

Franziska Rehde

Historic glazing in existing buildings using the example of Dresden Trachau

GPD 2023, Tampere // June 15th, 2023

Introduction

Motivation

Current

Replacement of architectural glass due to insufficient insulation properties

Historic glass panes do not meet today's standards

Properties

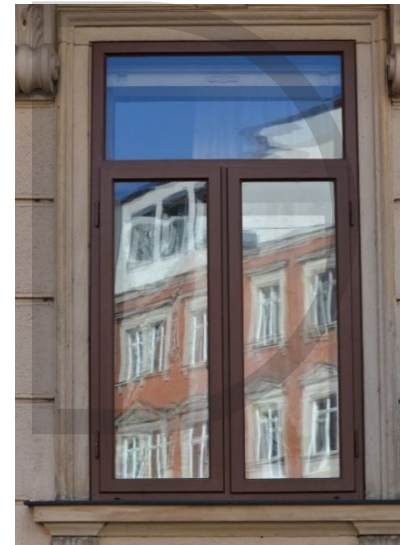
Optical disturbances

Wavy structure

Bubbles

Today, this is interpreted as a defect rather than a testimony to technical progress.

Authenticity and materiality of buildings is lost to a certain extent



Introduction

Motivation

Sayner Hütte, Germany

Built in 1830

Decommissioned in 1926

The south facade made of cast-iron profiles was replaced by a structure made of rolled steel and float glass

Authenticity and materiality of the original construction unfortunately is lost

GPD
Glass
Performance
Days 2023



Sayner Hütte before the refurbishment, 2008.
Picture: Dr. Karn



Sayner Hütte after the refurbishment, 2009.
Picture: Dr. Karn

Historical manufacturing processes

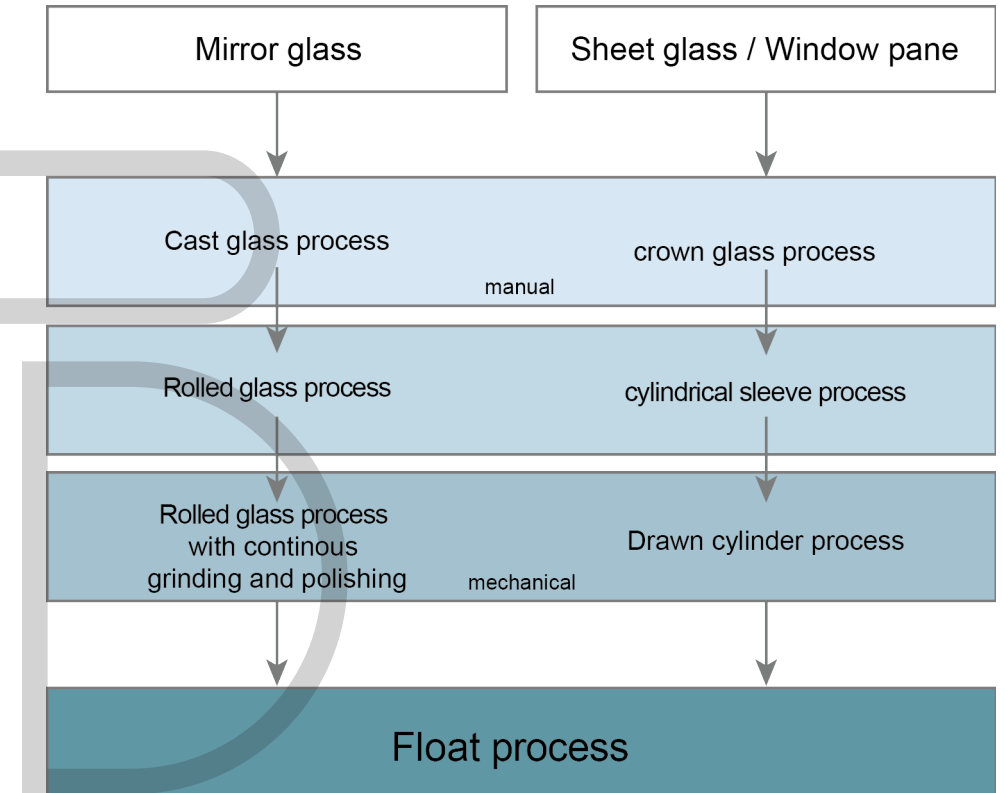
Development of flatglass production

Basically there are **4 methods of glass production**:

Casting, pressing, blowing and drawing

Oldest methods is the cast glass process (17th century) for the production of mirrors - an important strand for the development of float glass.

