FLOW OF INFORMATION (Demonstrator)

TIPHERED
Data Capture System + Spectacles Selection (lens + frame)
IBV

¿?

INDO
Automatic Design System

Generation of the Manufacturing order

MANUFACTURING ORDER

SUB-ORDER: LENS MANUFACTURING

OPTIKALCOM

SUB-ORDER: Lens Generation

LENS GENERATION
Generation machine

SUB-ORDER: Coatings

COATINGS

FUMU process (Hard Coating and Inkjet printing)	Hard Coating	AR coating	Top Coat
INKJET machine	SPIN COATER machine ¿?	SPUTER machine	TOPCOATER machine

SUB-ORDER: FRAME MANUFACTURING

SUB-ORDER: ASSEMBLY OPERATION

EOS

SUB-ORDER: Metal frame

METAL FRAMES

LS process EOSINT M270	Ink-jet Coating

Assembly /Polishing/Tinting (Base Color) — *Manual or auxiliary operations Sub-contracted*

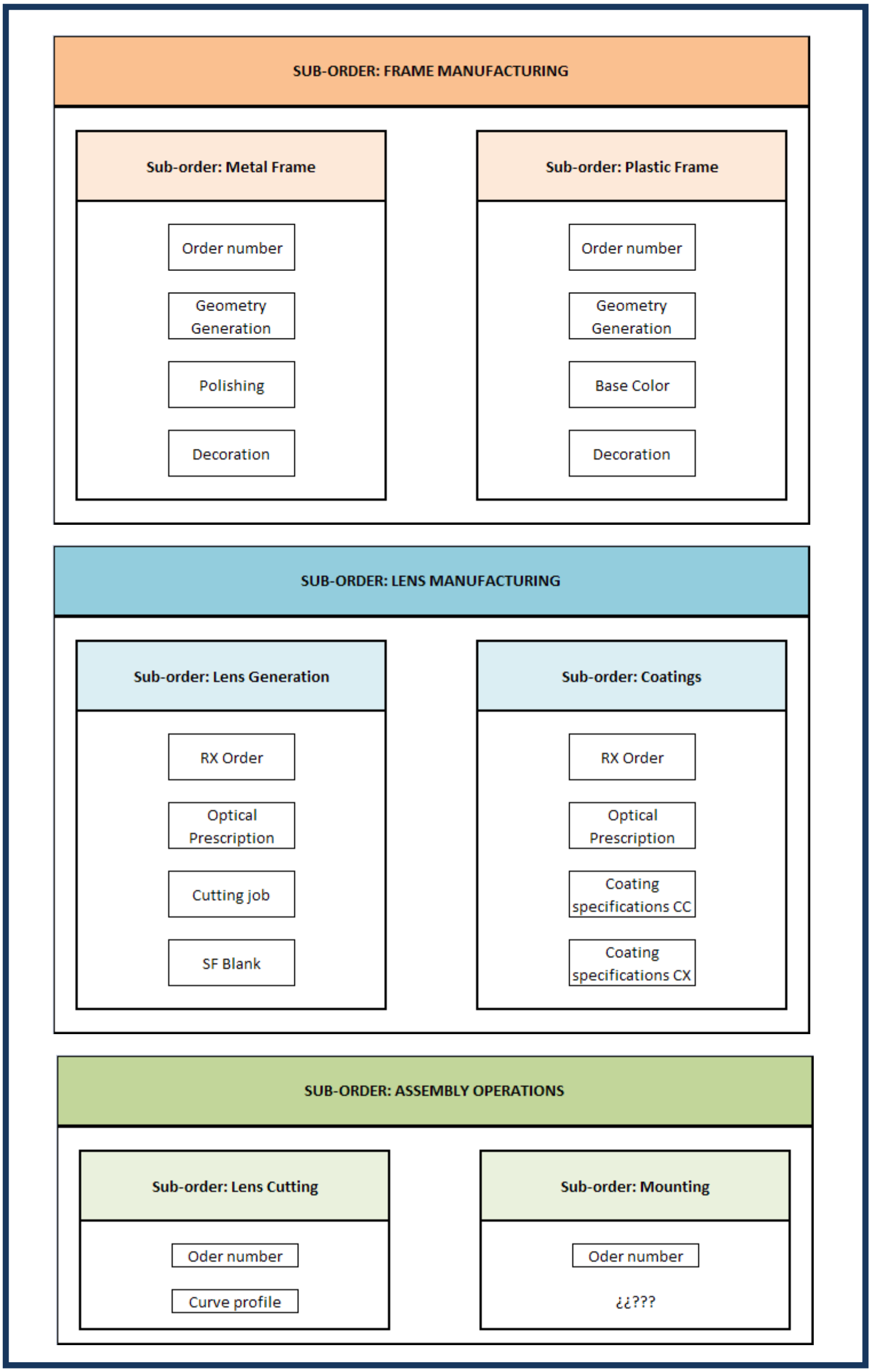
PLASTIC FRAMES

LS process FORMIGA P100	Ink-jet Coating

Assembly /Polishing/Tinting (Base Color) — *Manual or auxiliary operations Sub-contracted*

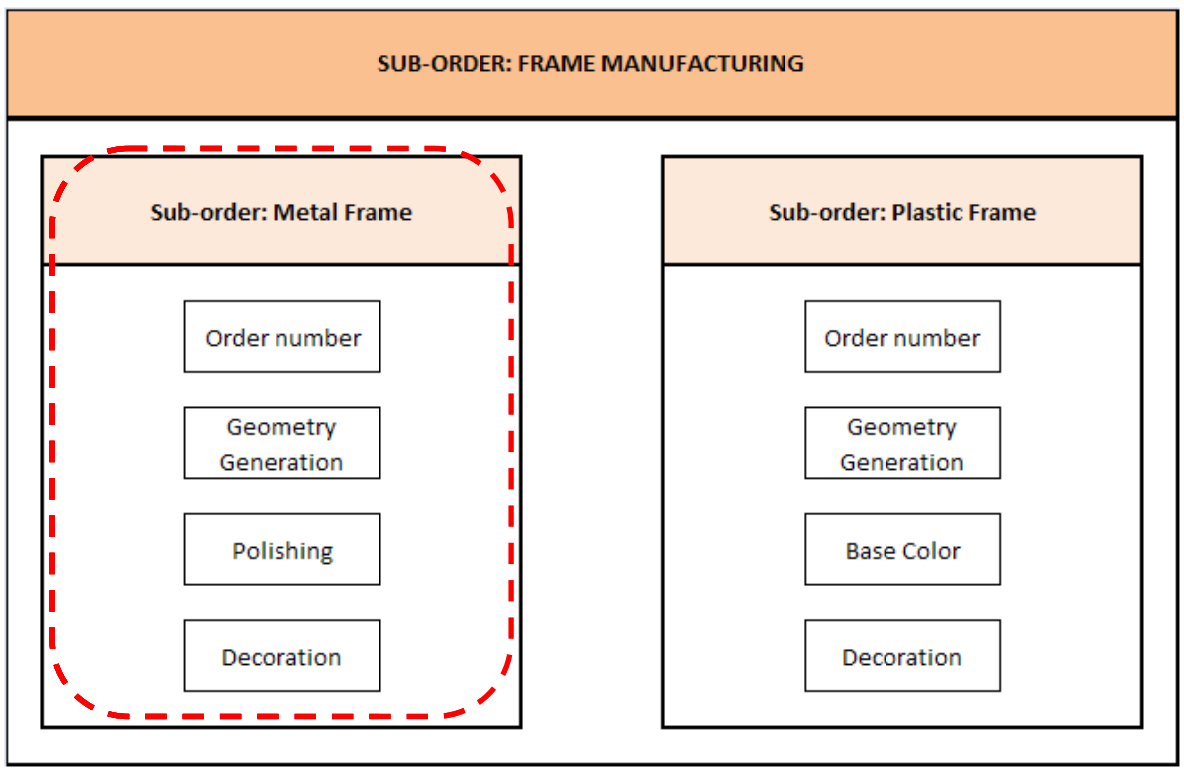
SUB-ORDER: Plastic frame

MANUFACTURING ORDER



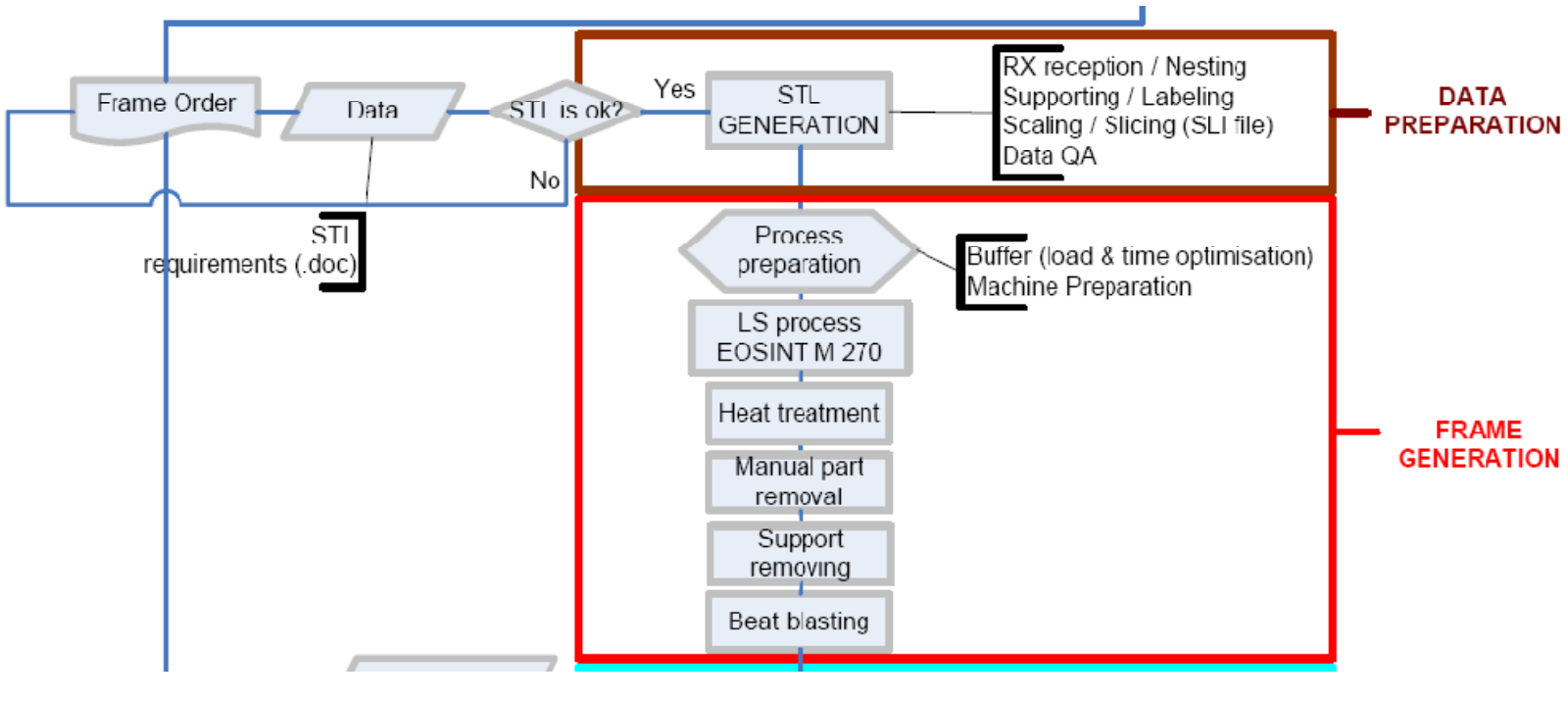
EXPLANATIONS OF THE MANUFACTURING ORDER CONTENT AND A LITTLE REVIEW ABOUT THE MANUFACTURING MAPS (FLOW DIAGRAMS)

