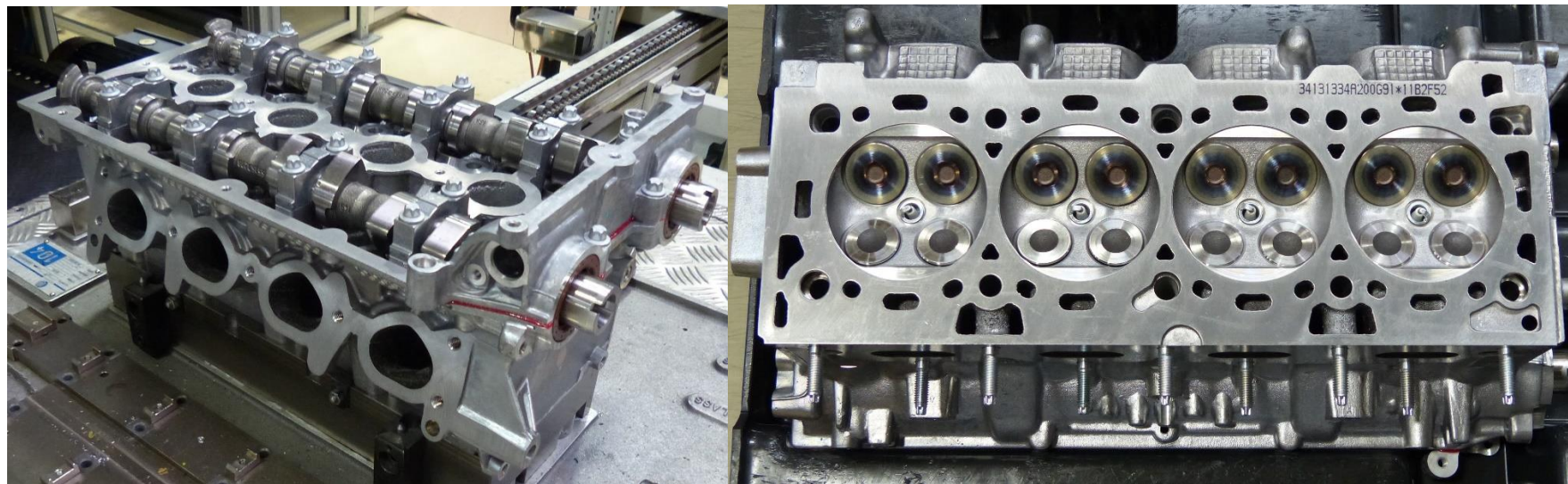


Subject to prior Sale we offer by Order of OPEL:

Complete Cylinder Head Assembly Line for 4-Cylinder Aluminium 16V Engine-Heads



The Line includes the following Stations and Operations:

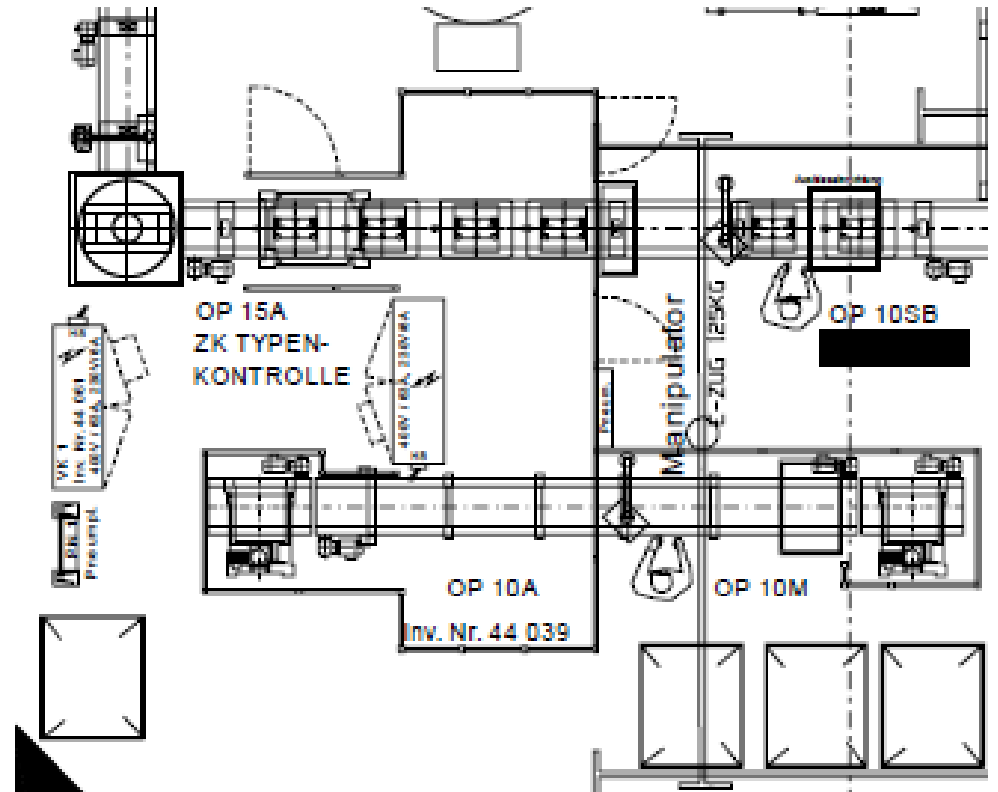
10M	Manual loading cylinder head to help line
10M	visual check bearing caps and bearing cap screws are not loosened ~3mm
10A	carry over cylinder head to main line by gantry
10A	check of cylinder head type with laser switch
10A	Clean the surface of the pallet
20A	cylinder head type punching with needle printer
20A	Loosen the screws of bearing bridge and bearing caps
20A	Gripping of the bearing bridge and bearing caps in two steps
20A	Putting down bearing bridge and bearing caps (with screws) on pallet
20A	Check the existence of 2 pcs locator on the cylinder head
30A	Check the hole of tappets before assembly of sealing
30A	Pressing of valvshaft sealing
40A	rotation cylinder head from 0° to 180°
50M	oiling valve stem
50M	Assembly of intake and exhaust valves (Poka Yoke)
60K	Check the right type of intake and exhaust valve
60A	Turn valves within head for 270° 3 times (to ensure a proper seat)
60A	Holding down of the valves with 200N
60A	Moving of sealing units intake and exhaust side into position for leak test
60A	Difference mass measurement by intake and exhaust side
60A	release of measurement equipment
60A	if sealing check is OK, character "O" will be stamped
60R	Repair Station
70A	Zylinderkopf wird weiter auf 180° gewendet - turn cylinder head to 180°
70K	Check the ring of valve spring by camera system
80A	Automatic assembly of valve spring