2nd strand: drawing process - developed from the moon glass process (centrifugal process) and cylinder blowing process (often also called cylinder glass process)

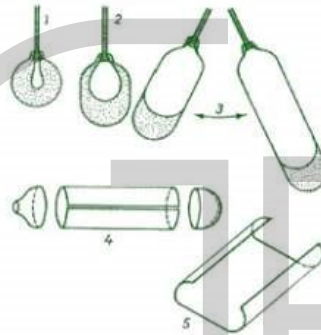


Schematic of the development of flat glass processes, after Glocker 2017, S. 13

Manufacturing Process

Manual manufacturing process in Germany

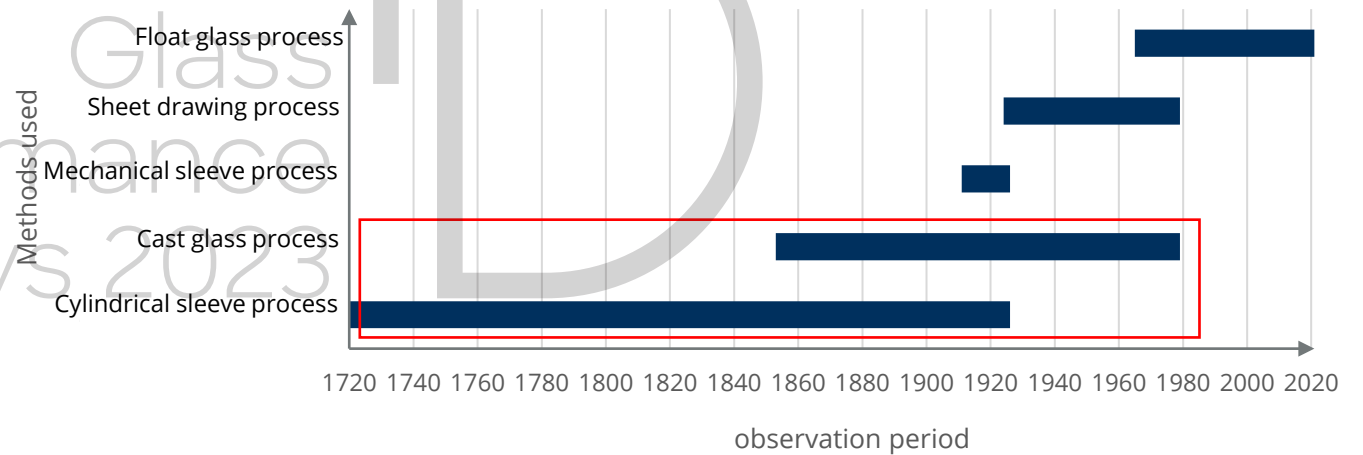
Flat glass production



Cylindrical sleeve process. Picture: Erwin Purucker



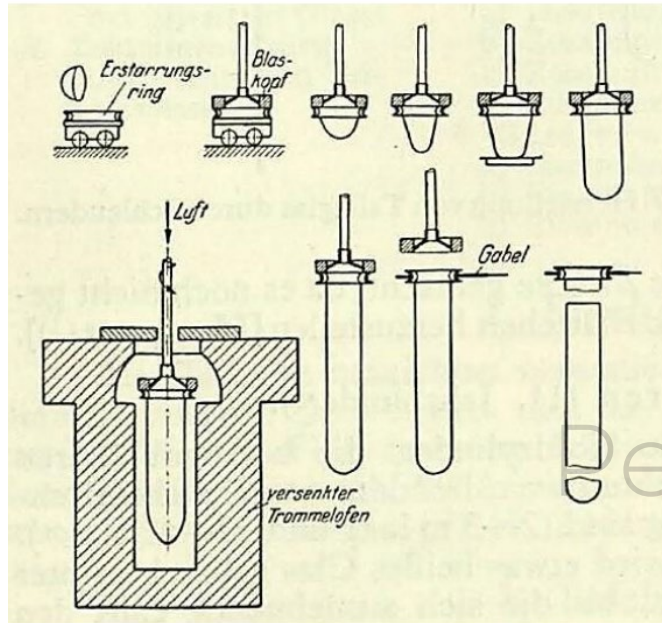
Cast glass Process. Picture: Schott