SUB-ORDER Metal Frame



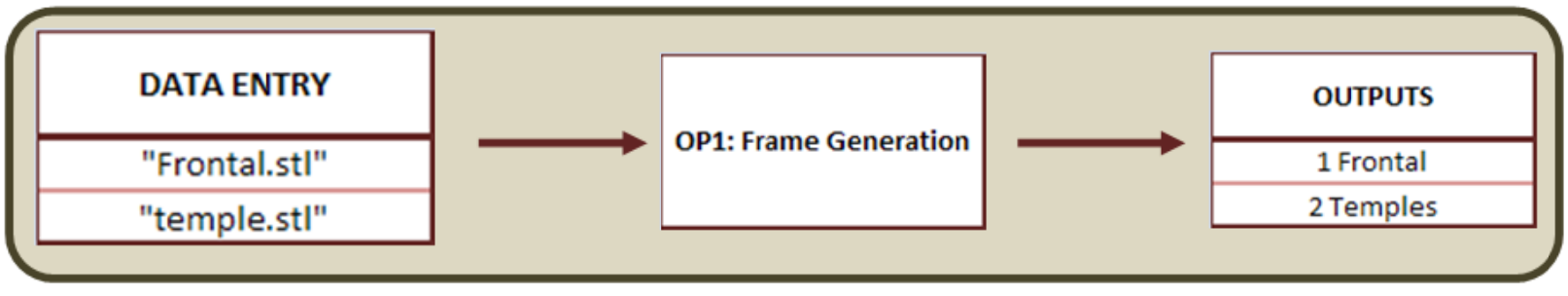
PROCESS FOR THE OBTAINNING OF METAL FRAMES

Operation 1: Frame Generation



The frame Generation is the first operation for the obtaining of the customised frames. For this process the geometrical information of the frame (frontal + temples) are needed.

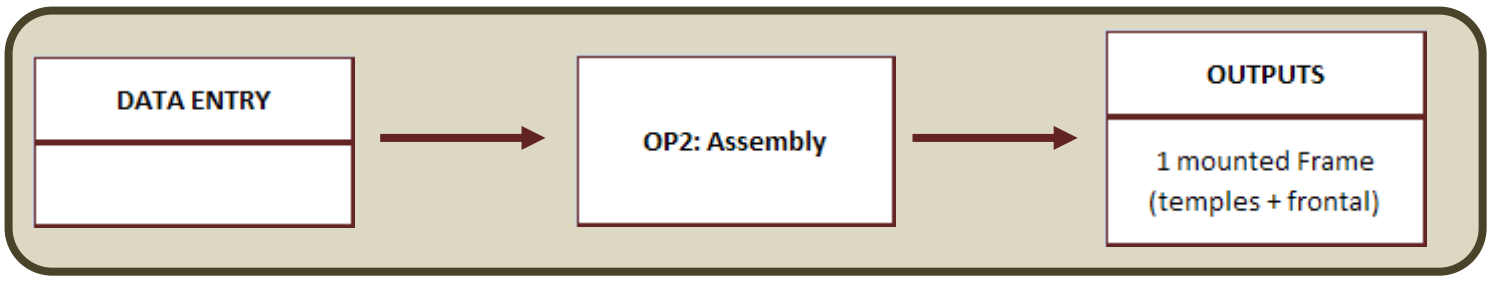
The temples and the frontal are built separately (in the same machine but separately). As a result of this operation 3 parts are obtained (1 frontal and 2 temples).



Operation 2: Assembly

In the last technical meeting of the WP5, in Krilling (EOS), it was decided that once the three parts are obtained (in the operation before) they should be assembled in order to improve the results of the next operation which is the polishing operation.

This operation will be manual and will be the mounting of the front and temples.



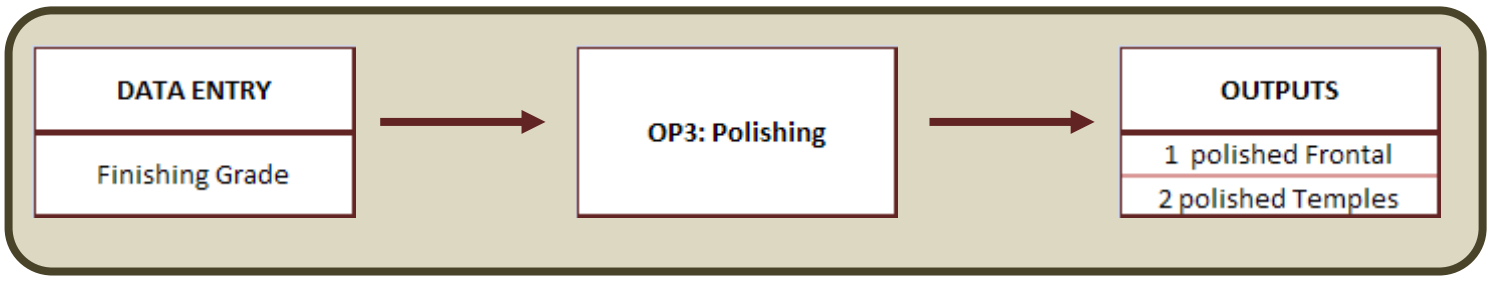
Operation 3: Polishing

This is one of the most difficult operations to talk about because it is still under development and research, to ensure the best way to succeed, in terms of finishing aspect and cost.

- In the last meeting (WP5) it was pointed out that one possibility is to combine a total of 2 different posishing operations:Vibratory Grinding (total time of running not defined yet).
- Electro-polished operation (maybe subcontracted).

And finally, a cleaning operation is considered.

The idea is that in this step the only required information will be the grade of finishing, in case that within this project a set of possible grades of finishing will be considered.



Operation 4: Ink-jet Coating

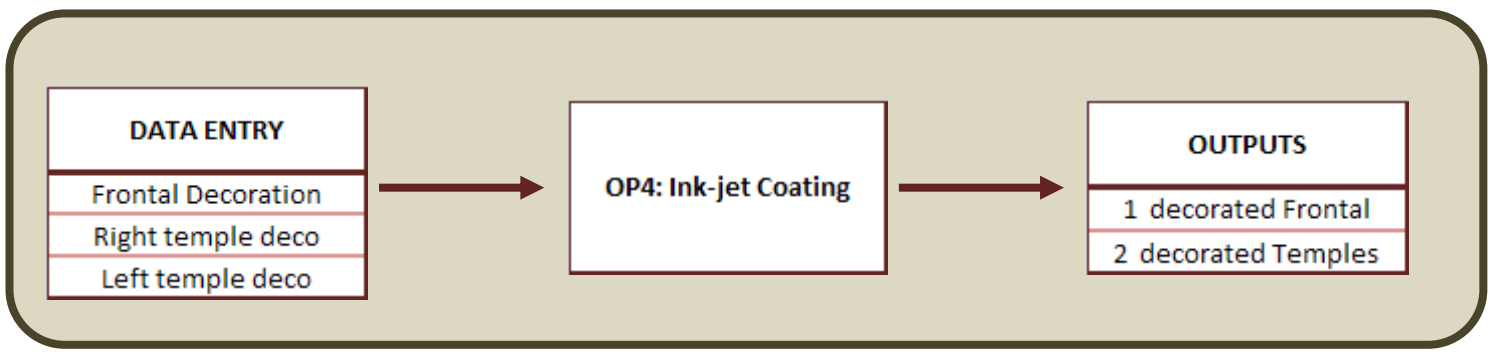
Before the process starts maybe it will be another operation more (not showed in the diagram) that will be the disassembly of the frame to enable the operation of Ink-jet Coating.

To do this process the image file to be applied on the frontal and/or temples should be defined.

The possibility of having three decorations on the frame surface is considered:

- Frontal decoration
- Right temple decoration
- Left temple decoration

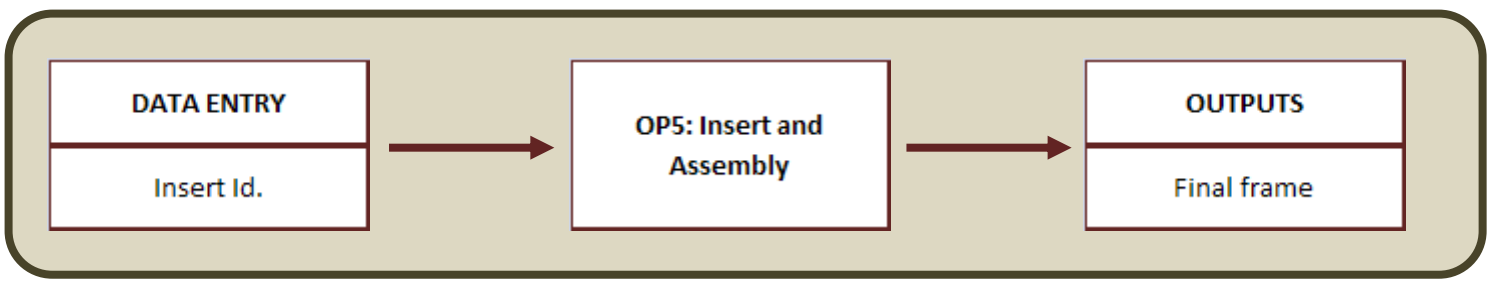
And the possibility of having different decoration in the three parts has been also considered, so different files to define the decoration of these parts should be considered too.



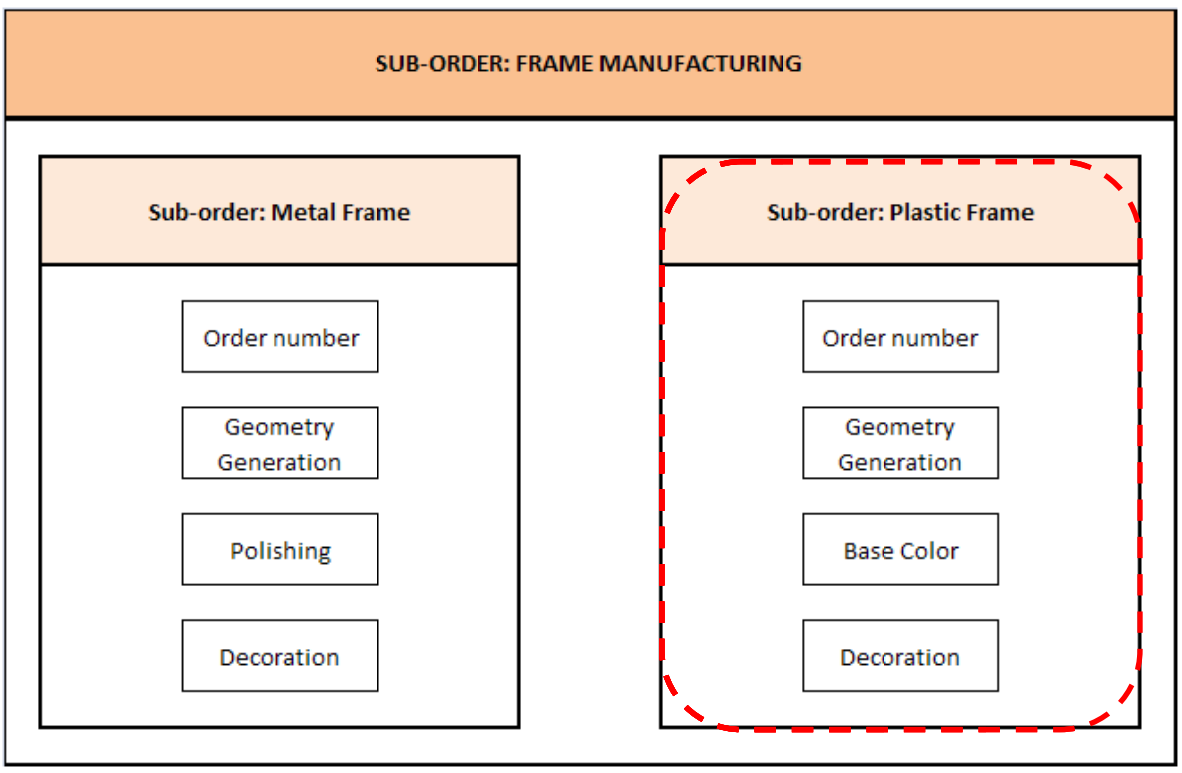
Operation 5: Insert and Assembly

This operation will be probably done in a very manual way: By welding, manually, the inserts with the metal frame.