90A	Assembly of valve retainer
100E	check of correct assembly valve spring and valve spring plates (mechanical)
100A/105A	seperation and pair wise blowing of the valve keys
100A/105A	pair wise blowing of the valve keys into loading plate (4 valve keys for 2 valves, 2 gripper, 8 cycles)
100A/105A	gripper presses down spring plate from upper side and valve keys are inserted (counter pressure with spring)
100A/105A	unclamp and raise the gripper, valve keys will be fixed by spring at the same time
110A	Laser check of the valve key assembly
110A	turn at 180° and ejecting foreign parts by shaking
110R	Repair Station
120M/121M	Assembly of hydraulic tappets an cam shafts
122M	Visual check of the valve key assembly
122M	picking up 10 screws and putting them into the cylinder head
122M	taking right cam shafts and putting down to pallet orientated to position
125A	Insert and prewind 4 spark plugs
130A	1st thightening step Ma=25Nm, seperate screwing according sequence inside out
130A	2nd thightening step: all screws at the same time with 60Nm
130A	screw in 4 spark plugs, Ma=28Nm, Mp min 20Nm
135A	Camshaft station: static distance measurement between cambase radius and upper surface line of the shaft extension diameter
135A	Cylinderhead camshaft bore diameter measurement
135A	Bottom camshaft bore and valve stem up distance measurement
145A	selecting the calculated tappets
145A	insert the tappets in the helppallet
140A	oiling tappet bore (0,96 cm ³)
140A	insert 16 choosen tappets (33 classes)
140L	Laser check existing of hydraulic tappets
150A	oiling camshaft bearing and all cams (0,3cm ³)
150A	concurrent lift up the camshafts from the palett and put them down on the cylinder head
150K	Camshaft detection station: reading idntnumber and the position of trigger wheels with camera
160A	Dispensing sealant material (Loctite 5188)