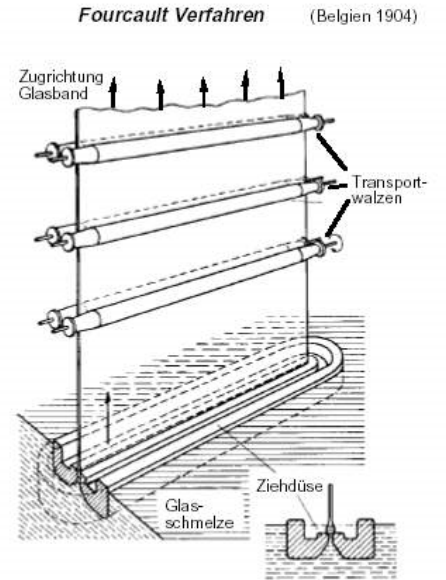
Manufacturing Process

Mechanical manufacturing process in Germany

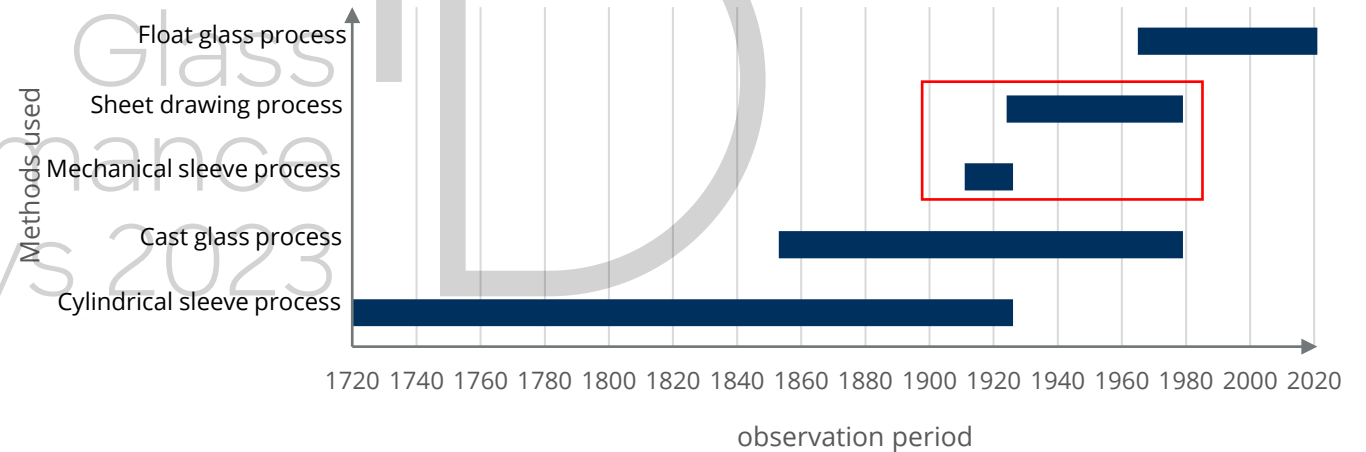
From manual to mechanical manufacturing process



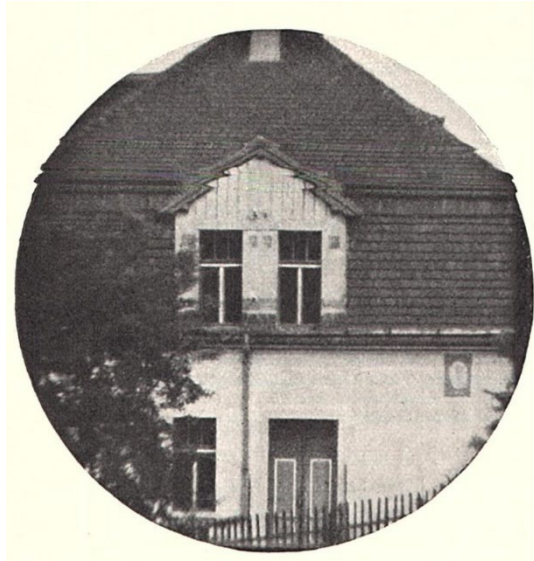
Sievers process, glass "flows" from above and forms into a cylinder by gravity. Picture: Andres, 2016.



Mechanical sleeve Process by Fourcault. Picture: Erwin Purucker



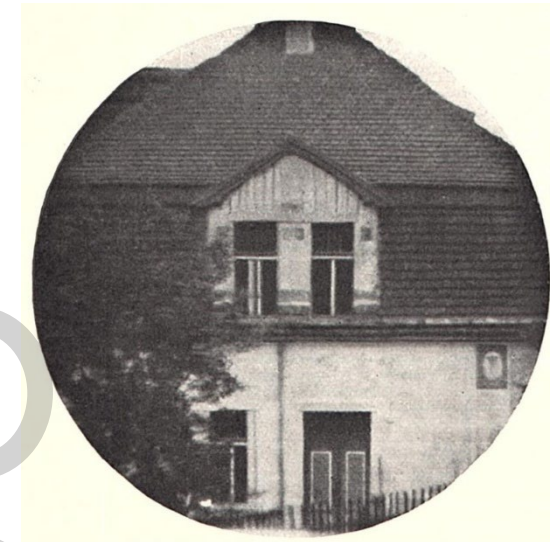
Detection of historical Glass



See-through no glass. (Dralle).