What will be necessary to have controlled will be the identification of the inserts (code) to put in the frame and we suggest to consider if an image or cad file to indicate its localization within the frame could be necessary, as well.



SUB-ORDER Plastic Frame

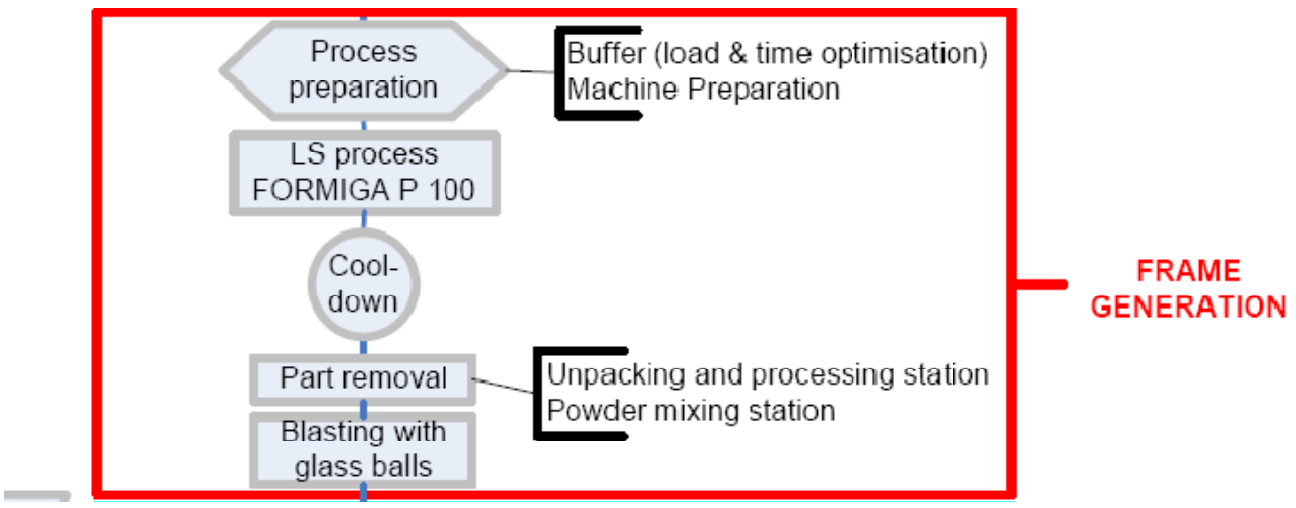


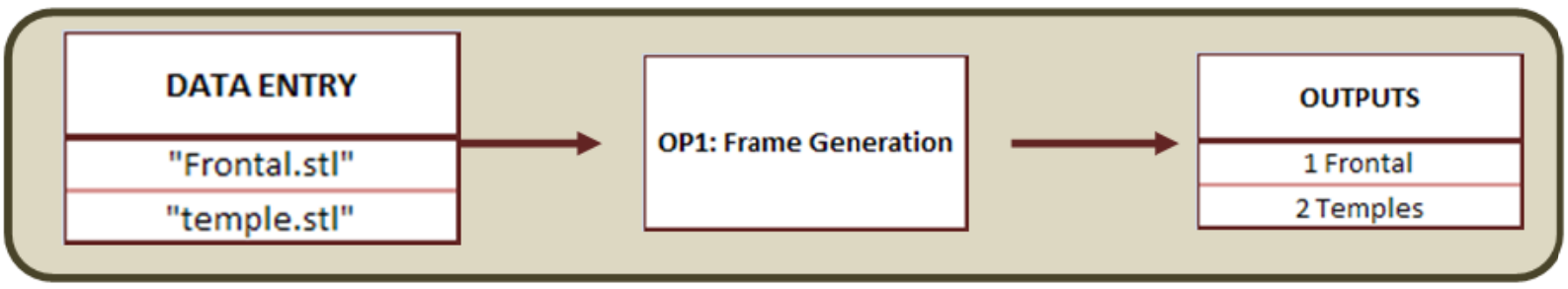
PROCESS FOR THE OBTAINNING OF PLASTIC FRAMES

Operation 1: Frame Generation

The frame Generation is the first operation for the obtaining of the customised frames. For this process the geometrical information of the frame (frontal + temples) are needed.

The temples and the frontal are built separately (in the same machine but separately). As a result of this operation 3 parts are obtained (1 frontal and 2 temples).





Operation 2: Polishing

Different ways and grades of polishing has been analysed and in the end one of the 3 ways will have to be selected. Then, No information will be required because the process is done manually and the process will be standardized and always the same.

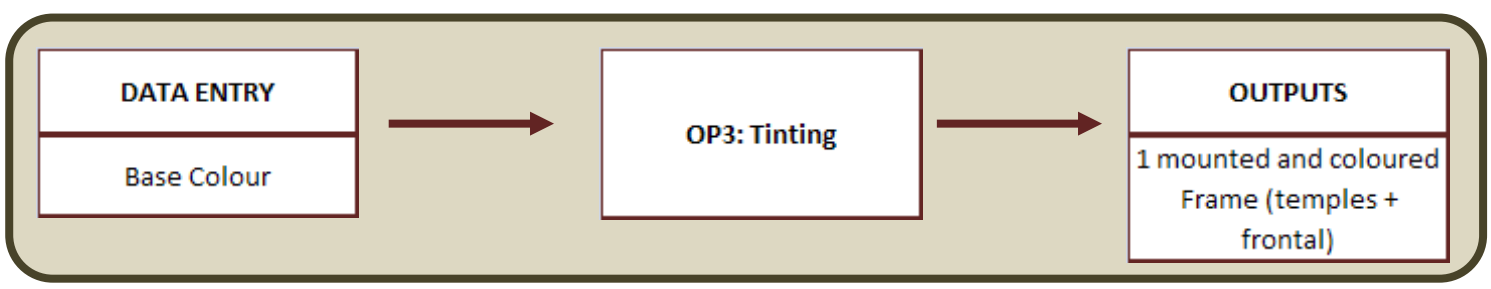
Operation 3: Assembly & Tinting

Before applying the ink-jet coating decorations and colours, a general tinting operation should be considered in order to tint the entire frame (frontal and temple) in the same base colour.

The operation is not defined yet, since two different possibilities are taken into account (by the moment):

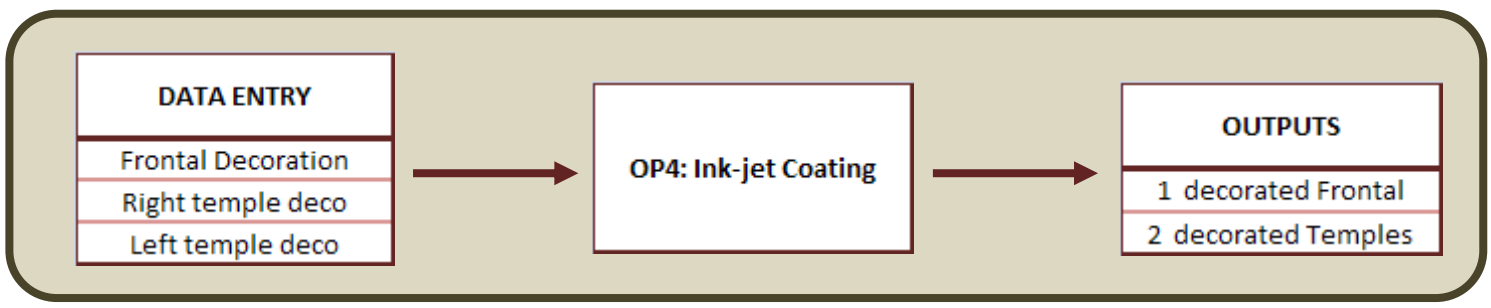
- Manual Spray
- Powder Coating

In terms of information required in the process we consider the information of the base colour that it is wanted to tint the frame. This information will be just an identification code and could be the RAL paint colours (is an international standard classification of colours).



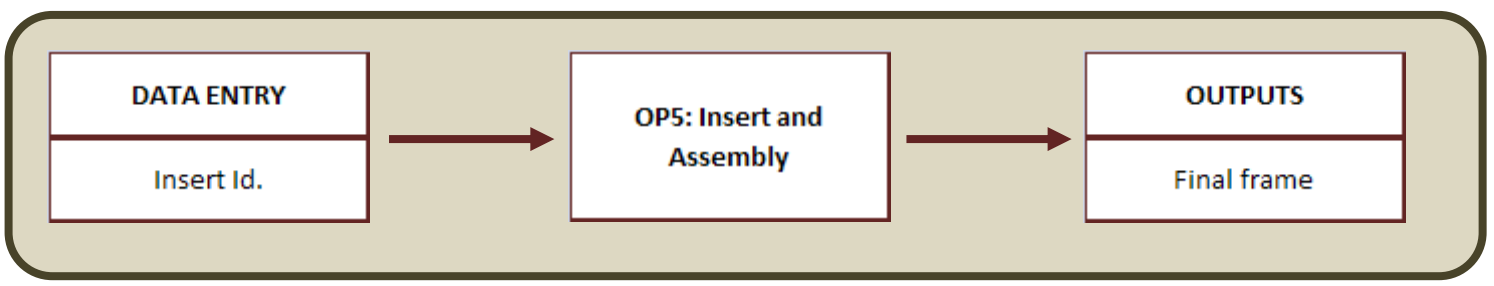
Operation 4: Ink-jet Coating

Idem metal frames.