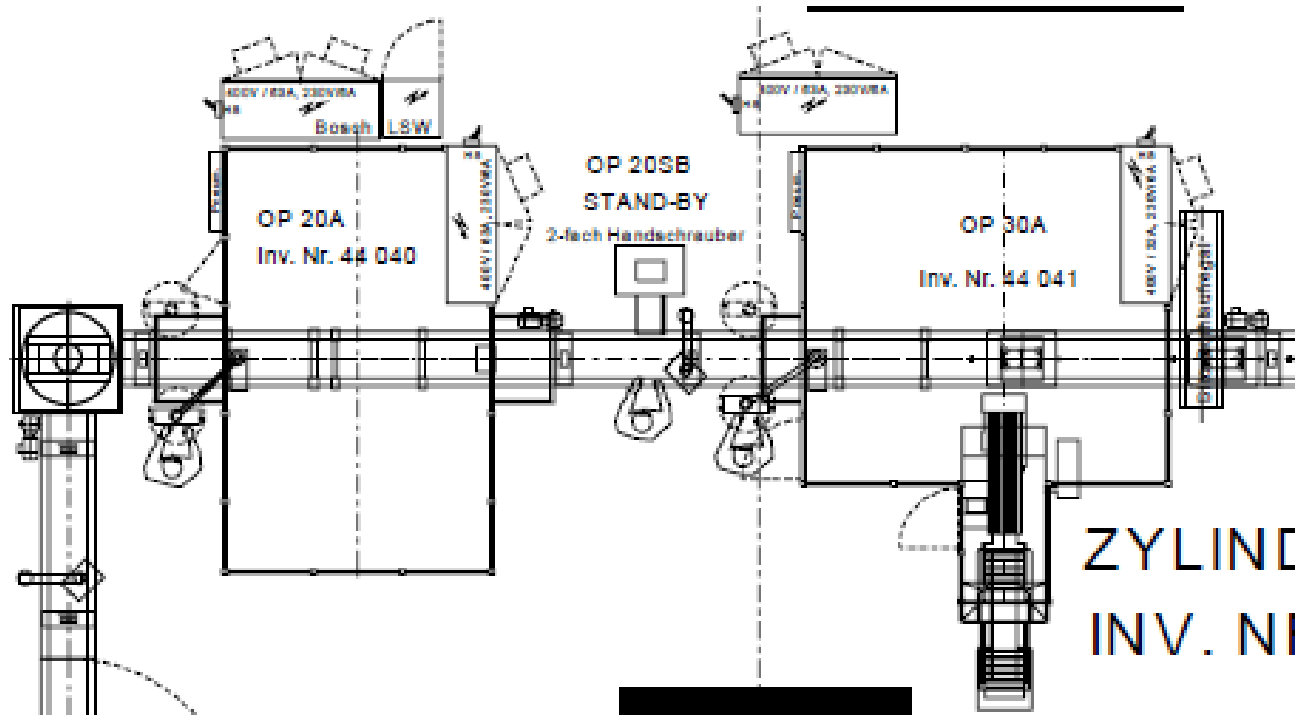
160A	Check the correct shape dispensing of sealant material by camera
160A	taking off camshaft bearing caps form pallet and put down on cylinder head
160A	fasten screws Ma=8Nm, Mp min 6Nm
160A	taking off camshaft bearing bridge form pallet and put down on cylinder head
160A	fasten screws Ma=8Nm, Mp min 6Nm
170A	Measuring of valve lash
170R	Repair Station
180A	Loosen of the 10 cylinder head screws with automatic station according to sequence
180A	Camshaft seal preassembly by Robot
180A	automatic press in the camshaft seal rings
180M	removing the 10 screws with a visual check of OK and NOK screws
180M	yellow marking of cylinder head screws
180M	check the assembled camshaft sealings (different types)
180M	check of overlapping Loctite
190A	turn the camshaft for 710°
200A	seperate the stud bolts (2 types)
200A	blowing off the stud bolts in preposition
200A	the M8 stud bolt has to be tightened with a torque of Ma 10 Nm, Mp min 8Nm
200A	check the length and position of the stud bowls +/-1,5 mm
200K	Control the numbers of Trigger wheel
200K	Control the type of spark plug
200R	Repair Station
210A	carry over the cylinder head from pallet to helppallet
210M	Check according check list: visual check
210M	manual unloading with manipulator to pallet

Details of Line-Layout:

