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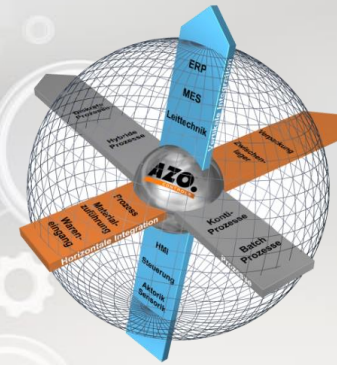


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Interdivisional competence

No project is the same as another. In order to find the optimum solution for your raw material automation, we have engineering teams with the following focuses.



- PVC-Dryblend
- Compounding
- PVC Pastes
- Personal care
- Paint / Lacquers
- Cleaning agents
- Dairy products
- Pharmaceuticals
- Convenience food
- Bakery products
- Baking mixtures
- Additive / Masterbatch
- Processing of plastics
- Additive Manufacturing
- Fine chemicals
- Basic chemicals
- Additive Manufacturing
- Confectionary
- Beverages
- Spices / Flavours
- Pet food





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Raw material analysis

Process analysis



Status analysis

Recipe analysis

Analysis

Raw material analysis

- Safety data sheets • technical data sheets • explosion data • raw material analysis • preparation and documentation of product data



GHS Label elements, Pictogram	Indicators of special risks H-Phrases	Security advice S-Phrases	Additional hazard characteristics and label elements Eh-Phrases	Hazard (statement) H000 - Physical hazards	Hazard (statement) H000 - Health hazards
	<p>H200 - May cause severe eye irritation. May impair visibility.</p> <p>H201 - Corrosive metal of concentrated solution.</p> <p>H202 - Corrosive metal of concentrated solution or solid content.</p> <p>H203 - May cause severe eye irritation.</p> <p>H204 - May cause severe eye irritation.</p> <p>H205 - May cause severe eye irritation.</p> <p>H206 - May cause severe eye irritation.</p> <p>H207 - May cause an allergic reaction.</p> <p>H208 - May cause an allergic reaction.</p> <p>H209 - May cause an allergic reaction.</p> <p>H210 - May cause an allergic reaction.</p> <p>H211 - May cause an allergic reaction.</p>				

This is a detailed technical data sheet table with multiple columns and rows of data. The table is organized into sections, with some columns highlighted in red and others in blue. The data includes various chemical and physical properties, likely related to the raw material analysis mentioned in the slide.

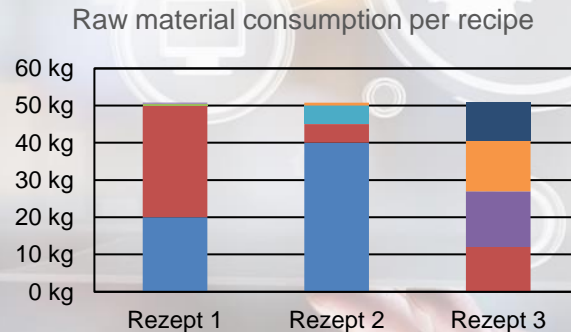
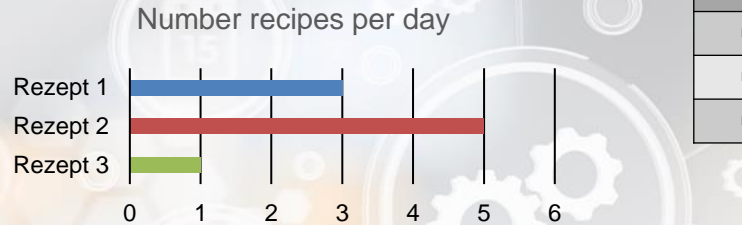
Recipe analysis

- Recipe varieties • structure • components • cross-contamination recipes • necessary dosing capacities • annual throughput

Recipe 1	3x per day
Raw material 1	20,00 kg
Raw material 2	30,00 kg
Raw material 3	0,50 kg
Raw material 4	0,30 kg
Total	50,80 kg

Recipe 2	5x per day
Raw material 1	40,00 kg
Raw material 2	5,00 kg
Raw material 5	5,00 kg
Raw material 6	0,80 kg
Total	50,80 kg

Recipe 3	1x per day
Raw material 2	12,00 kg
Raw material 4	15,00 kg
Raw material 6	13,50 kg
Raw material 7	10,30 kg
Total	50,80 kg



- Rohstoff 1 ■ Rohstoff 2 ■ Rohstoff 3 ■ Rohstoff 4
- Rohstoff 5 ■ Rohstoff 6 ■ Rohstoff 7

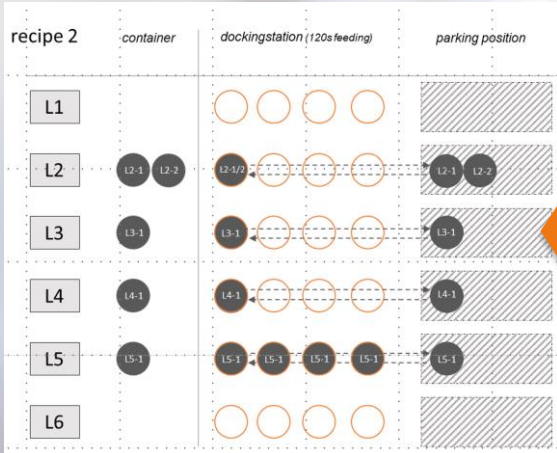
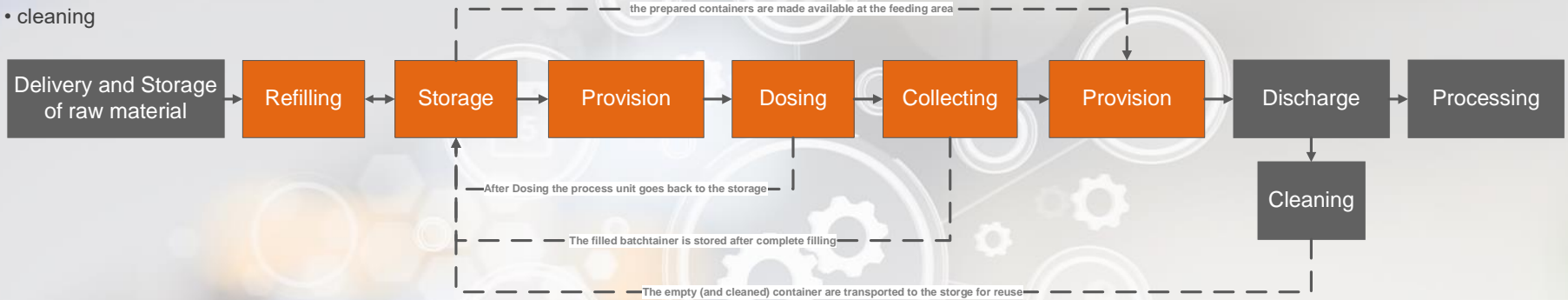
Mixer type	Mixer occupancy / day			
mixer 1	recipe 2	recipe 2	recipe 1	
mixer 2	recipe 1	recipe 1	recipe 2	recipe 2
mixer 3	recipe 2	recipe 3		