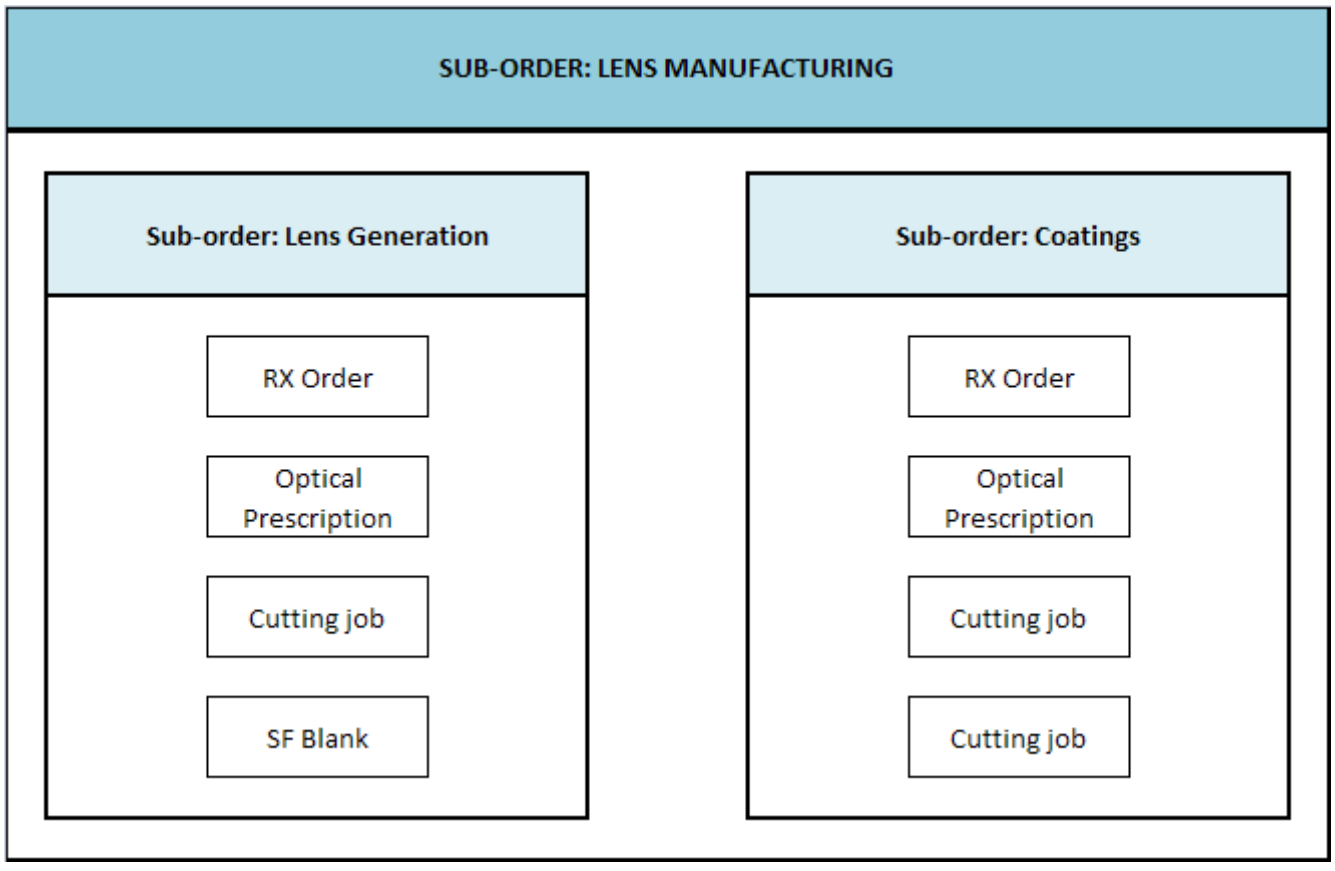


Operation 5: Insert and Assembly

Idem metal frames.



SUB-ORDER Lens Manufacturing



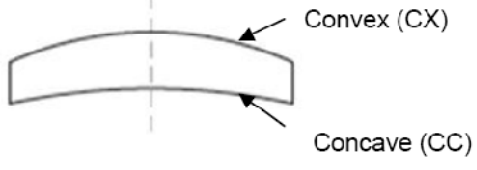
The manufacturing of the lenses include two big and different operations:

1. The generation of the lens (milling of the internal and/or external curvature of the lens)
2. The application of the coatings on lens surfaces.

In case of lens manufacturing there are two possible processes:

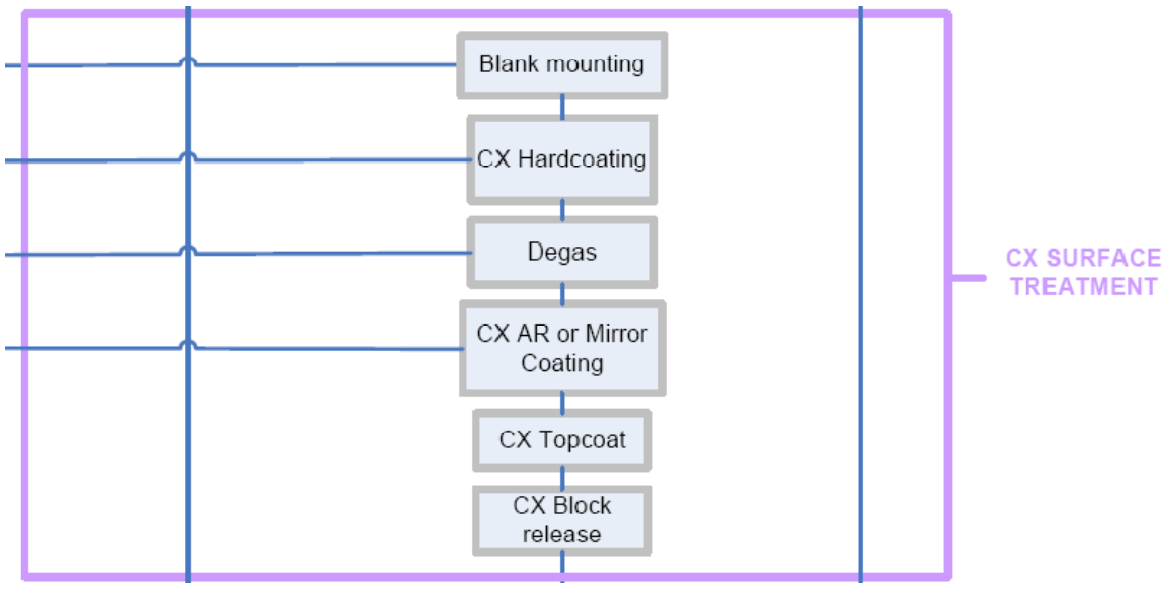
1. Starting the process with a semi-finished blank: which contains the coatings on the external surface and the internal surface should be considered within the coating operations.
2. Starting the process with a no semi-finished blank: the coatings must be applied on the external and internal surface (only strange cases,… not decided yet whether will be considered within M4u or not).

Here, the second case is explained, since it is the most general and complete case.

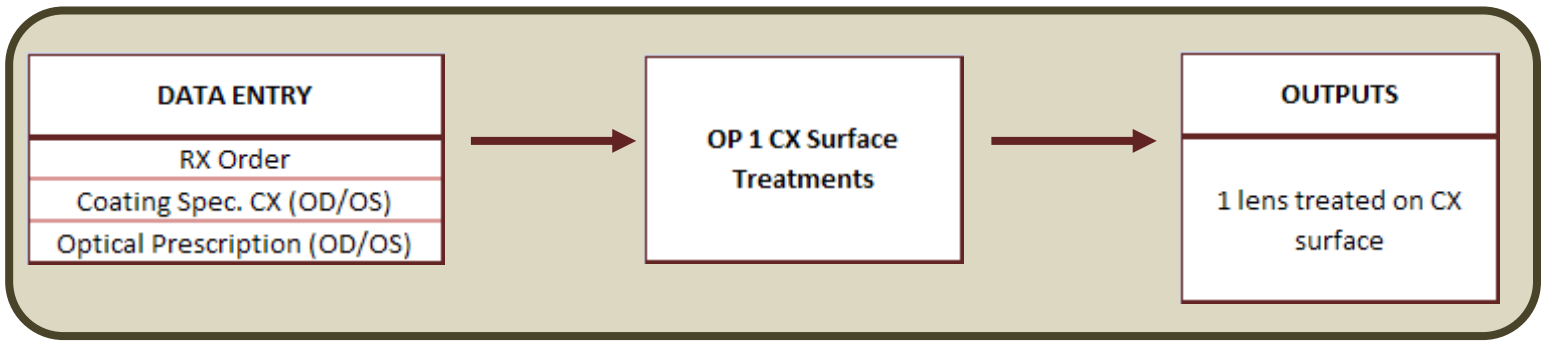


PROCESS FOR THE OBTAINNING OF LENSES

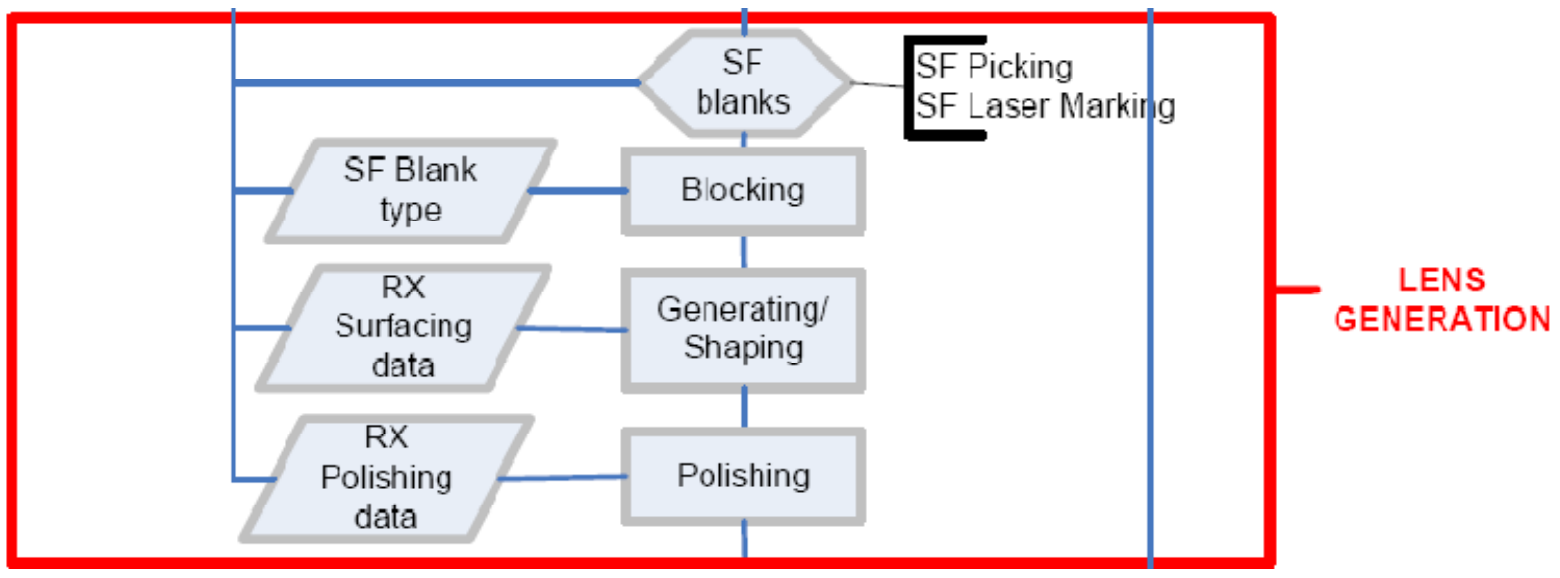
Operation 1: CX surface treatment



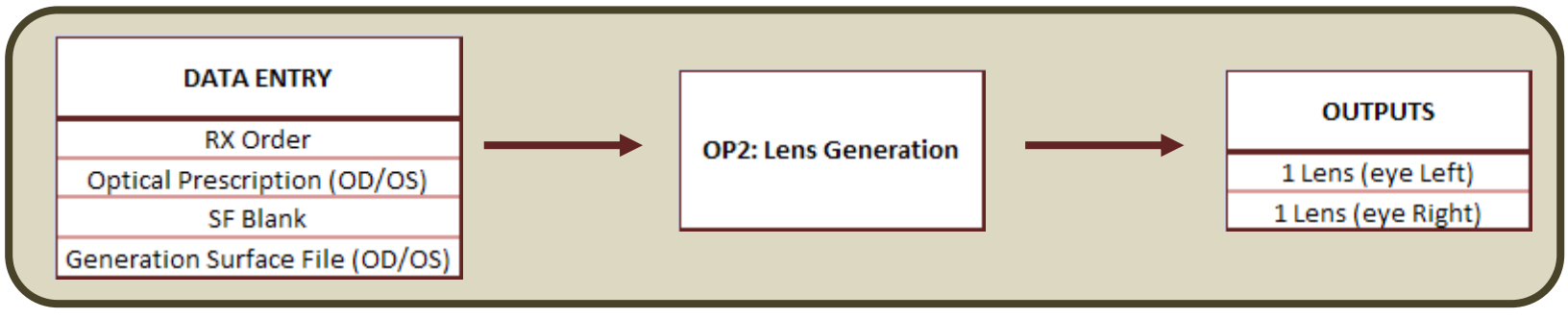
All the coating layers are applied on the more external surface (Surface CX).