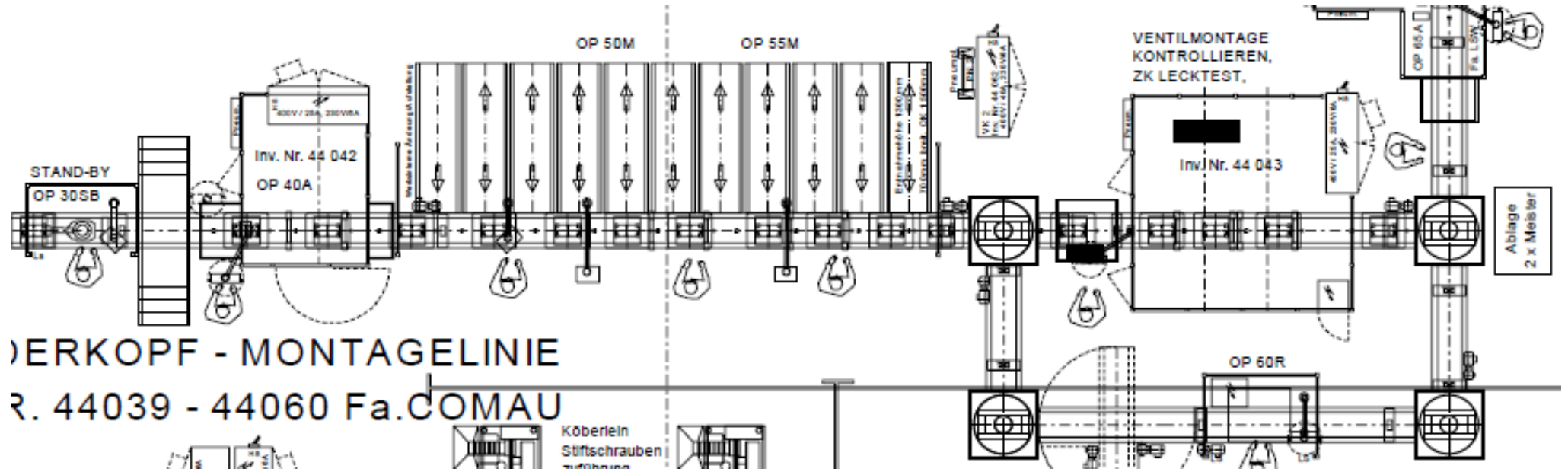
OP 10 + 15



OP 20 + 30



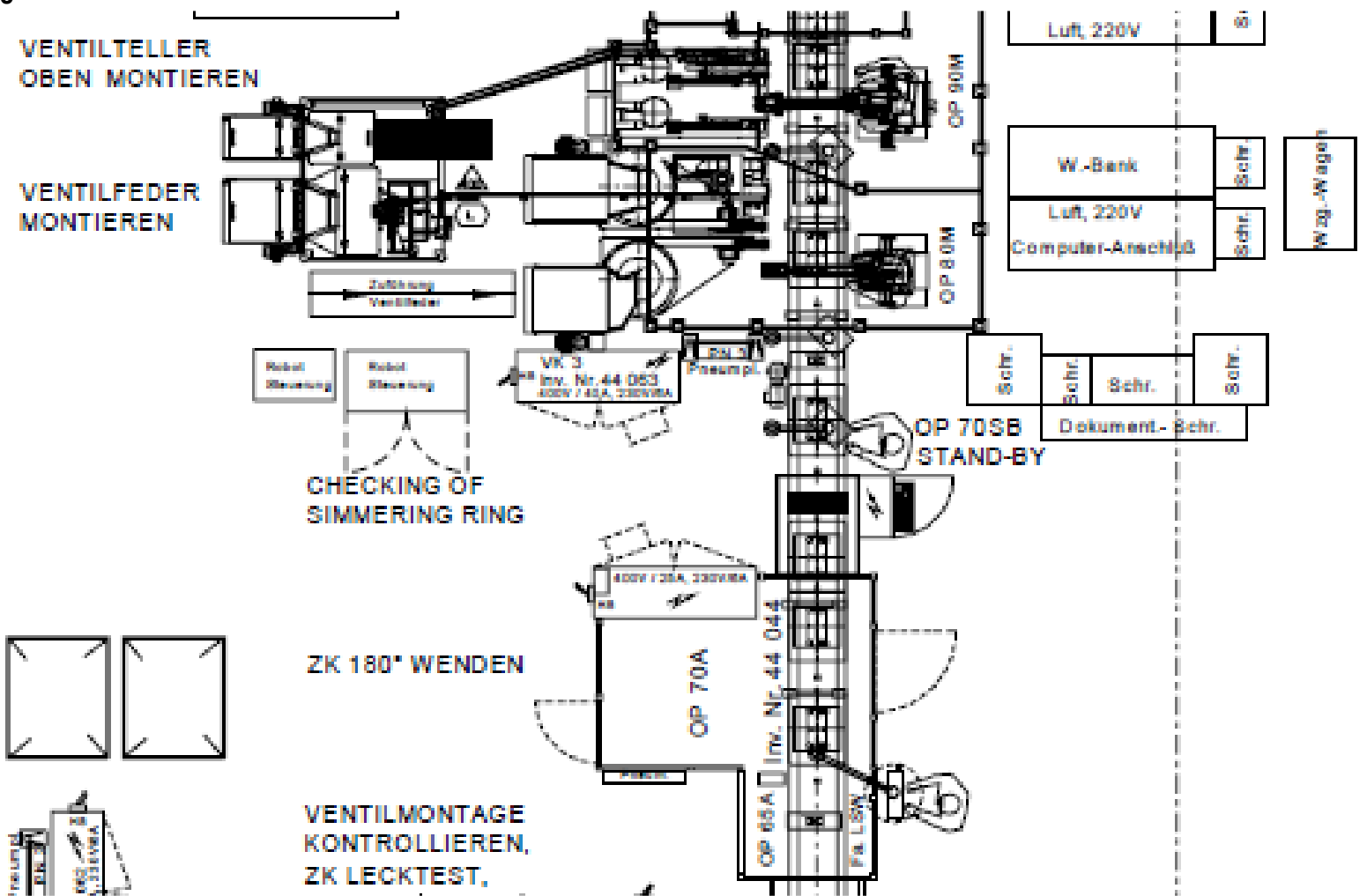
OP 30 + 40 + 50 + 60



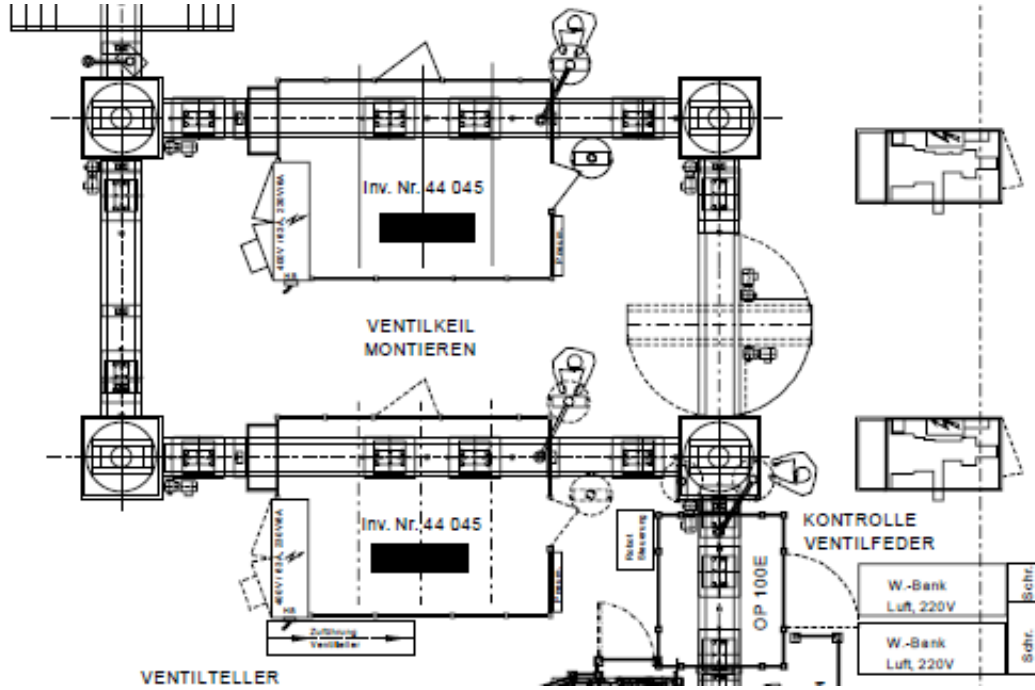