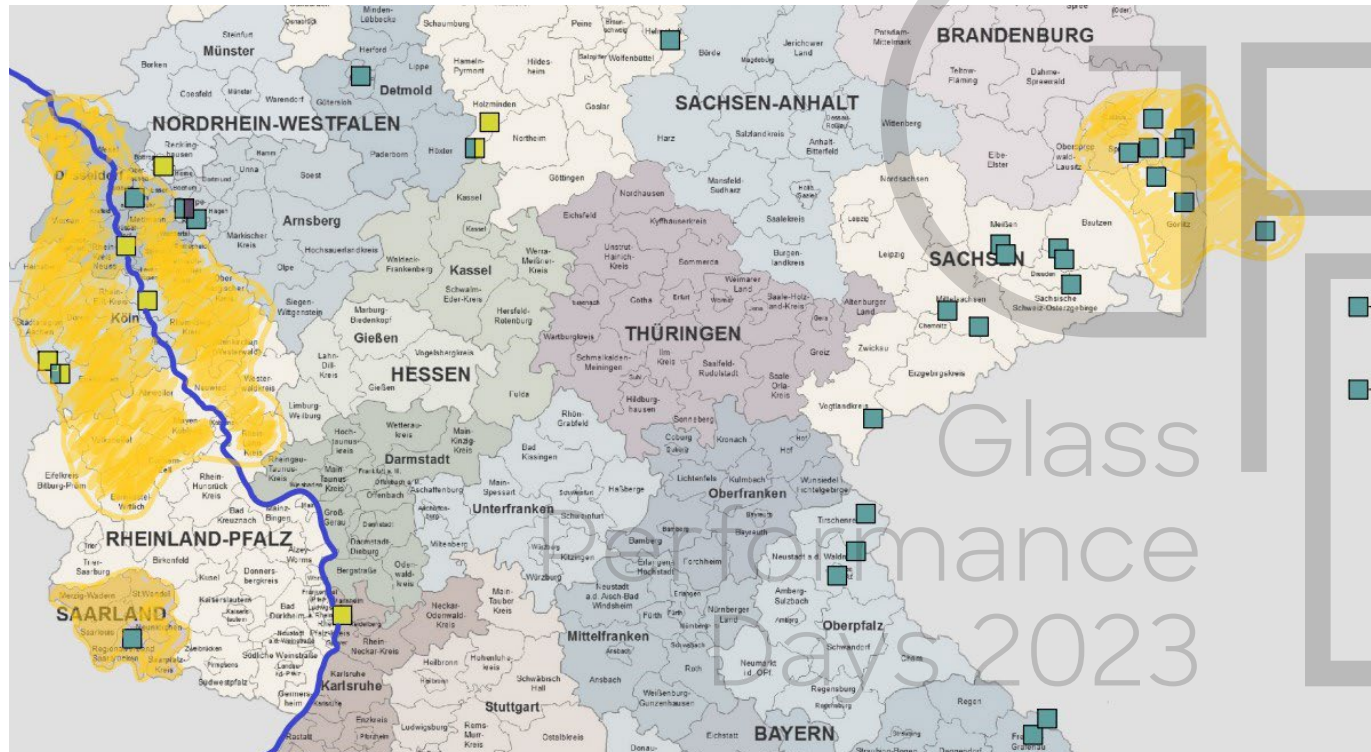
See-through cylindric sleeve process. (Dralle).



See-through drawn cylinder process. (Fourcault process). (Dralle).