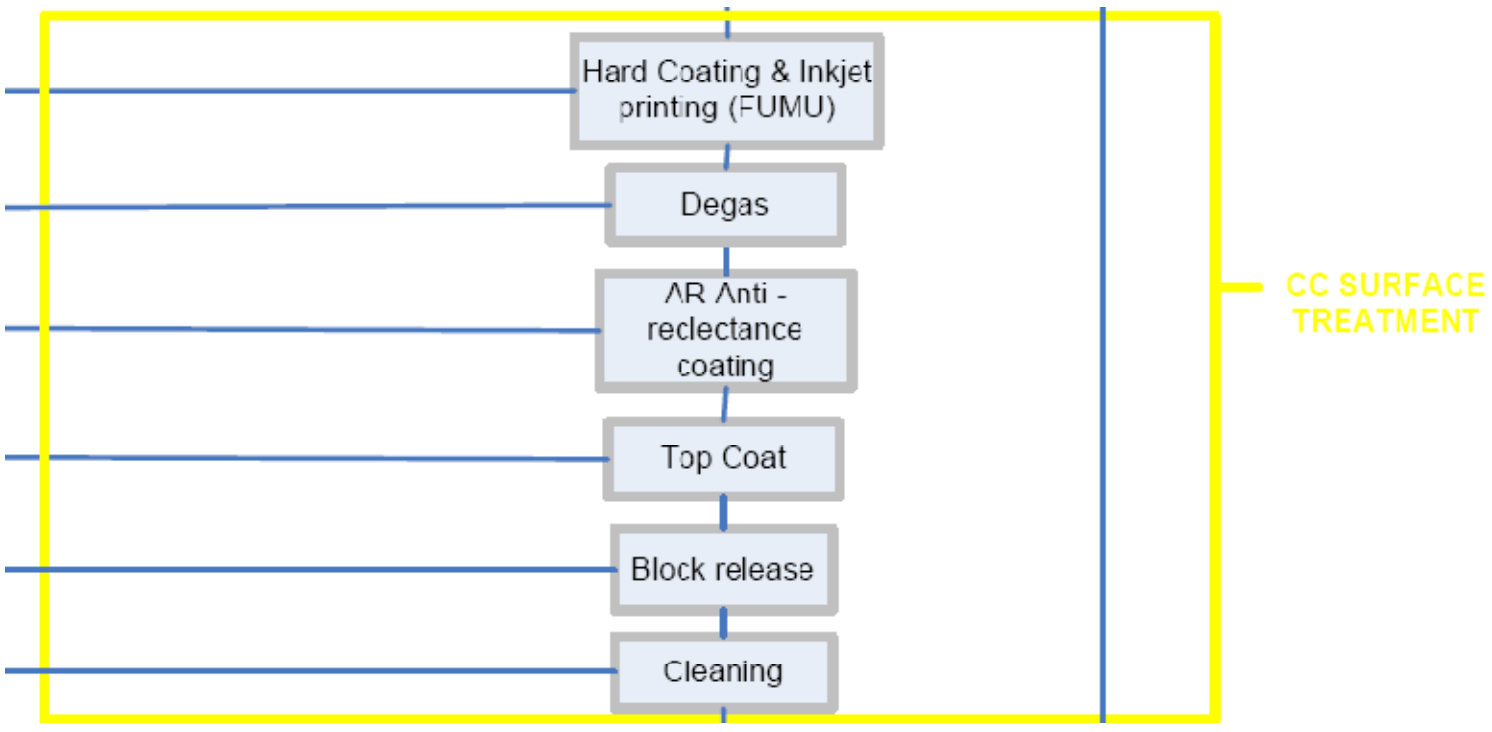
Operation 2: Lens Generation

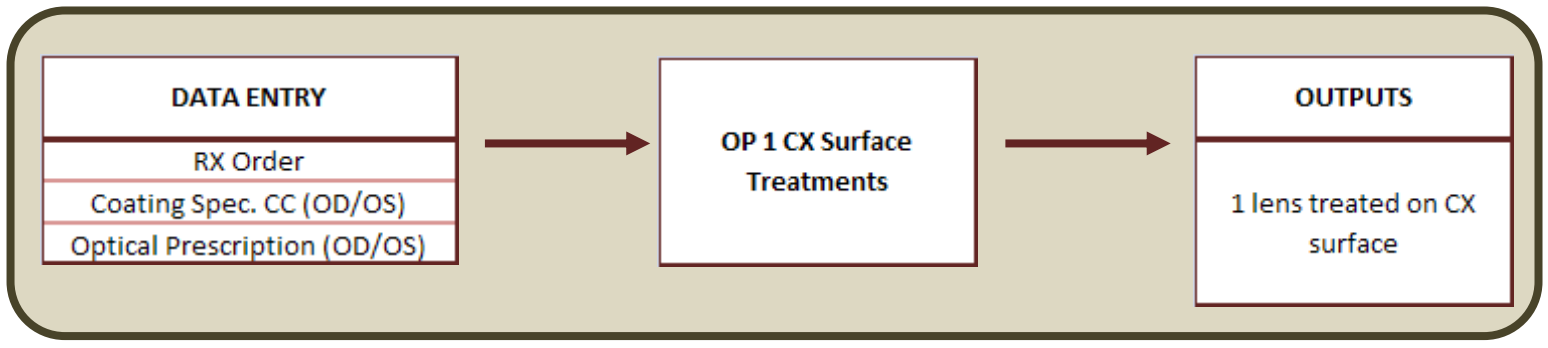


The machine receives a job file, encrypted, which contains all the necessary information to generate the lens.

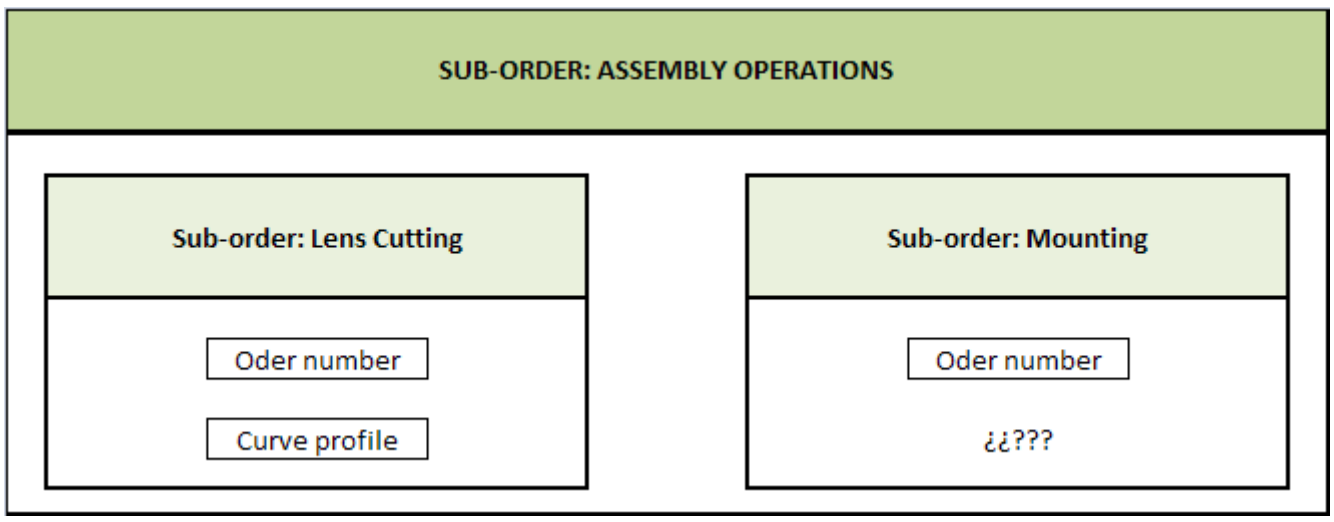


Operation 3: CC Surface Treatements



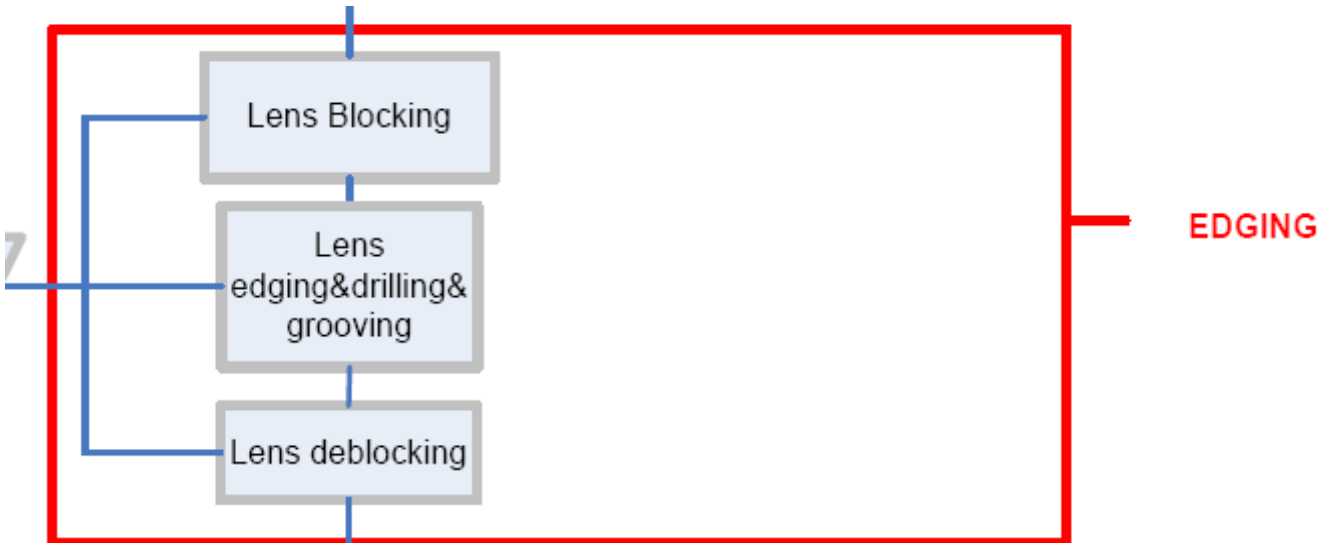

DATA ENTRY
RX Order
Coating Spec. CC (OD/OS)
Optical Prescription (OD/OS)
OP 1 CX Surface Treatments
OUTPUTS
1 lens treated on CX surface

SUB-ORDER Assembly Operations



ASSEMBLY OPERATIONS PROCESS

Operation 1: Edging



Operation 2: Mounting

No data is required ¿?