WERKOPF - MONTAGELINIE
R. 44039 - 44060 Fa.COMAU



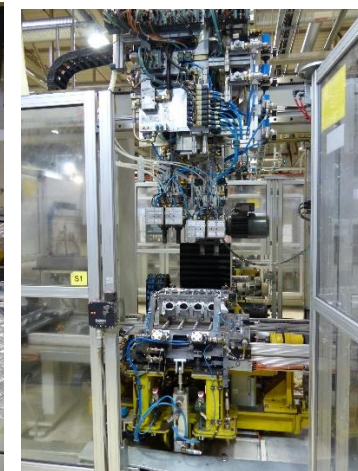
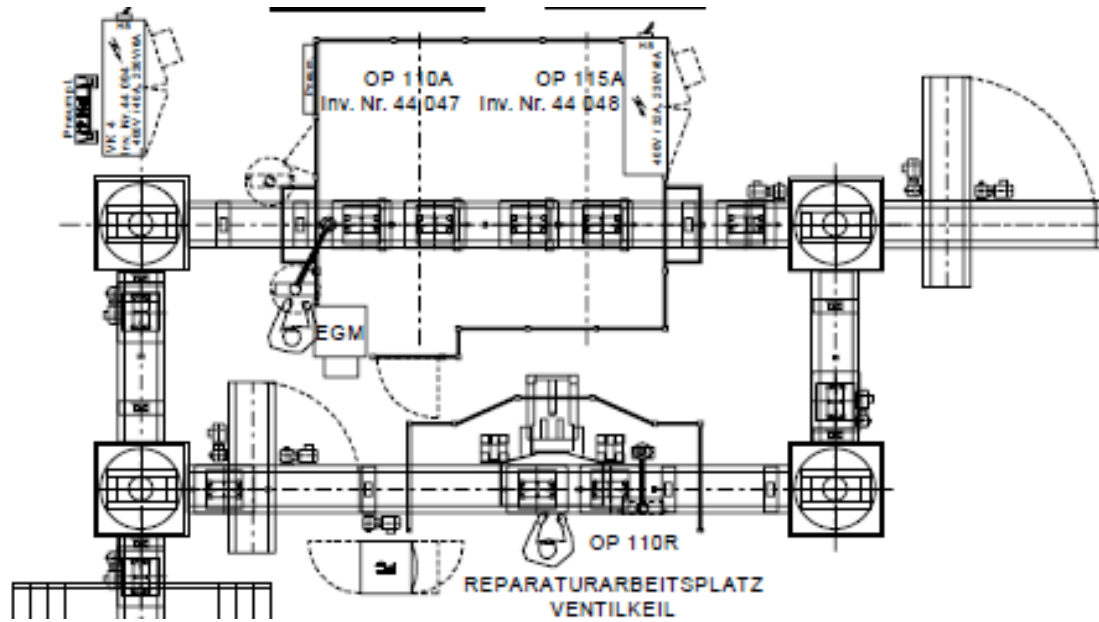
OP 65 + 70 + 80 + 90