Summary	Sum / day	Access / day	sum/h	Sum/a
Raw material 1	260,00 kg	8		
Raw material 2	142,00 kg	9		
Raw material 3	1,50 kg	3		
Raw material 4	15,90 kg	4		
Raw material 5	25,00 kg	5		
Raw material 6	4,00 kg	6		
Raw material 7	10,30 kg	1		

Process analysis

- Bin type / -size • addition time • media • material flows / personnel
- cleaning



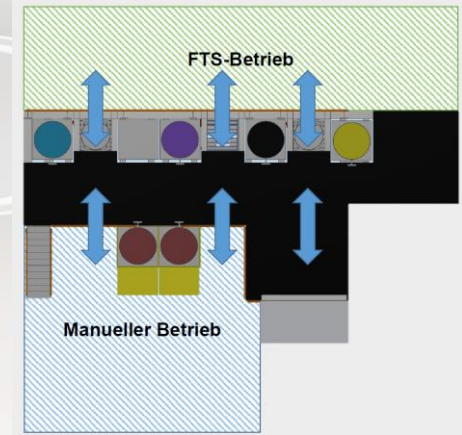
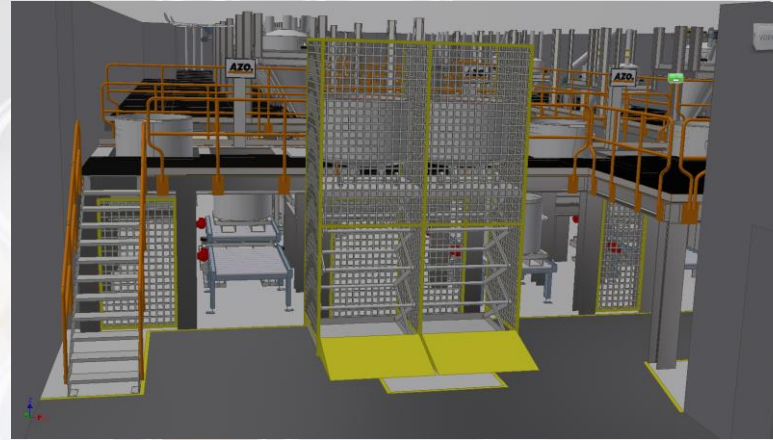
Material flow / driving course

recipe	load	source (start)	lower (target)	(part)-route x-direction	(part)-route y-direction	load	positioning accuracy	number/30min	walling time source (feeding time)
R1-x	L1-x	from	to	m	m	kg	± mm	n/30	s
R2	L1	no Container							
	L2	Co1 DO1	Co1 C	50	12	300	10	1	120
		Co1 C	Co1 DO1	50	12	100	10	1	0
		Co2 DO1	Co2 C	50	12	300	10	1	120
		Co2 C	Co2 DO1	50	12	100	10	1	0
	L3	Co1 DO1	Co1 C	50	18	300	10	1	120
		Co1 C	Co1 DO1	50	18	100	10	1	0
	L4	Co1 DO1	Co1 C	26	5	300	10	1	120
		Co1 C	Co1 DO1	26	5	100	10	1	0
	L5	Co1 DO1	Co1 DO2	6	2	300	10	1	120
		Co1 DO2	Co1 DO3	2	2	300	10	1	120
		Co1 DO3	Co1 DO4	2	2	300	10	1	120
		Co1 DO4	Co1 C	20	5	300	10	1	120
		Co1 C	Co1 DO1	26	5	100	10	1	0
	L6	no Container							



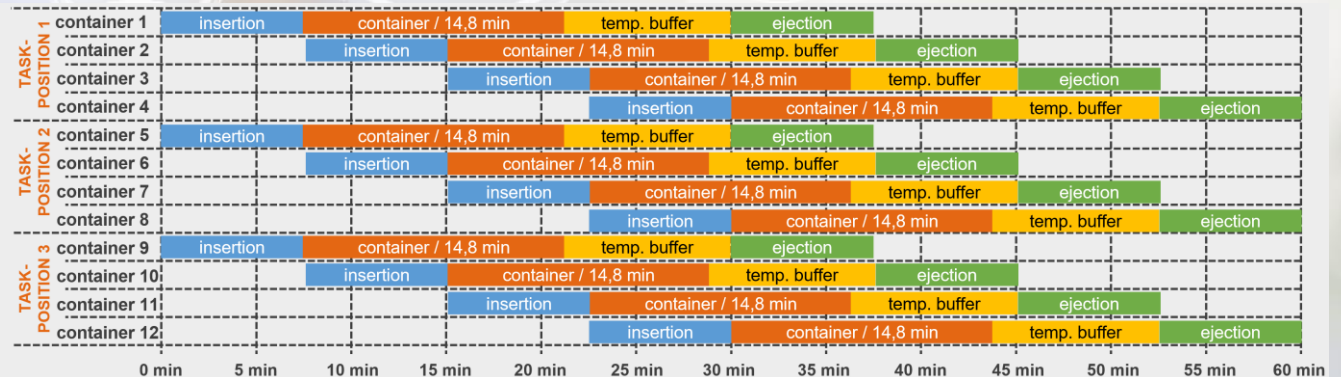
Process analysis

- Bin type / -size • addition time • media
- material flows / personnel • cleaning



„container“- insertion

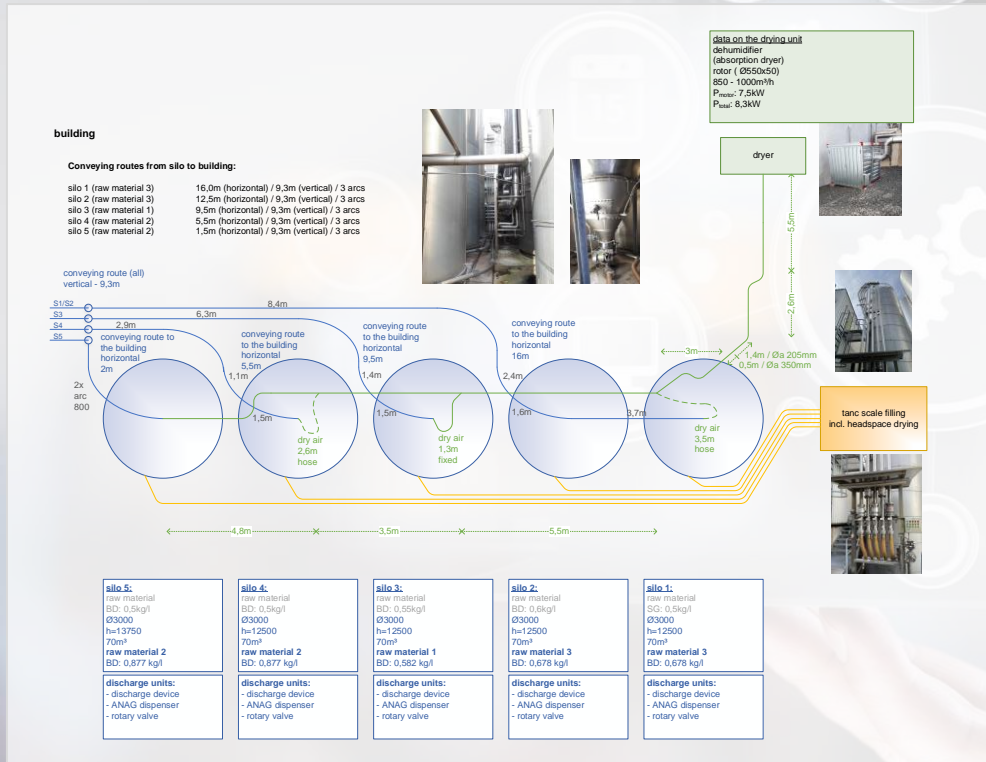
- (1) „container“-task
 - set container on roller conveyor ~ 30 seconds
 - identification RFID ~ 15 seconds
 - travel way on lift table ~ 30 seconds
- (2) „container“-feeding
 - lift table up ~ 15 seconds
 - taring scale ~ 5 seconds
 - raw material display terminal ~ 30 seconds
 - collection of raw materials/ kardex warehouse ~ 45 seconds
 - request Kardex to output ~ 30 seconds
 - return to the station ~ 180 seconds
 - addition in „container“ / incl. paste container registration encore ~ 5 seconds
- (3) „container“-providing
 - Hublisch nach unten ~ 15 seconds
- (4) „container“-pickup
 - pickup by agv ~ 60 seconds