MANUFACTURING ORDER CONTENT

MANUFACTURING ORDER

SUB-ORDER: FRAME MANUFACTURING

Sub-order: Metal Frame

- Order number
- Geometry Generation
- Polishing
- Decoration

Sub-order: Plastic Frame

- Order number
- Geometry Generation
- Base Color
- Decoration

SUB-ORDER: LENS MANUFACTURING

Sub-order: Lens Generation

- RX Order
- Optical Prescription
- Cutting job
- SF Blank

Sub-order: Coatings

- RX Order
- Optical Prescription
- Coating specifications CC
- Coating specifications CX

SUB-ORDER: ASSEMBLY OPERATIONS

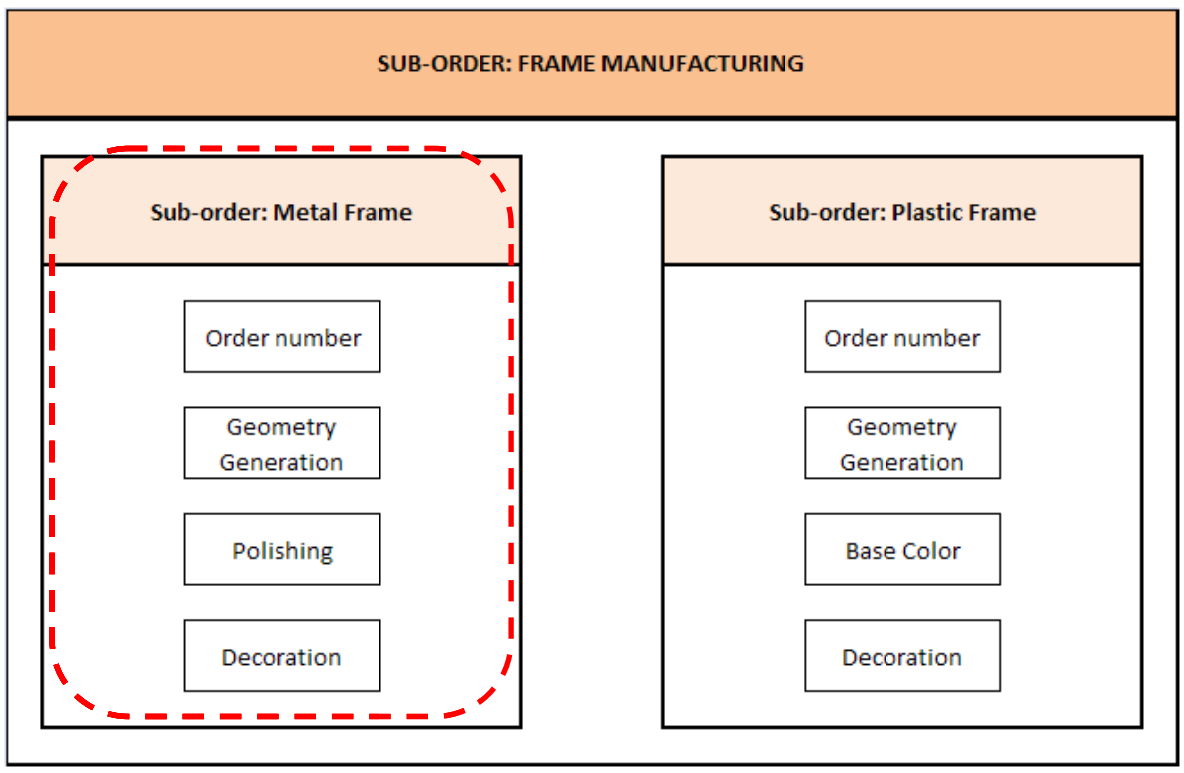
Sub-order: Lens Cutting

- Oder number
- Curve profile

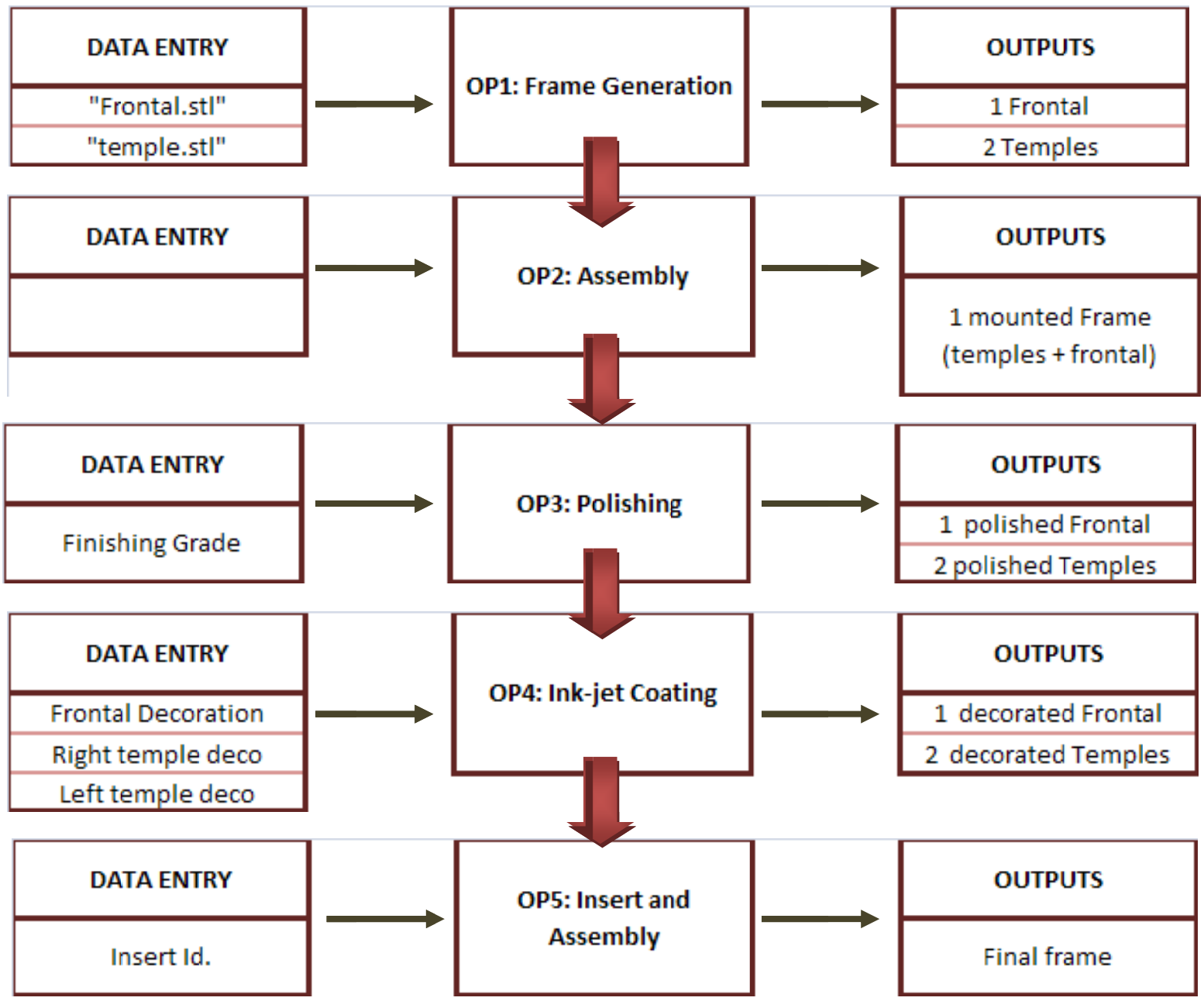
Sub-order: Mounting

- Oder number
- ¿¿???

SUB-ORDER Metal Frame



Flow of information



Content of the Manufacturing order *("Data Entry")*

ORDER NUMBER	SAMPLE FILE	NUMBER	ENCRYPT
Identification Code: Alphanumerical	No	1	Yes

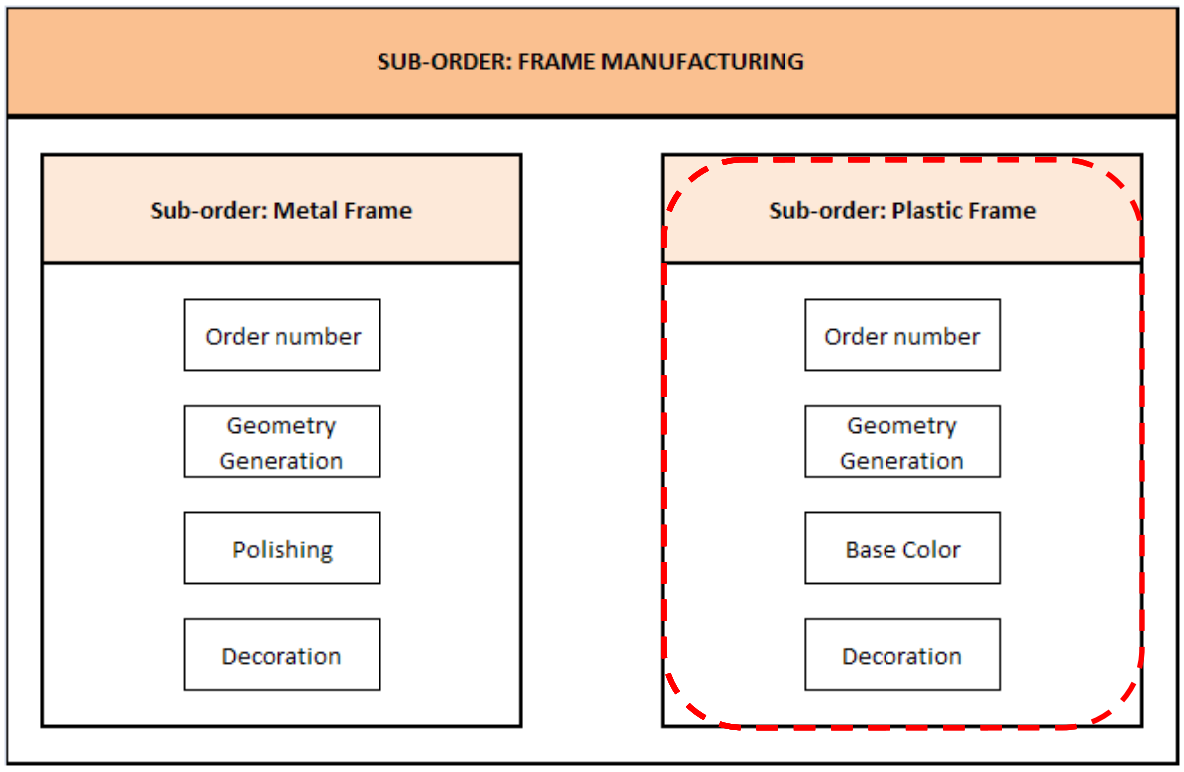
GEOMETRY GENERATION	SAMPLE FILE	NUMBER	ENCRYPT
Frontal 3D Geometry: stl file	Yes: "frontal stl"	1	?
Temple 3D Geometry: stl file	Yes: "temple.stl"	1	?