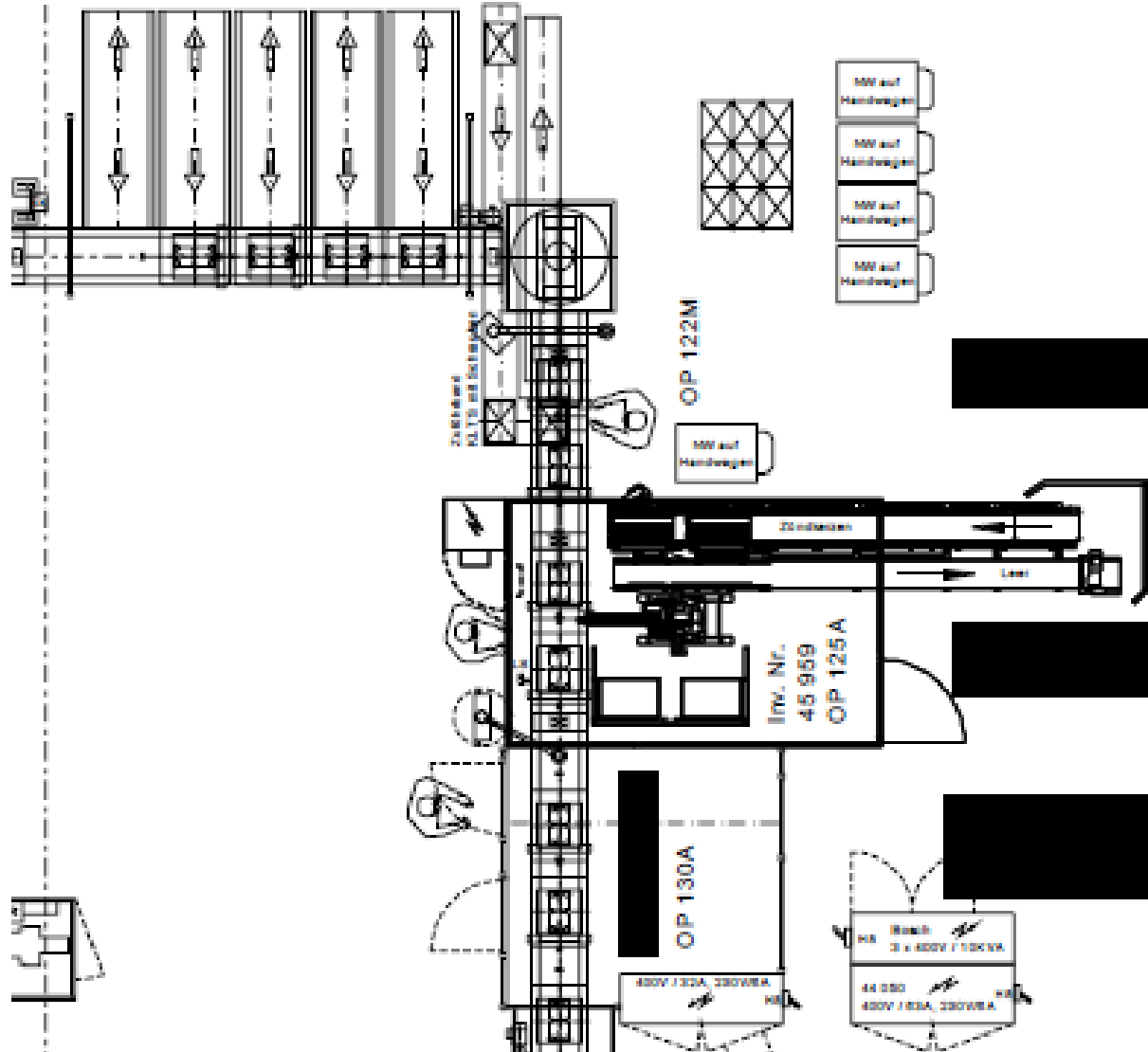
OP 100

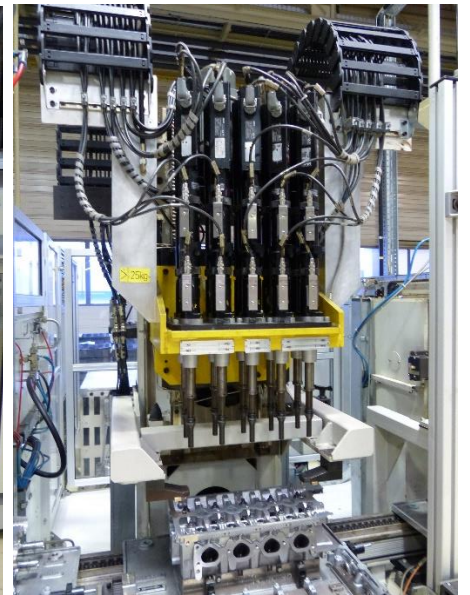
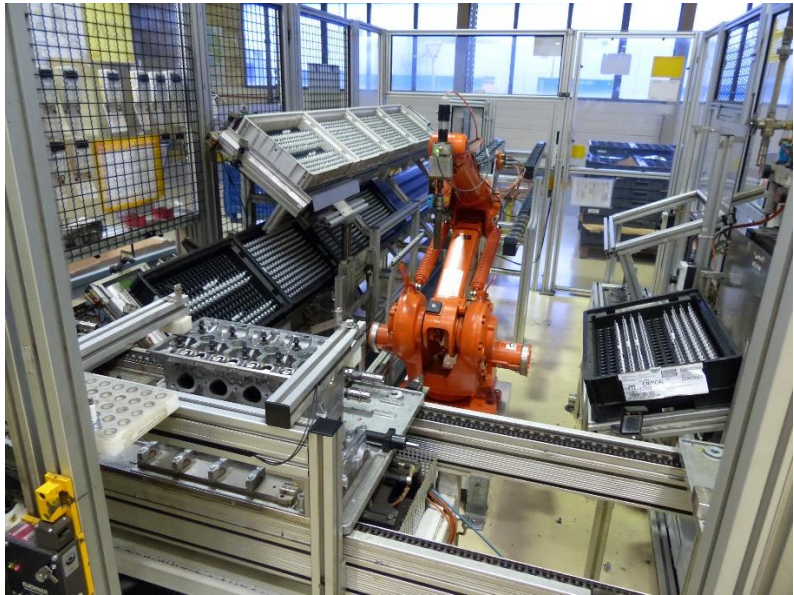