total time „container“-instertion ~ 460 seconds

Status analysis

- Equipment • building • control engineering • process / safety



Category	no 0204.0017	Forecast	Phase 1a	Phase 1b	Reinigungszeit
Gesamtvolumen	4.761,93	3.350,00	2.361,52		
Anzahl Aufträge	952	476	476		
Gesamtvolumen SOLL	4.761,93	3.350,00	2.361,52		
	900	477	477		
	3 Linien	1 Linien	2 Linien		
Fabrikzeit	4502 h	2185 h	2185 h		
Produktionszeit	1262 h	2121 h	2121 h		
Fabrikzeit (bei Verteilung)	1500 h	1395 h	1395 h	pro Linie	
Produktionszeit (bei Verteilung)	826 h	2121 h	2121 h	pro Linie	
Kategorie 2	56,9% → 2.640,50		601,06 kg/h	→ 400 kg/h	400
Kategorie 3	15,7% → 706,50		165,89 kg/h	→ 400 kg/h	400
Kategorie 4	25,1% → 679,50		199,51 kg/h	→ 400 kg/h	400
Möglichkeit 1	3.350,00 t/a				
Möglichkeit 2	2.640,50 t/a				

Category	no 0206.0017	Forecast	Phase 1a	Phase 1b	Reinigungszeit
Gesamtvolumen	831,79	1.000,00			
Anzahl Aufträge	64	23			
Gesamtvolumen SOLL	831,79	1.000,00			
	115	12			
	1 Linien	1 Linien			
Fabrikzeit	460 h	92 h			
Produktionszeit	300 h	268 h			
Fabrikzeit (bei Verteilung)	460 h	92 h			
Produktionszeit (bei Verteilung)	300 h	268 h			
Kategorie 2	20,9% → 846,00		102,83 kg/h	→ 1000 kg/h	1000
Kategorie 3	21,7% → 1.098,00		204,72 kg/h	→ 1000 kg/h	1000
Kategorie 4	60,9% → 3.045,00		514,51 kg/h	→ 1000 kg/h	1000
Möglichkeit 1	9.648,00 t/a				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	Produktionsphilosophie			2 d		Forecast	15.500,00							
3				S d		IST (2016/17)	6.733,49							
4				48 w		Möglichkeit 1	9.442,50			2.709,01				
5				5760 h (Prod.std)		Möglichkeit 2	8.636,25			1.902,76				
6														
7														
8						ist (2016/2017)								7 h
9	Gesamtvolumen IST (2016/2017)			6.701,96	to	1 Linie	3.350,00	to						
10	Anzahl Aufträge			579			290							
11														
12	Gesamtvolumen SOLL			Forecast 2023		Phase 1a	3.350,00			Phase 1b				
13				6.000,00			290			2.361,52				
14				519			250			250				
15							3 Linien			1 Linien				2 Linien
16	Fabrikzeit			3633 h			2030 h			2030 h				
17	Produktionszeit			2127 h			2730 h			3730 h				
18														
19	Fabrikzeit (bei Verteilung)			1211 h			2030 h			1015 h				pro Linie
20	Produktionszeit (bei Verteilung)			4549 h			3730 h			4745 h				
21														
22														
23	Kategorie 2			29,2% → 1.752,00			385,14 kg/h			650 kg/h				
24	Kategorie 3			20,6% → 1.236,00			271,71 kg/h			400 kg/h				400
25	Kategorie 4			48,5% → 2.910,00			639,70 kg/h			650 kg/h				650
26														
27	Möglichkeit 1			2.426,50	to									
28	Möglichkeit 2			4.982,25	to									
29														



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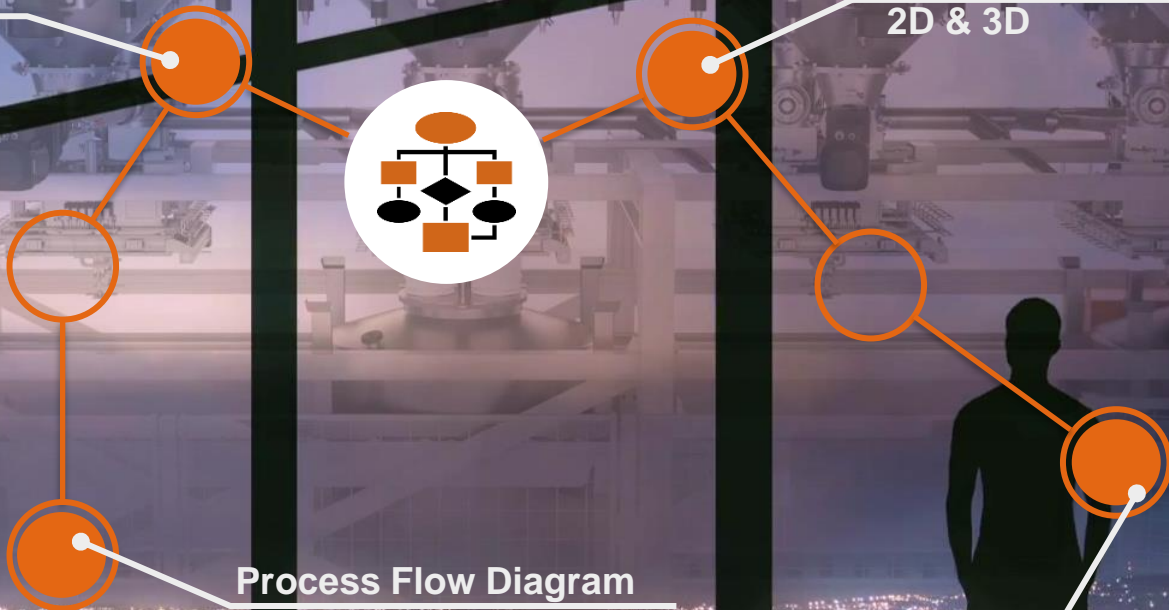


