
Contents

1	Introduction	1
2	Prefabrication in Timber Construction	3
3	Types of Manufacturing	7
3.1	Workshop Production	7
3.2	Cell Production	9
3.3	Line Production	10
3.3.1	Line through Individual Tables	10
3.3.2	Endless Table	11
4	Processes and Manufacturing Technologies	15
4.1	Material Storage and Supply	15
4.1.1	Storage and Supply of beams	16
4.1.2	Storage and Feeding of Plates	20
4.2	Upstream Material Cutting	24
4.2.1	Rod Cutting	26
4.2.2	Panel Cutting	30
4.3	Sorting, Buffering, and Commissioning	36
4.3.1	Manual Acceptance with Digital Support	36
4.3.2	Acceptance by Automated Area Portal	37
4.3.3	High-Bay Sorting Storage	38
4.3.4	Robot Sorting Cell	40

4.3.5	Comparison and Classification of Sorting and Buffering Systems	41
4.4	Internal Logistics and Material Provision	42
4.4.1	Specialized Racks and Trolleys	43
4.4.2	Individual Part Transport on Roller Conveyors, Belts, or Chain Conveyors	43
4.4.3	Driverless Transport Systems	44
4.4.4	Comparison and Classification of Systems for In-house Logistics	45
4.5	Bar Assembly Manufacturing (Wall Elements)	45
4.5.1	Manual Tensioning Table for Wall Elements	46
4.5.2	Frame Construction Station with Manual Insertion	47
4.5.3	Frame Construction Station with Robotic Insertion	48
4.5.4	Portal-Articulated Arm Robot Combination	49
4.5.5	Comparison and Classification of Systems for Truss Production	51
4.6	Framework for Roof and Ceiling Elements	52
4.6.1	Manual Tensioning Table for Roof/Ceiling Elements ...	52
4.6.2	CNC Tensioning Table with Manual Insertion	53
4.6.3	CNC Tensioning Table with Automated Insertion	54
4.6.4	Comparison and Classification of Systems for Frame Manufacturing Roof Ceiling	54
4.7	Laying of the Cladding	55
4.7.1	Manual using Vacuum Suction Cups or Needle Grippers	57
4.7.2	Remote-Controlled Manipulators	58
4.7.3	Articulated Robot with Handling Unit	59
4.7.4	Linear or Portal Robots with Handling Units	61
4.7.5	Comparison and Classification of Systems for Panel Placement	61
4.8	Attaching and Processing Cladding	62
4.8.1	Semi-Automated Clip Device	63
4.8.2	CNC Processing Portal with Tools	64
4.8.3	Articulated Robots with Tools	65
4.8.4	Linear or Portal Robots with Tools	65
4.8.5	Comparison and Classification of Cladding Attachment and Processing Systems	66
4.9	Turning	66
4.9.1	Turning using Overhead Crane or Manipulator	67

4.9.2	Turning through Two Element Tables	69
4.9.3	Turning on the Spot	70
4.9.4	Comparison of Turning Systems	70
4.10	Insulation of the Timber Frame Compartment	71
4.10.1	Manually Guided Blowing Plate on Crane or Portal ...	72
4.10.2	CNC Machining Portal with Insulation Plate	73
4.10.3	Linear or Portal Robot with Insulation Plate	73
4.10.4	Comparison of Systems for the Integration of an Insulation Plate	75
4.11	Plastering	75
4.12	Battening	76
4.13	Formwork	76
4.14	Further Digital Support Options	77
4.14.1	Touch Displays and Industrial Tablets	77
4.14.2	Laser Projection	77
4.14.3	Mixed Reality	78
4.14.4	Pick-by-Light and Pick-to-Light Systems	79
5	Digital Process and Information Flow in Timber Construction	81
5.1	Data Generation for Design and Approval Planning	83
5.2	Data Generation for Execution Planning	84
5.3	Data Generation for Production	85
5.4	Planning and Control of Prefabrication and Pre-assembly in the Factory	85
5.5	Planning and Control of Assembly and Construction Site Activities	87
6	Summary and Outlook	89
	Quellen	91