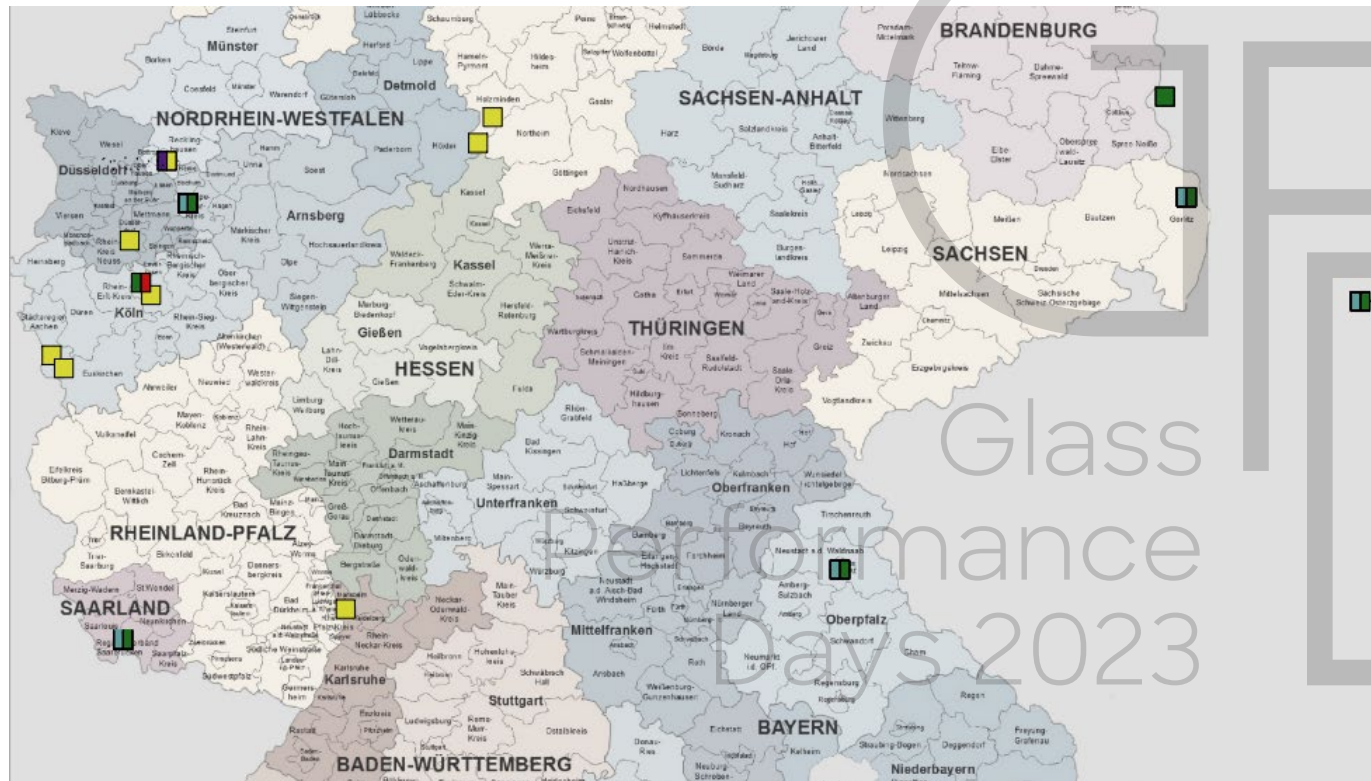
Mapping of the Glass Production Factory 1880 - 1923