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Block diagrams

Layout planning
2D & 3D



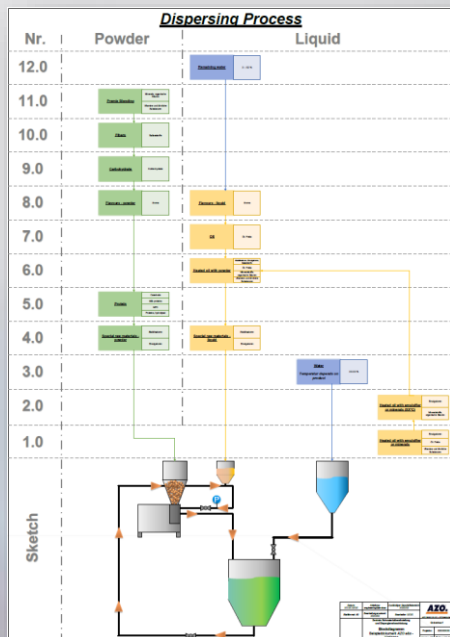
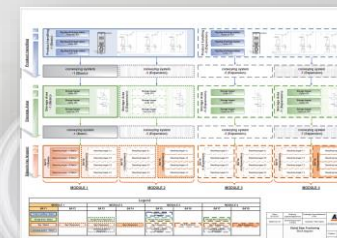
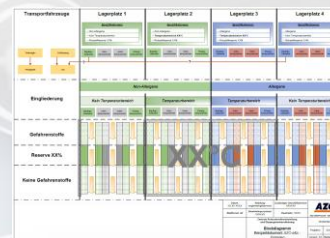
Process Flow Diagram

Conceptual design

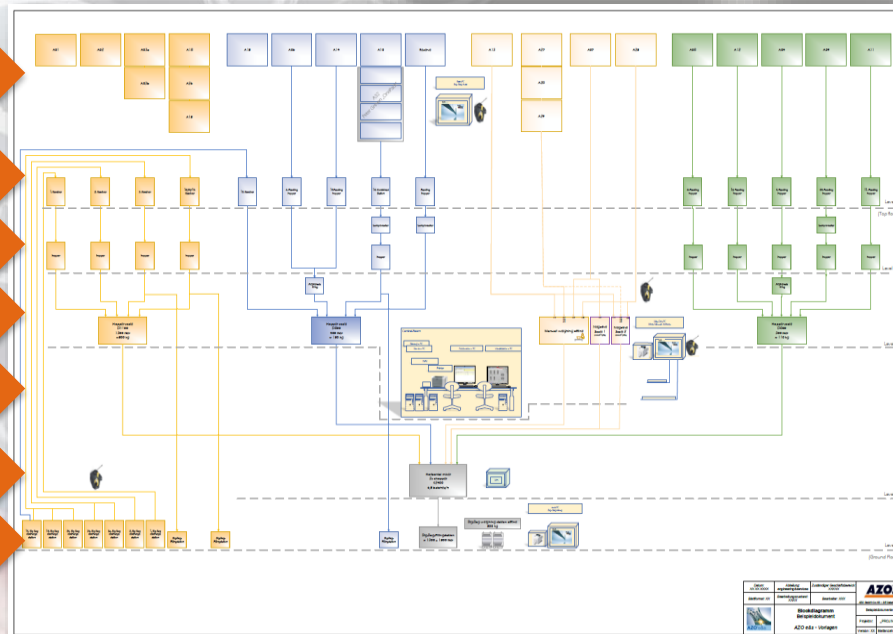
Piping & Instrumentation
Diagram www.azo.com

Block diagrams

- Rough-/ detailed planning • prioritization information flow • storage areas
- production areas • zones • roads-, & transport routes • logistics
- personnel • interfaces

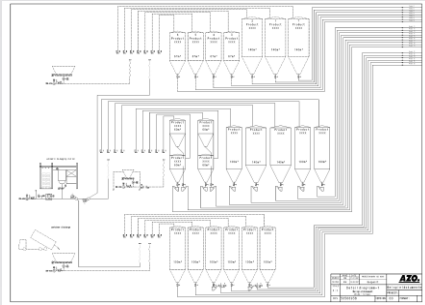


- Raw materials
- Product pick up
- Product storage
- Weighing (automatically & manually)
- Operator station
- Mixing
- Filling

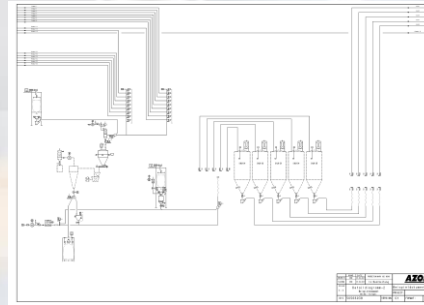


Process Flow Diagram (PFD)

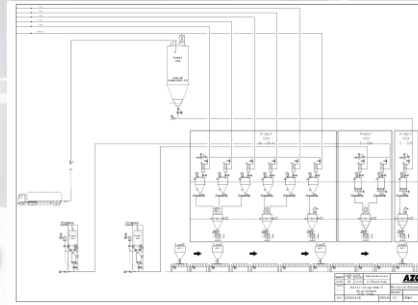
- Process flow • components & structure • schematic illustration
- detailed illustration