POLISHING	SAMPLE FILE	NUMBER	ENCRYPT
Finishing Grade: Alphanumerical /Chart / Int Code	No	1	No

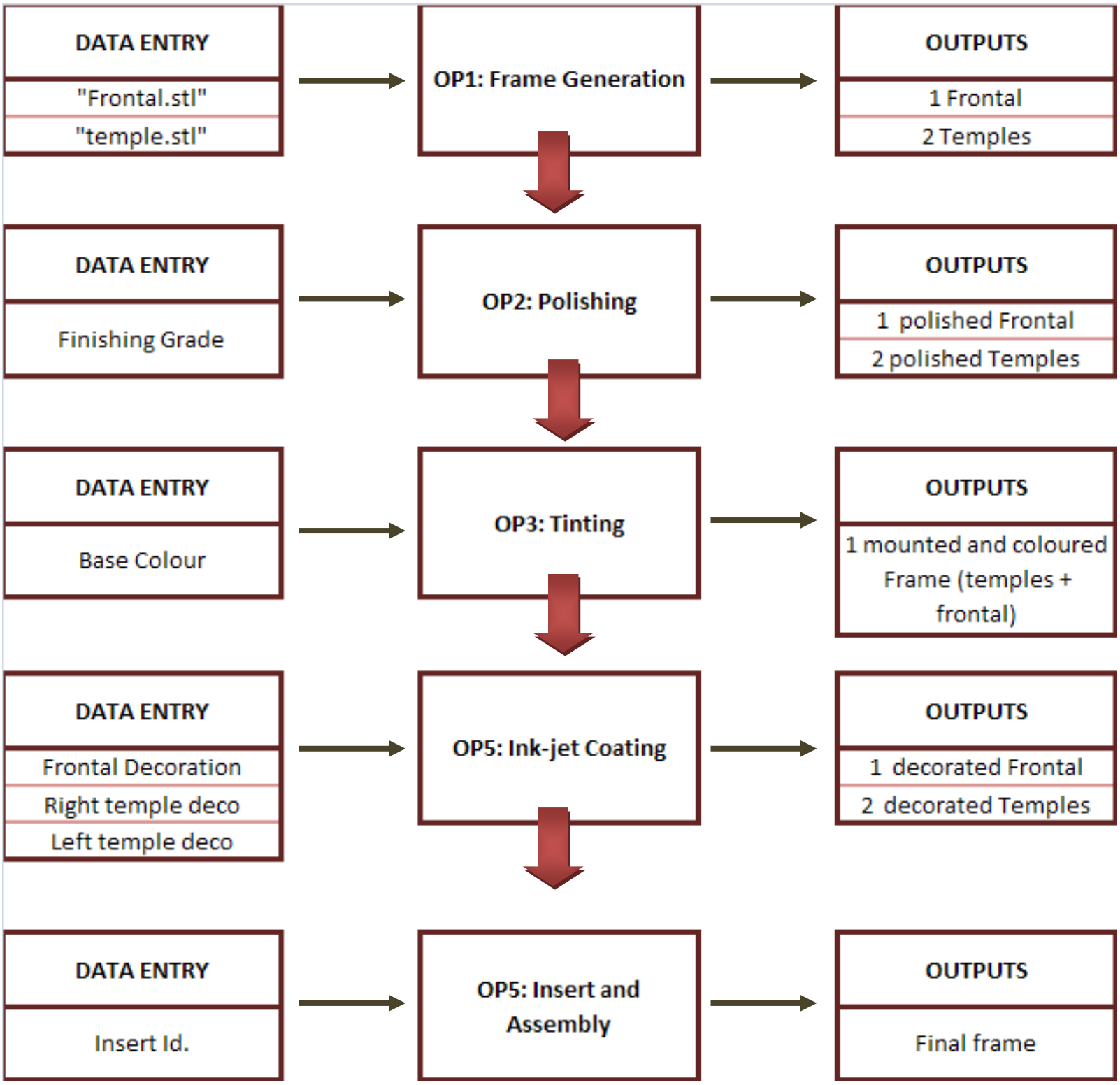
DECORATION	SAMPLE FILE	NUMBER	ENCRYPT
Frontal Decoration: EPS/PDF file	Yes: Frontal Decoration.jpg	1	?
Temple Right decoration: EPS/PDF file	Yes: Temple Decoration.jpg	1	?
Temple Left decoration: EPS/PDF file	Yes: Temple Decoration.jpg	1	?

INSERTS	SAMPLE FILE	NUMBER	ENCRYPT
Inserts: Alphanumerical Code	No	1/2 ??	No

SUB-ORDER Plastic Frame



Flow of information



Content of the Manufacturing order *("Data Entry")*

ORDER NUMBER	SAMPLE FILE	NUMBER	ENCRYPT
Identification Code: Alphanumerical	No	1	Yes

GEOMETRY GENERATION	SAMPLE FILE	NUMBER	ENCRYPT
Frontal 3D Geometry: stl file	Yes: "frontal stl"	1	?
Temple 3D Geometry: stl file	Yes: "temple.stl"	1	?

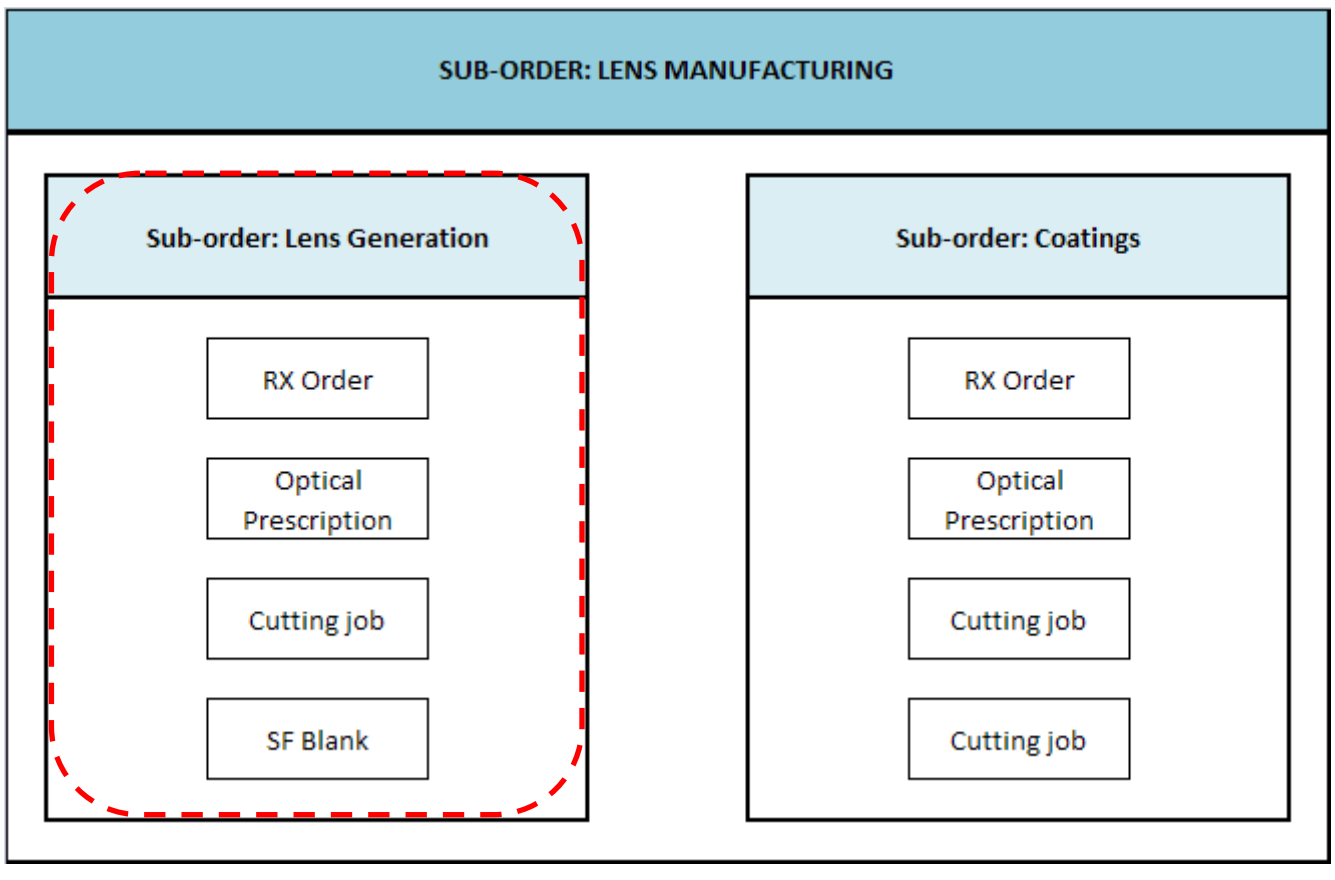
POLISHING	SAMPLE FILE	NUMBER	ENCRYPT
Finishing Grade: Alphanumerical /Chart / Int Code	No	1	No

BASE COLOR	SAMPLE FILE	NUMBER	ENCRYPT
Base Color: Alphanumerical Code	Yes: Ral Color Chart/Palette	1/2??	No

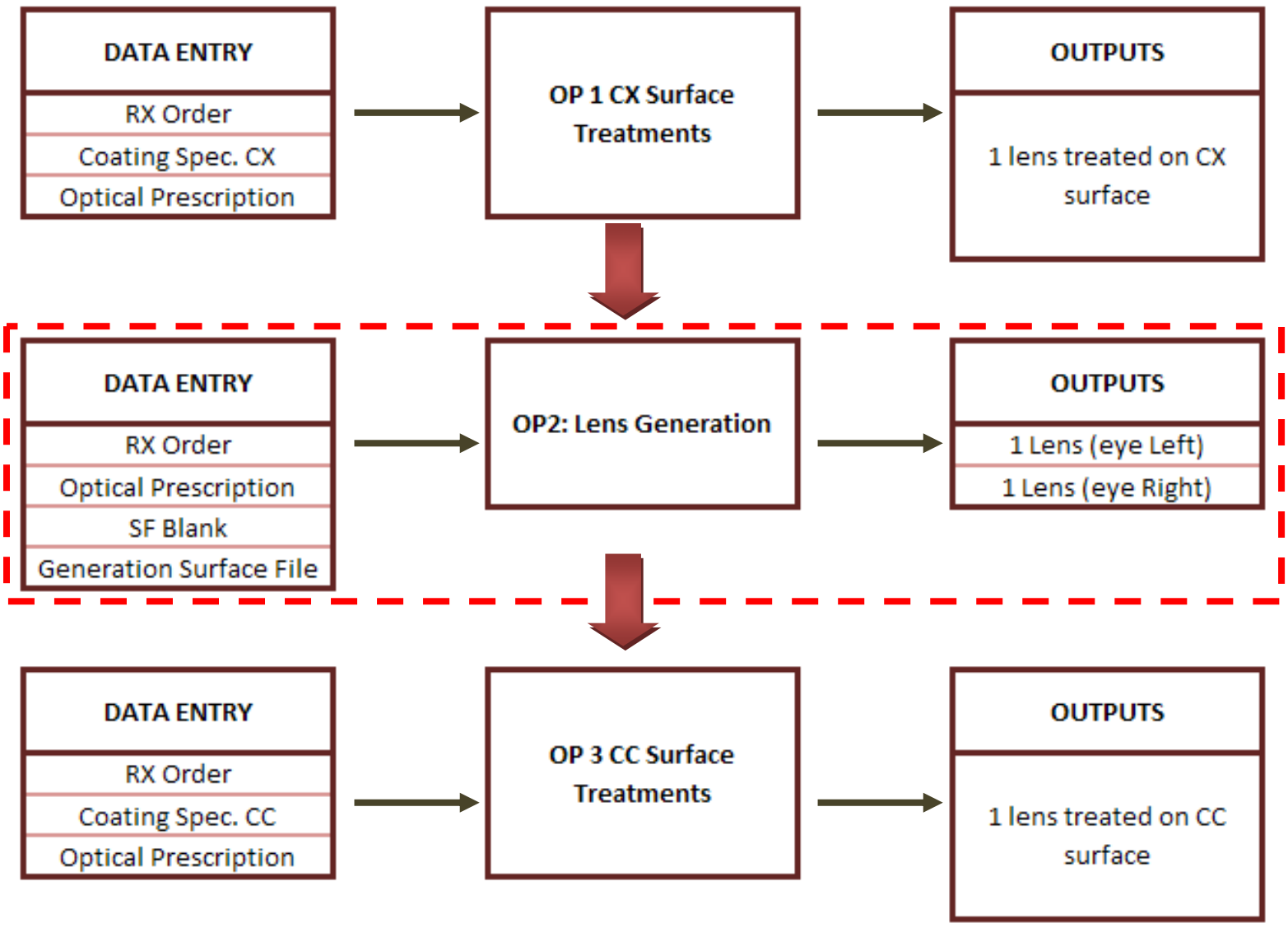
DECORATION	SAMPLE FILE	NUMBER	ENCRYPT
Frontal Decoration: EPS/PDF file	Yes: Frontal Decoration.jpg	1	?
Temple Right decoration: EPS/PDF file	Yes: Temple Decoration.jpg	1	?
Temple Left decoration: EPS/PDF file	Yes: Temple Decoration.jpg	1	?