Glass Production Methods

- Cylindrical sleeve process
- Mechanical sleeve process by Lubbers

Mapping of the Glass Production Factory 1924 -1932

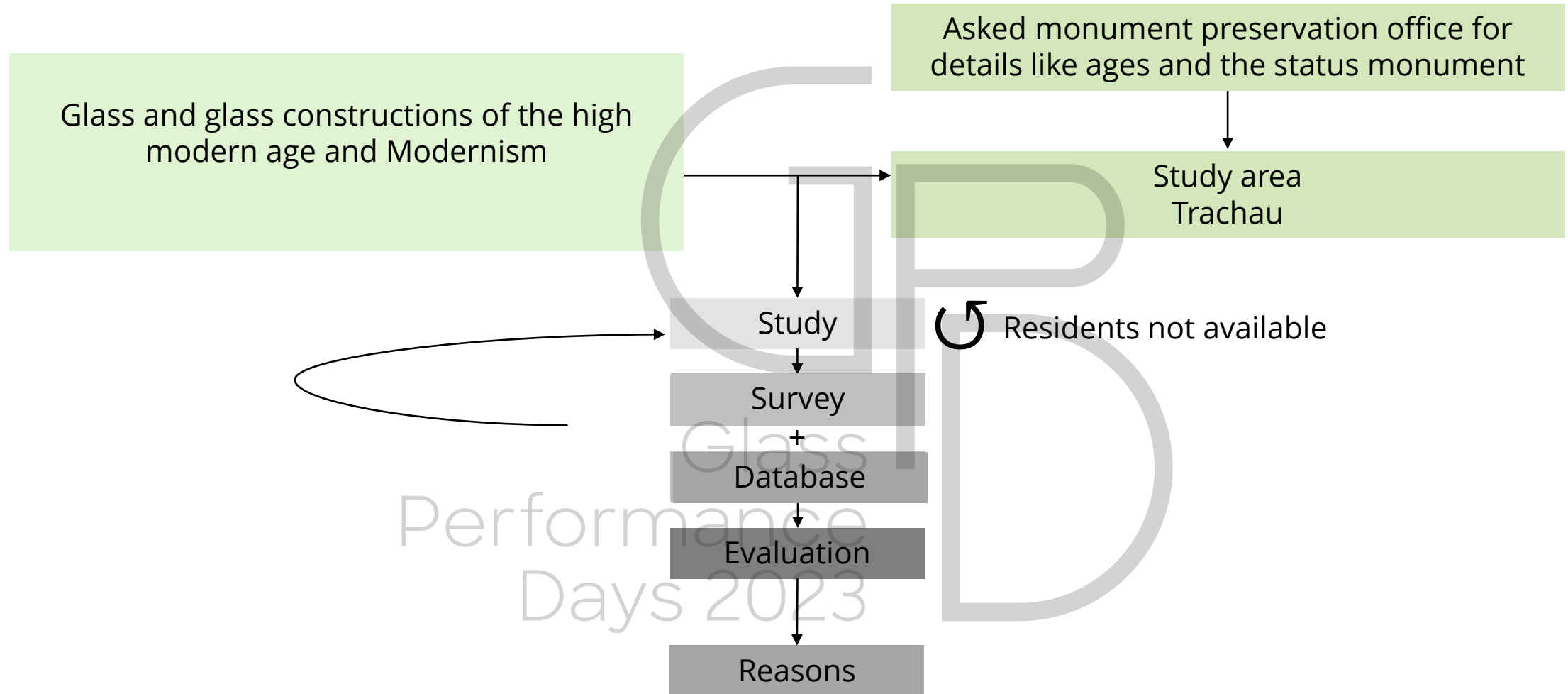


Glass Production Methods

-  Cylindrical sleeve process
-  Mechanical sleeve process by Lubbers
-  Mechanical sleeve process by Pittsburgh
-  Mechanical sleeve process by Fourcault
-  Mirror Glass

Flatglass examination in a city district

Procedure



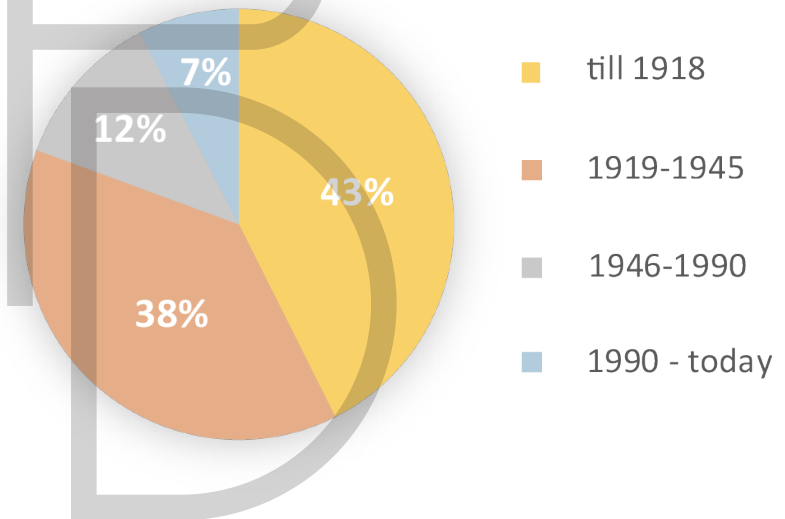
Flatglass examination in a city district

Study area of Dresden-Trachau, Germany



Trachau district, redmarked, within the Pieschen district, darkgrey marked, Dresden, Germany.

GPD
Glass
Performance
Days 2023



Classification of buildings according to year groups.