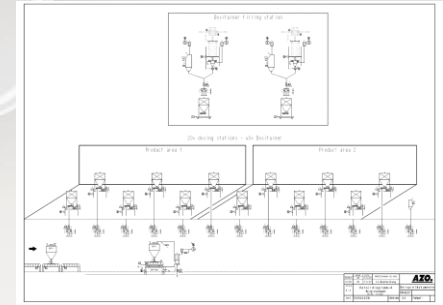
Silos



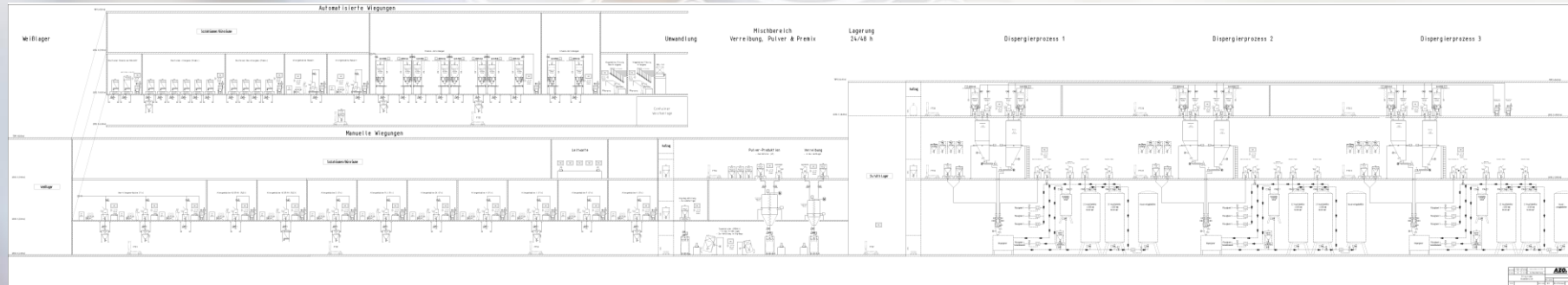
Day bins



Container handling



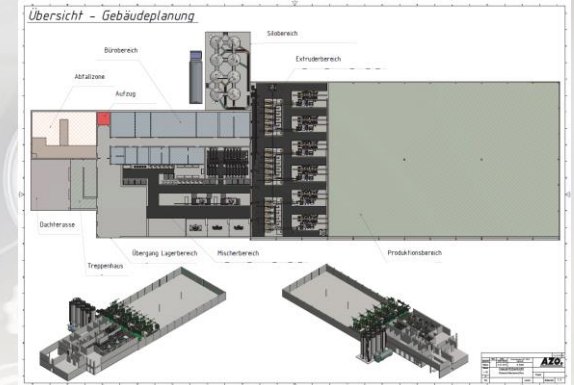
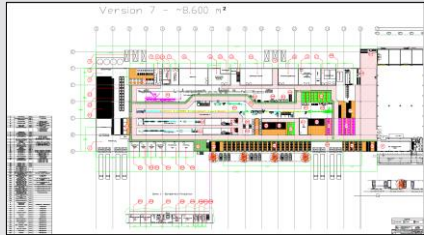
Componenter



Plant design / Allergen handling

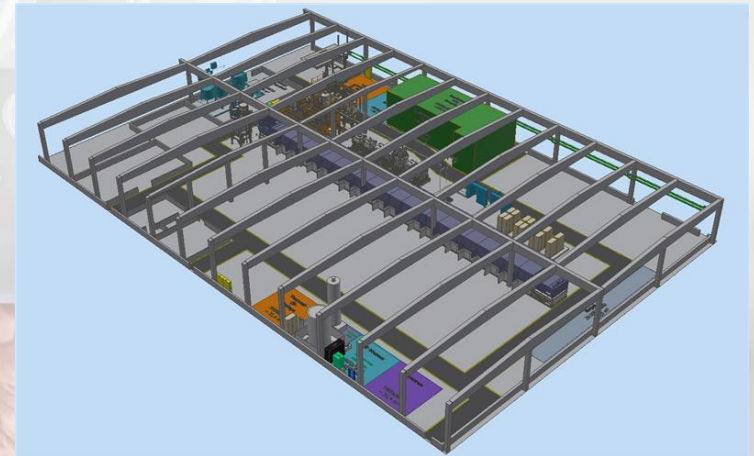
Layout planning 2D

- Components • integration existing building
- personnel • material flows • stock sizes
- maintenance rooms • needed production area



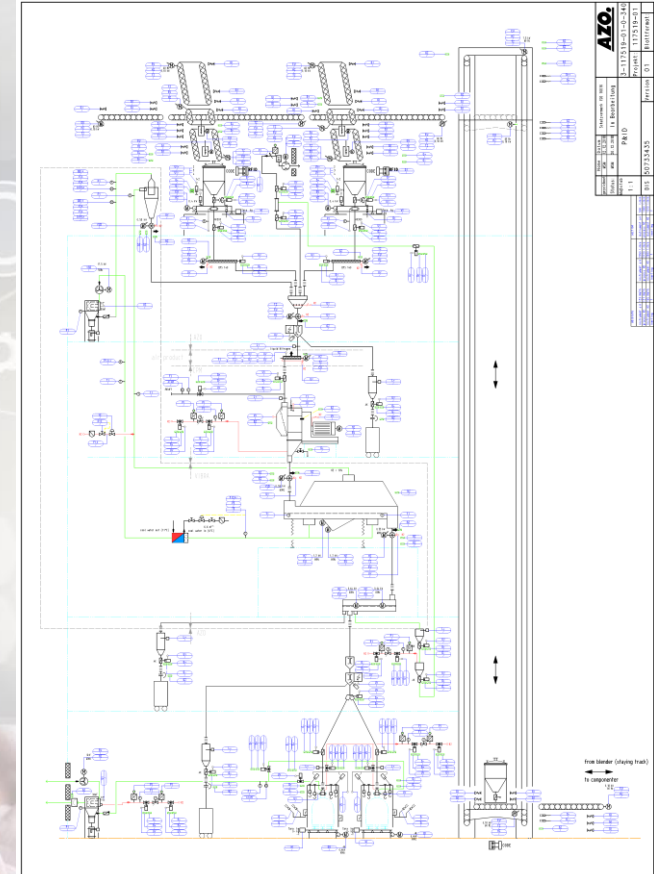
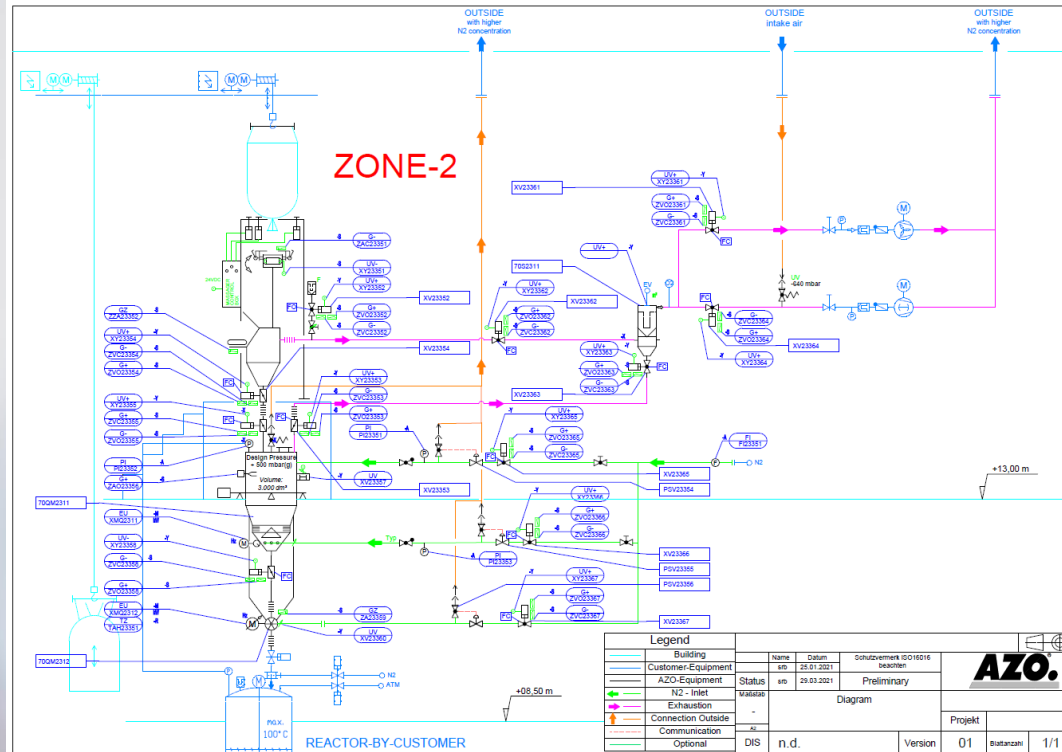
Layout planning 3D