OP 105 + 110 + 115



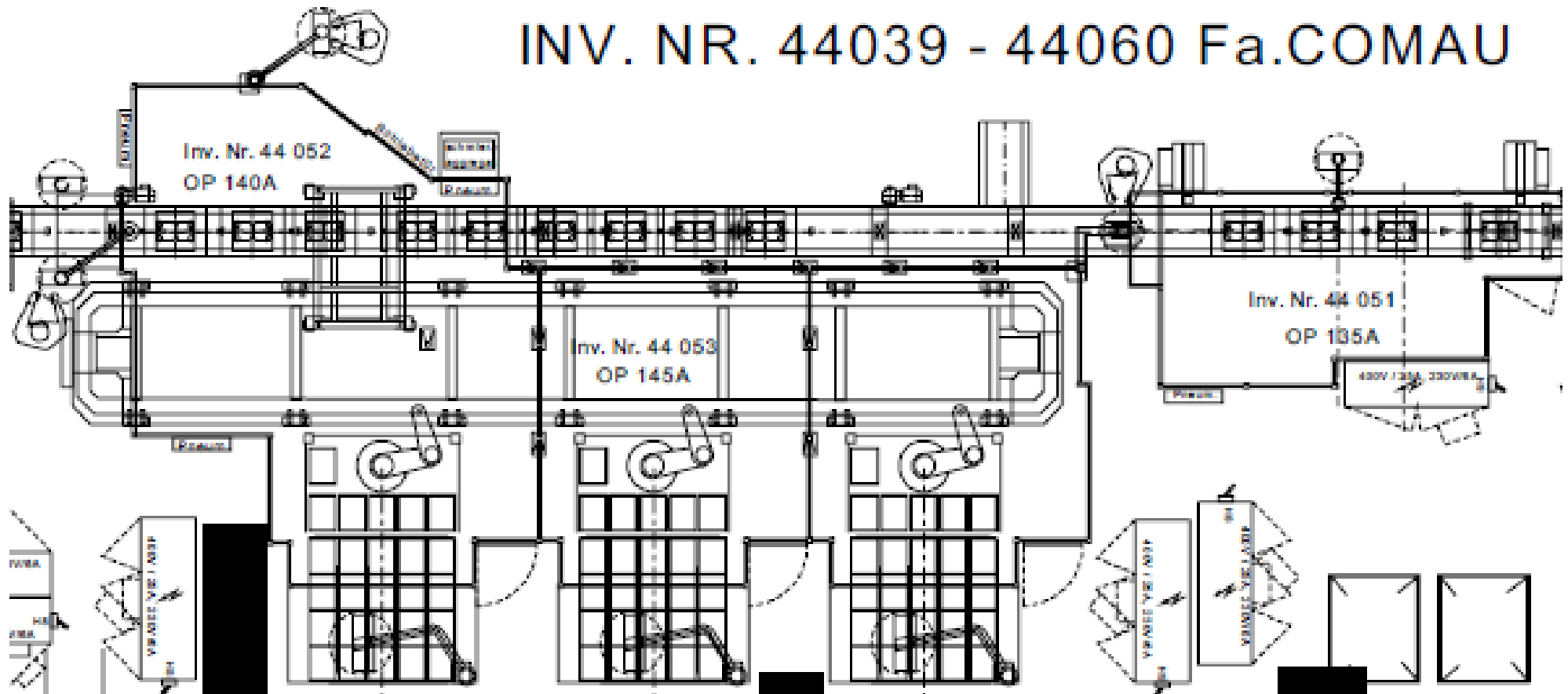
OP 120 + 125 + 130

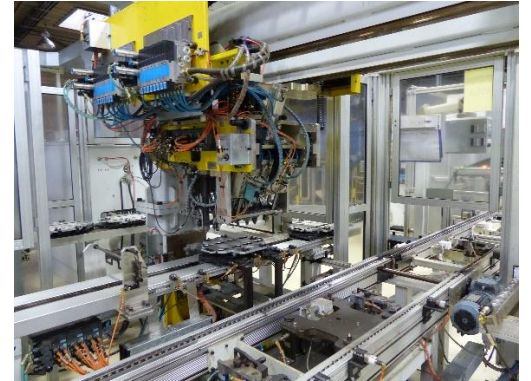
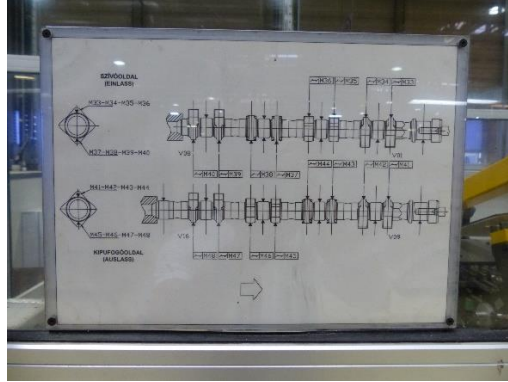