Flatglass

Study area of Dresden-Trachau, Germany



Study area shown in QGIS (own image, modified)



Buildings of the district in the east shown in QGIS (own image, modified)

Flatglass

Study area of Dresden-Trachau, Germany



Study area shown in QGIS (own image, modified)



Buildings of the district in the east shown in QGIS (own image, modified)

Flatglass

Study area of Dresden-Trachau, Germany



Wilder-Mann-Straße 23c



Buildings of the district in the east shown in QGIS (own image, modified)

Study area of Dresden-Trachau, Germany Database



Box type Window Wilder-Mann-Straße 23c

Wilder-Mann-Straße 23c, Ku

Bezeichnung				
WM	23c	O	1	2

Kulturdenkmal										
Glaskonstruktion										
allg.	Teilung	Bauzeit	Material	Flügelk.	Farbe	Entwä.	Zierprofile	Mehrl.	Form	
F	G	B	Ho	KF	W	WS	nein		1	SR

Glass Performance Days 2023



Wilder-Mann-Straße 23c, Kulturdenkmal											Oberlicht						Flügel																
Bezeichnung		allg.	Teilung	Bauzeit	Material	Flügelk.	Farbe	Entwä.	Zierprofile	Mehrl.	Form	vorh?	Teilung	Anzahl	Sprossen	Verglasung	Glasart	Höhe	Breite	vorh?	Teilung	Anzahl	Sprossen	Verglasung	Glasart	Höhe	Breite						
WM	23c	O	1	2	F	G	B	Ho	KF	W	WS	nein		1	SR	1	UG		1	AK	E	Mu	0,5	1	1	G		2	K	E	Mu	1	0,5

Study area of Dresden-Trachau, Germany Database



Window Wilder-Mann-Strasse 23c

Wilder-Mann-Straße 23c, Ku

Bezeichnung					
WM	23c	O	1	2	1

Kulturdenkmal										
Glaskonstruktion										
allg.	Teilung	Bauzeit	Material	Flügelk.	Farbe	Entwä.	Zierprofile	Mehrl.	Form	
F	G	B	Ho	KF	W	WS	nein		1 SR	

Oberlicht								
vorh?	Teilung	Anzahl	Sprossen	Verglasung	Glasart	Höhe	Breite	
1	UG		1 AK	E	Mu	0,5	1	

Flügel								
vorh?	Teilung	Anzahl	Sprossen	Verglasung	Glasart	Höhe	Breite	
1	G		2 K	E	Mu	1	0,5	



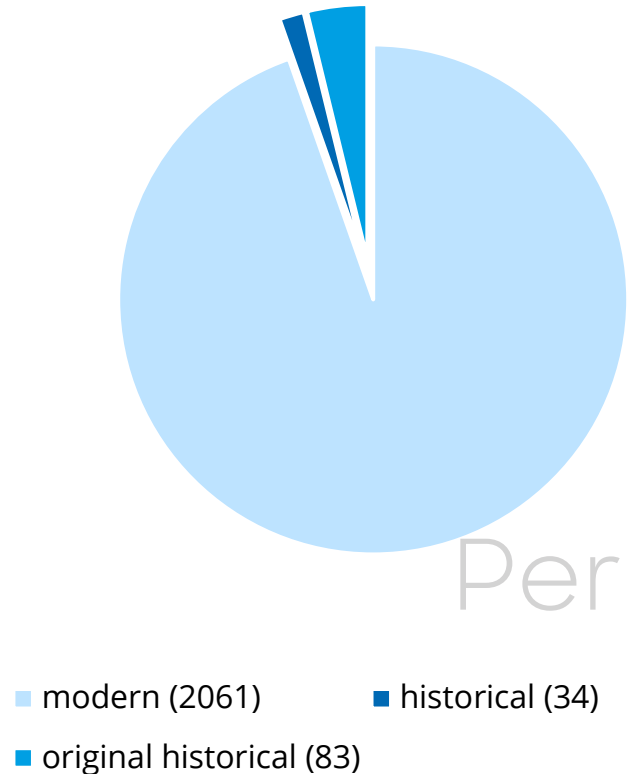
Wilder-Mann-Straße 23c, Kulturdenkmal

Glaskonstruktion											Oberlicht						Flügel											
Bezeichnung			allg.	Teilung	Bauzeit	Material	Flügelk.	Farbe	Entwä.	Zierprofile	Mehrl.	Form	vorh?	Teilung	Anzahl	Sprossen	Verglasung	Glasart	Höhe	Breite	vorh?	Teilung	Anzahl	Sprossen	Verglasung	Glasart	Höhe	Breite
WM	23c	O	1	2 F	G	B	Ho	KF	W	WS	nein	1 SR	1	UG	1	AK	E	Mu	0,5	1	1	G	2	K	E	Mu	1	0,5