- Production system • area specific illustration • detailed heights • placing of equipment •
- analysis of problematic area • penetration & load plans



Piping & Instrumentation Diagram (P&ID)

- detailed process flow • EMSR-symbols • defined construction sizes & components
- mechatronical dependences





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Media evaluation

Surface planning

Interface evaluation



Requirement
planning

Media

Status analysis

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Media evaluation

- characteristic of process relevant media
- examination existing media

Interface evaluation

- existing equipment
- synchronization new systems

Requirement- & surface planning

- Guarantee supply
- communication suppliers
- consideration maintenance
- spare parts

Consumption list

- Connection values
- consumption values
- detailed presentation of individual values



Voltage supply:		
Protection class:	IP55	
Operating voltage:	415 Volt AC 50 Hz	
First stage	installed	nominal
Motor drive	700 kW	450kW
cooling unit (E2151)	48 kW	40kW
cooling unit (E2152)	90 kW	50kW
Pump capacity	18 m³/h	18m³/h
Motor	100kW	100kW
second stage	847 kW	162kW
Motor drive (IMAD00)	110kW	100kW
cooling unit (E2153)	48 kW	10kW
cooling unit (E2154)	90 kW	20kW
cooling unit (E2155)	77 kW	20kW
Pump capacity	18m³/h	18m³/h
total power	740 kW	700 kW
Motor drive (IMAD00)	220kW	220kW
total connection	220kW	220kW
Total connection Power:	1010kW	630kW

Compressed air supply:		
planetary roller extruder (metal detection)	Necessary air pressure:	min. 5 bar (1-5bar)
	Necessary air amount:	0.005 m³/h
		0,5 bar switching pressure, 0 compressed from 0-10 switch per hour
single screw extruder (Extruder) (outer cooling)	Necessary air pressure:	min. 2 bar
	Necessary air amount:	3,3 m³/h

Cooling water supply:	
Cooling water supply temperature:	13 - 15 °C
Cooling water supply requirements (temporing only):	85 m³/h

Voltage supply:		
Protection class:	IP 54 / IP55	
Operating voltage:	415 Volt AC 50 Hz	
Combined capacity:	955 kW	
nominal capacity:	55 kW	
nominal capacity:	1,5 kW	
nominal capacity:	0,5 kW	
total connection Power:	433 kW	
switching at the same time:	415 kW	

Compressed air supply:	
Necessary air pressure:	min. 6 bar
Necessary air amount:	22 m³/h

Cooling water supply:	
Cooling water supply temperature:	13 - 15 °C
Cooling water supply requirements (temporing only):	82 m³/h

COOLING WATER SPECIFICATION			
Maximum pressure	max. pressure (at 20°C)	Bar	5
Flow rate	nominal flow rate	m³/h	12
Temperature	inlet	°C	13
	outlet	°C	15
Water quality	Hardness	°dH	180
	Calcium	mg/l	180
	Magnesium	mg/l	180
	Total hardness	mg/l	360
	Chloride	mg/l	1000
	Sulfate	mg/l	1000
	Iron	mg/l	0,05
	Copper	mg/l	0,05
	Zinc	mg/l	0,05
	Other ions	µm	100
	Other ions	µm	100
Maximum recommended water flow to avoid cavitation			
Maximum pressure	max. pressure (at 20°C)	Bar	5
Flow rate	nominal flow rate	m³/h	12
Temperature	inlet	°C	13
	outlet	°C	15
Water quality	Hardness	°dH	180
	Calcium	mg/l	180
	Magnesium	mg/l	180
	Total hardness	mg/l	360
	Chloride	mg/l	1000
	Sulfate	mg/l	1000
	Iron	mg/l	0,05
	Copper	mg/l	0,05
	Zinc	mg/l	0,05
	Other ions	µm	100
	Other ions	µm	100

Decisions on these values are necessary before any final design or approval and also to the Member of the AZO Group who is responsible for the technical specifications.



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System- and functional
description

Safety-relevant
documents

Status equipment



3D-Photo
documentation

Retrofit

VR-Visualization

Design Base

Documentation

3D-Scan / Laserscan

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Design Base

- General project information • general site information
- system specific parameters • communication interfaces

System description

- System overview • short description • detailed description

Functional description

- Mechanical system functions • control functions

Safety relevant documents

- Risk assessment • safety relevant evaluation (dust-ex)

Status equipment

- Dimensional/photo recording • customer specific documentation • integration in existing and further project planning

Retrofit

- Preparatory works for control and mechanical Retrofit
- customer specific processing

3D-Photo documentation

- 3D-Scan-technology • service and project content
- customer specific processing

8. Prozesszeiten

Die Prozesszeiten definieren die genauen Zeitintervalle der jeweiligen Komponenten zur Beschickung des Mischers und Homogenisierhilos. Außerdem wurde die bestehende Abfüllanlage analysiert.

8.1. Mischerbeschickung

Die Auslegungsgrundlagen und Zeitintervalle beziehen sich auf eine definierte Rezeptur. Wenn diese Intervalle eingehalten werden, wird die theoretische Jahresproduktion von 5.000 t_a erreicht. Berechnet wurden die Zeitintervalle bei einem 2-Schicht-Betrieb bei 4.000 Arbeitsstunden pro Jahr.



8.2. Beschickung Homogenisierhilos

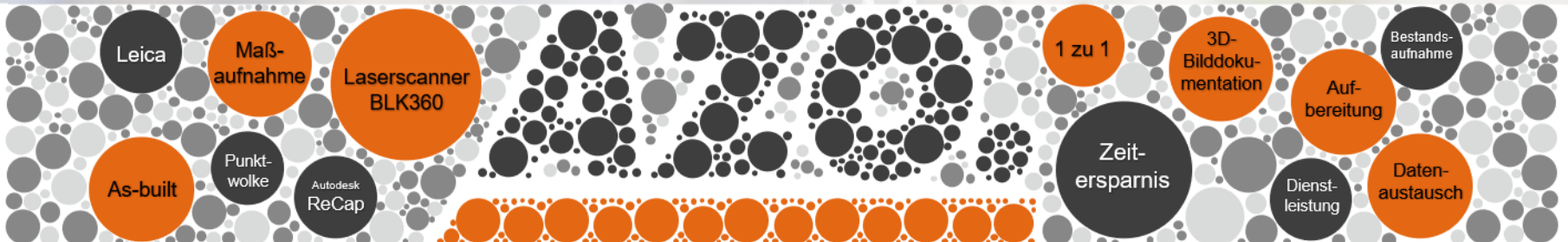
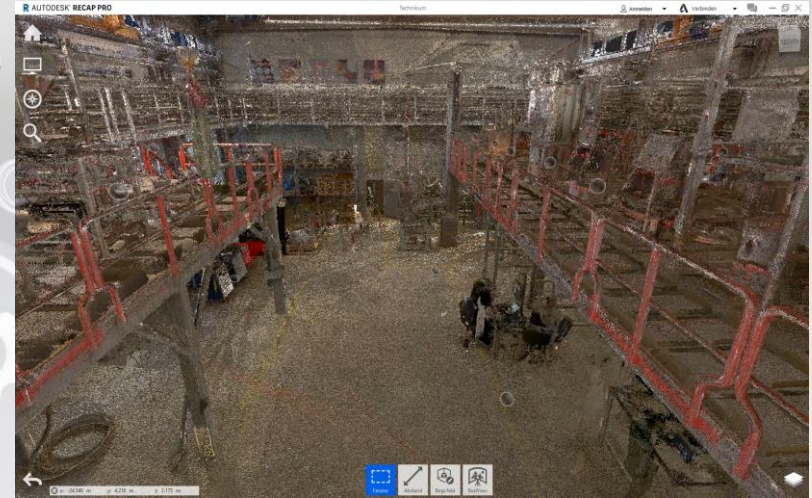
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3D-Scan

By the acquisition of a 3D laser scanner this procedure was significantly simplified. By means of a laser-based scan system a high-quality measurement in form of a point cloud can be generated which visualizes the system, building, equipment and interfering contour with the support of photo material.