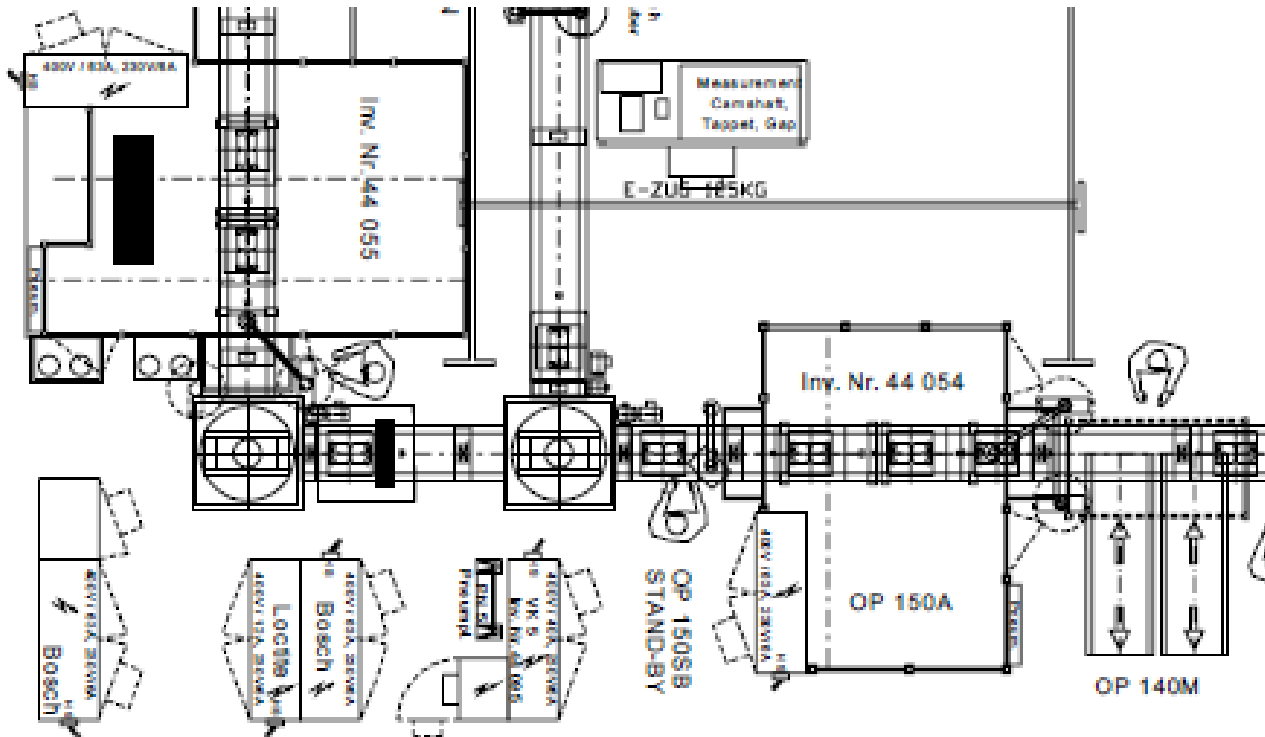
OP 135 + 140 + 145

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OP 140 + 150



OP 160 + 170