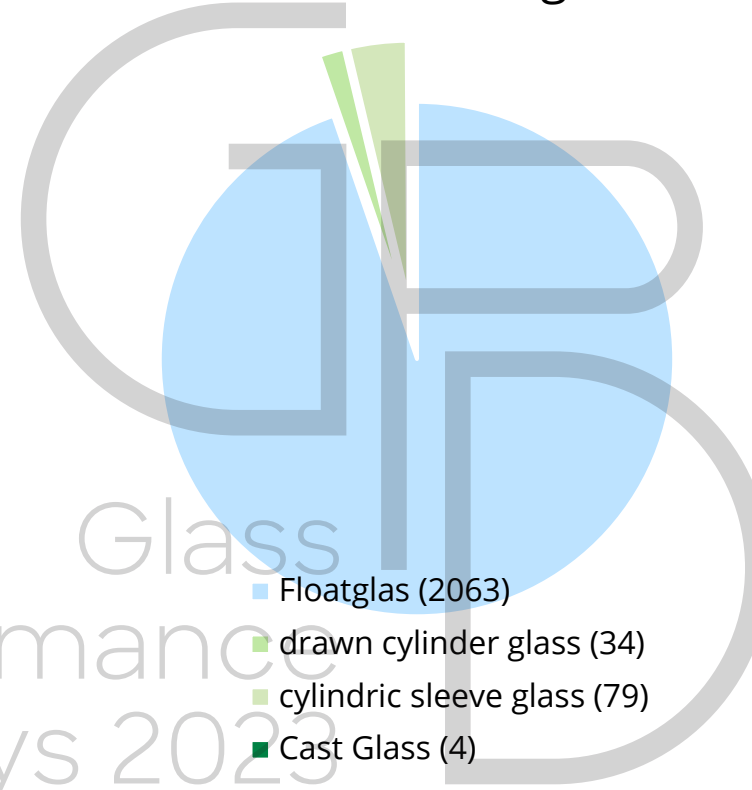
Study area of Dresden-Trachau, Germany

Evaluation

2178 windows - construction



2178 windows - glass



8.4 % of all glass in the windows are original

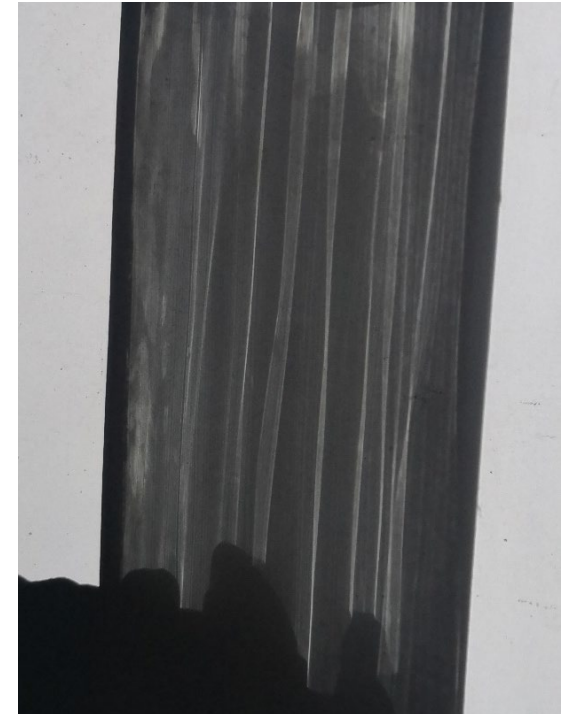
Outlook

Image historical glass panes by using a light source

→ **Goal: document individual stripes and categorize into different production methods and its companies**

Investigations on glass panes in old buildings

→ **Goal: Mapping glass structures from the building stock**



Acknowledgements

Supported by:



Partner:



SPP Kulturerbe Konstruktion

<https://kulturerbe-konstruktion.de>

Glass
Performance
Days 2023

Institute of Building Construction

Direction

Deputy Head of Chair

Senior Prof.



Engelmann



Weller

Coordination

Research

Education

Laboratory

OER



Tasche



Vogt



Ebert



Bergert

Lecturer

Lecturer

Lecturer

Lecturer



Holzem



Nikolowski



Horn

Supporting Staff

Secretariat

Laboratory



Tetzner



Hegewald



Brandt

Design & Construction

Groupleader



Tasche



Lohr



Möckel



Schöne

Energy & Sustainability

Groupleader



Seeger



Čupáč

Adhesives & Lamination

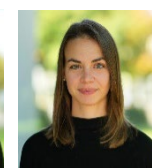
Groupleader



Nicklisch



Wunsch



Joachim



Kießlich



Bukieda



Hänig



Pfarr



Rehde



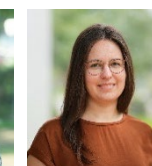
Popp



Giese-Hinz



Kothe



Fleckenstein