- Low time effort for a complete, system specific (photo-) documentation
- Digital „As-built“ – status of the scanned object
- Minimization of risk with status measurement concerning completeness
- Planning safety with plant expansion and –modernization
- Automatic generating of 360° view as additional derivation of the point cloud
- Comprehensive basis for documentation, planning- and training purposes
- Optimum basis for presentations and marketing purposes





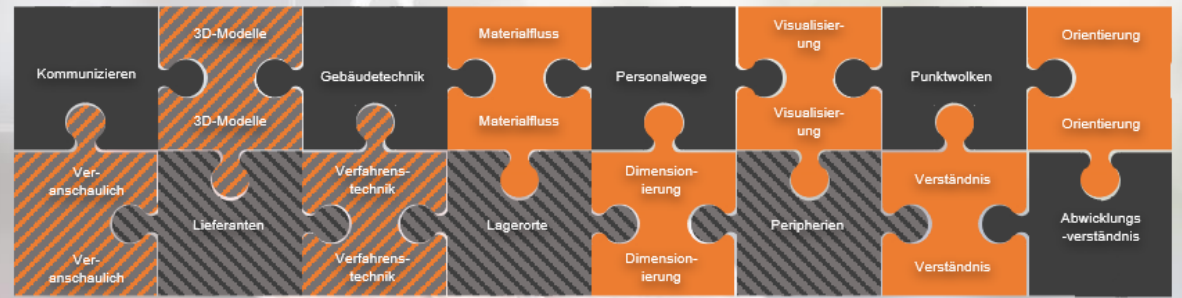
Virtual Reality

„...the depiction and parallel perception of reality and its physical characteristics in a computer-generated, interactive virtual surrounding in real time....“

- System planning on a very high base level
- Interdisciplinary discussion contents
- Stationary VR unit / mobile VR system for optimum customer support

New chances for our customers:

- System can be entered and reviewed even before installation (customer, AZO)
- Components and equipment can be entered visually in order to observe and understand the interior areas better
- System parts can be marked, relocated and evaluated concerning the existing space
- Employee training can be carried out even before commissioning



E&S Services

AZO Engineering Services 1200

Virtual reality at AZO

Computer-generated, interactive virtual exploration of 3D models

Virtual environment
Design and planning
System visualisation
Discussion tool
Mobile and stationary
Visualisation

The task in hand
 It goes without saying that we and our customers put a great deal of effort into ensuring that we can only give a virtual spatial understanding of the situations using devices we transfer offer you the opportunity to dive into the virtual world and discover and experience the system and its surroundings for yourselves. VR technology presents a wide scope which can be used as a basis for training device information.

The solution
 AZO offers a number of variants for depiction, ranging from the stationary VR unit at AZO's site to mobile, wireless VR systems that we use at your premises. We take the perfect format for your VR presentation, whether it's for larger numbers of participants or relatively small groups, at your company headquarters or on-site at AZO. It is advisable to inform your employees early about changes.

especially changes to processes, new systems and changing concepts, and to involve them in the process, into increasing acceptance and helps counteract any misconceptions.
 Full depiction incorporating:
 + Architecture services
 + Process facilities
 + Systems for peripheral processes
 + Components
 + Point cloud mass using 3D scans

SERVICES

3D-Objekte
AZO 3D Objects
VIRTUAL REALITY
 Visualisierung
 VR
 Brillle
 Controller
 Point cloud
 Wolk
 Visualization

Operating principle
 The 3D data are converted into a suitable format in advance, if required, and then displayed in the VR program directly on the computer. The projection environment then appears, and the operator can "step" to the desired points of interest using the controller. The system can also be controlled in first-person view using the fly setting on the controller. This gives an overview of the system, allowing movements through it to specific areas of interest.

It is possible to see through components and equipment to consider internal regions in more detail. Subsequently, they can also be accessed and moved.

Our team of experts is always working on new features for VR visualisation at AZO.

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AZO®e&s

Pre-Engineering, Proofs of Concept & Feasibility Studies all from a single source

Analyses
Conceptualisation and Planning
Potential Media Consumption
Technology Management
Documentation
Visualisation

Our mission
 As one of the most experienced manufacturers of plants and systems for automatic materials and processes handling, we know exactly what the number one priorities are when developing production facilities that are visible for the future.
 Our engineering team, composed of AZO experts, will support you with services relating to a multitude of questions on plant engineering and construction and making something out of effective use of your production plans.

We deliver solutions
 We provide proofs of concept, conduct feasibility studies and analyse your processes. At the same time, comprehensive project management services are also available to you, as are individual planning and development packages. Likewise, we can research suitable process technologies on your behalf.
 Our comprehensive understanding of production processes in the sectors of food, pharmaceuticals, chemicals and plastics guarantees our ability to develop tailored solutions for you. A main

focus of our work is retrofit: plant refurbishment, expansion of existing plants, bringing control engineering up-to-date and in compliance with requirements. We can assist you by using our individual 3D laser scans of your site for realistic planning of plants. We can conduct a survey of the current situation for you, support you in establishing the basis for the control system and in updating plant documentation. The focus is always firmly on keeping plant maintenance on a minimum and securing the continuity of production.

SERVICES

Greenfield
AZO Brownfield
PRE-ENGINEERING
Retrofit
Point-cloud Wolk
VR
As-Built Modell

4 Business Divisions – 1 collaborative engineering

Methods of representation and visualisation improve understanding and are the guarantee for a result that matches expectations exactly

AZO Engineering Services 1100

3D Laser scan as basis for an individual system engineering

Digitalization
Documentation
Visualisation
Validation
Dimensioning
Optimization
Integration

The task
 The essential planning aspect of investments is more and more focusing on, especially when considering large projects. Regardless of whether it concerns a grant for a brownfield plant or the installation of a greenfield project, a detailed concept study is more and more often requested. The preparation for this process step is that the data required parameters are available or able to be prepared. This is especially playing an important role during the layout planning and commissioning. Often the documentation for existing plants is insufficient.

The solution
 AZO offers the possibility to deliver the necessary documents in different engineering phases – specific to every customer – where AZO combines its long-standing experience in the automation industry with modern scanning technologies. For example, documentation and presentation of existing and new systems, structures and processes with the latest techniques. Scanning made by a 360° camera, enables the acquisition of the actual situation, based on a documented three-dimensional photo.

point cloud can be created. Based on this records and digitized data, the optimum basis for further specific steps such as documentation, modeling, optimization or visualization can be created.

SERVICES

Benefits of the AZO solution

- Less time effort for a complete system-specific process documentation
- Digital as-built situation of the scanned object
- Risk minimisation when considering existing systems regarding components
- Automatic generation of 360° views as further derivation of the point cloud
- Planning safety with system-specific process and modernisation documentation
- Direct comparability with modeling and visualization tools for transmission among the scanned system with 3D glasses
- Comprehensive basis for documentation, planning and training purposes
- Optimum basis for presentation and marketing purposes
- A 360-degree solution enables the user to independently view scans that have been performed
- Three weeks of tagging show different views of detail



We Love Ingredients.



AZO.®

Das Unternehmen stellt sich vor



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Process equipment

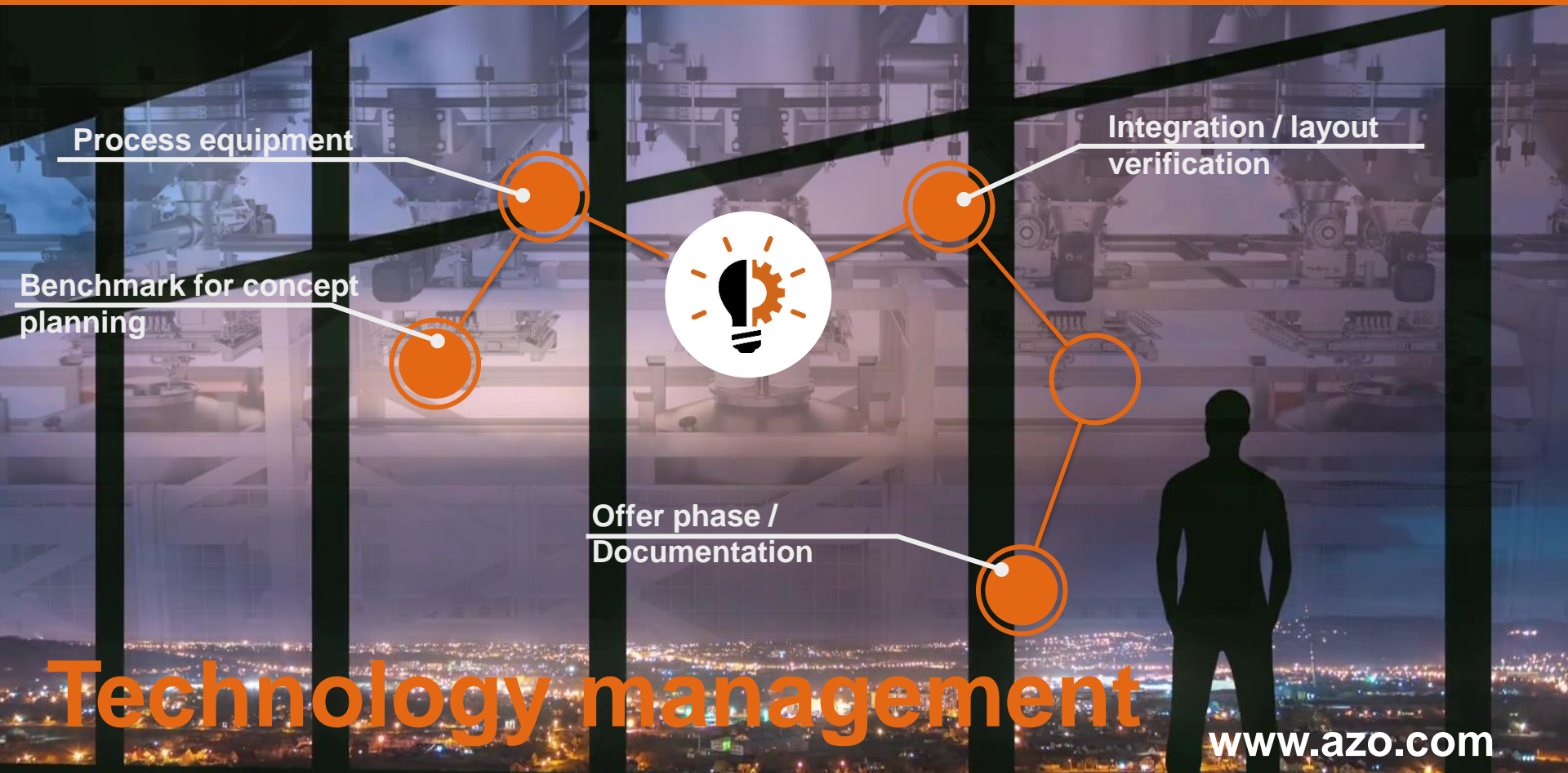
Integration / layout
verification

Benchmark for concept
planning

Offer phase /
Documentation

Technology management

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Process equipment

- Functions • interfaces • application area • continuous co-operation (suppliers)

Benchmark for concept development

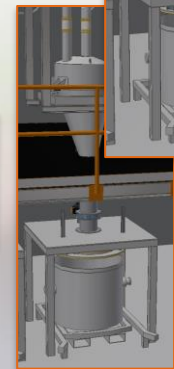
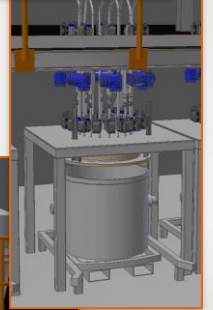
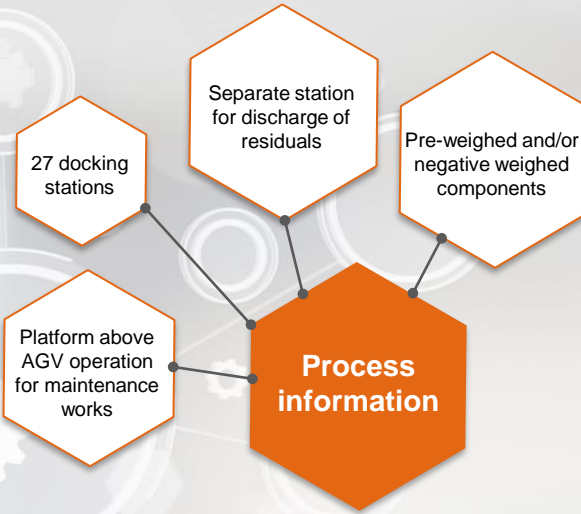
- Project-specific solutions • demand process • clarification state-of-the-art • coordination project content

Integration-/layout planning

- Detailed coordination • planning safety • compatibility • area specific coordination

Offer phase / documentation

- Coordination & processing • project specific communication • uniform • stage model



Agreement with suppliers

Detailed set-up

Personensichere Lösung

Zeitpunkt	Rückfahrt [m]	Anzahl Kurven	Abstellen [s]	Fahrt zur nächsten Station [m]	Anzahl Kurven	Drehungen docked	Drehungen undocked
80.0			36.2		0,0	0,0	0
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Netto-Fahrzeuge
15,88
aktualisieren



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Many thanks for your attention!
Questions?

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