INSERTS	SAMPLE FILE	NUMBER	ENCRYPT
Inserts: Alphanumerical Code	No	1/2 ??	No

SUB-ORDER Lens Manufacturing



Flow of information



Content of the Manufacturing order *("Data Entry")*

RX Order	SAMPLE FILE	NUMBER	ENCRYPT
Identification Code: Alphanumerical	No	1	Yes

OPTICAL PRESCRIPTION OD	SAMPLE FILE	NUMBER	ENCRYPT
Sphere: Float	No	1	?
Cylinder: Float	No	1	?
Prism: Float	No	1	?
Axis: Float	No	1	?
Addition: Float	No	1	?

OPTICAL PRESCRIPTION OS	SAMPLE FILE	NUMBER	ENCRYPT

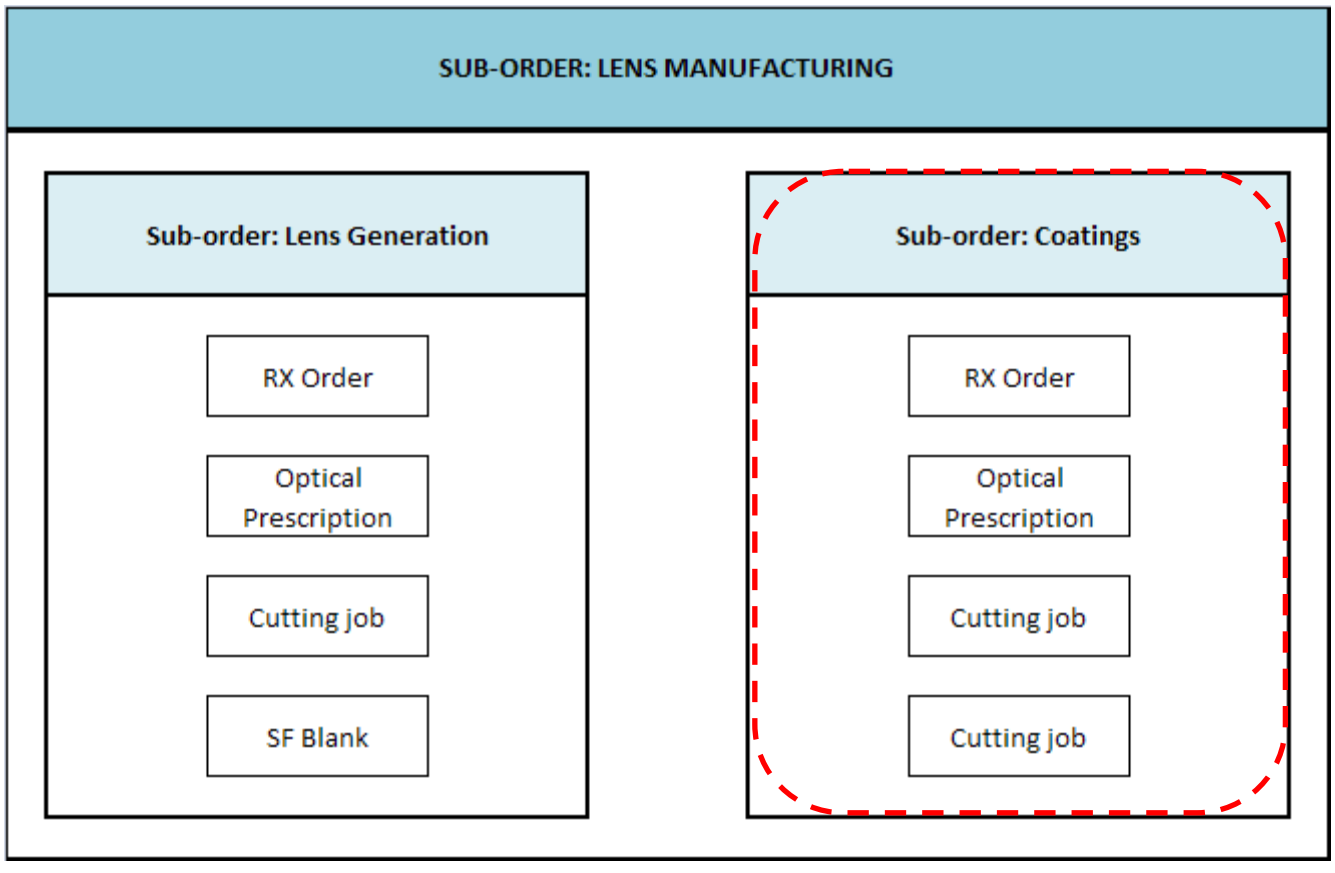
Sphere: Float	No	1	?
Cylinder: Float	No	1	?
Prism: Float	No	1	?
Axis: Float	No	1	?
Addition: Float	No	1	?

SF BLANK	SAMPLE FILE	NUMBER	ENCRYPT
Diameter: Float	No	1	**?**
Base: Float	No	1	**?**
Material: Alphanumerical code	No	1	**?**

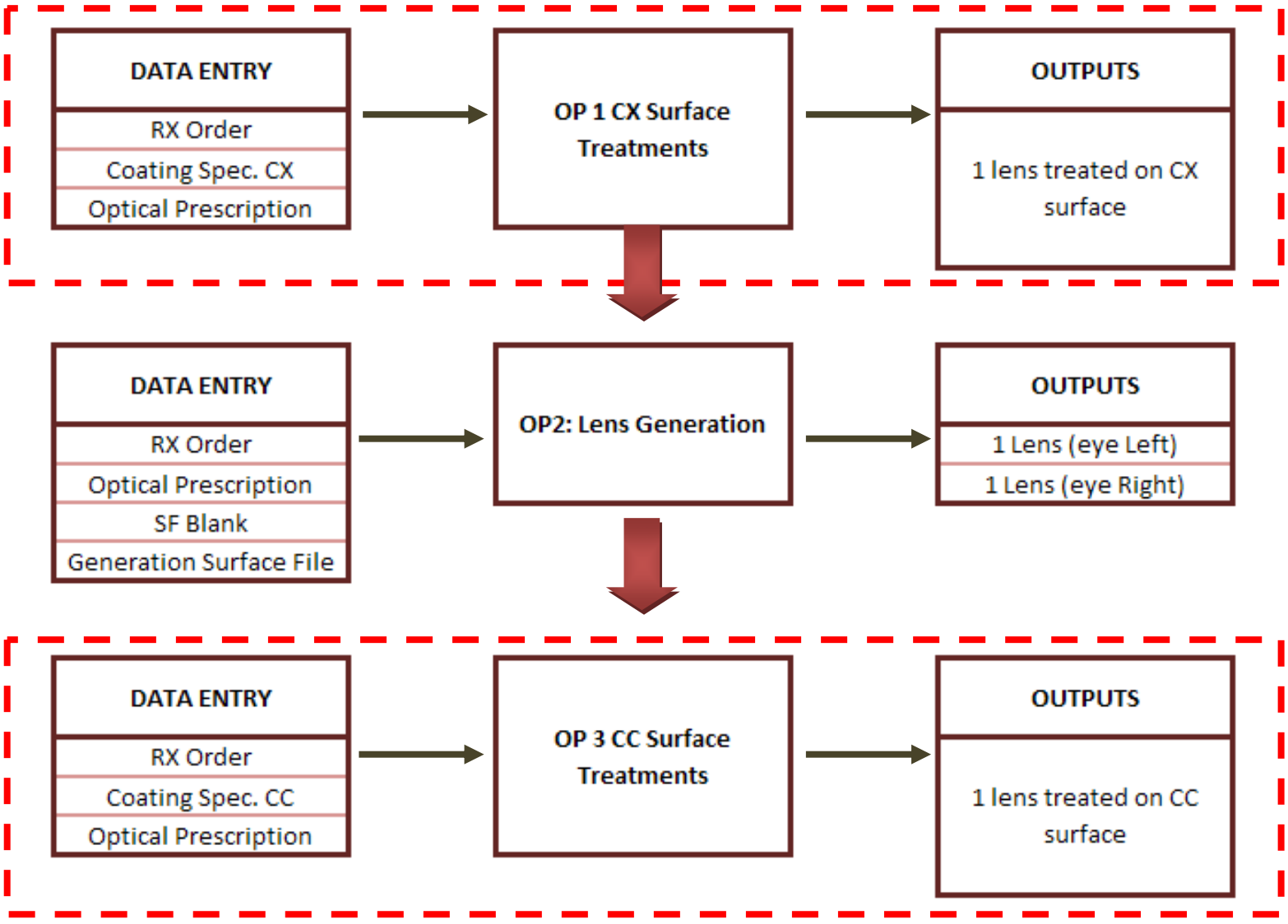
GENERATION FILE OD	SAMPLE FILE	NUMBER	ENCRYPT
Generation surface: Encrypted file (generated by Indo)	No	1	Yes

GENERATION FILE OS	SAMPLE FILE	NUMBER	ENCRYPT
Generation surface: Encrypted file (generated by Indo)	No	1	Yes

SUB-ORDER Lens Manufacturing



Flow of information



Content of the Manufacturing order *("Data Entry")*

RX Order	SAMPLE FILE	NUMBER	ENCRYPT
Identification Code: Alphanumerical	No	1	Yes

COATING SPECIFICATIONS CX	SAMPLE FILE	NUMBER	ENCRYPT
OD Recipe Name: Int	No	1	?
OI Recipe Name: Int	No	1	?

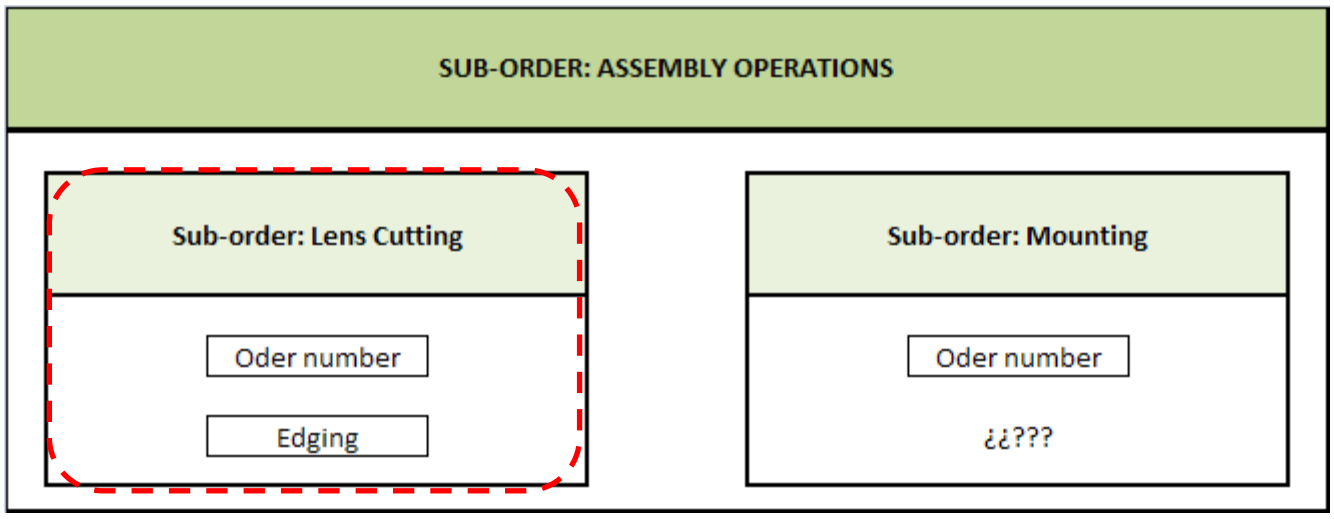
COATING SPECIFICATIONS CC	SAMPLE FILE	NUMBER	ENCRYPT
OD Recipe Name: Int	No	1	?

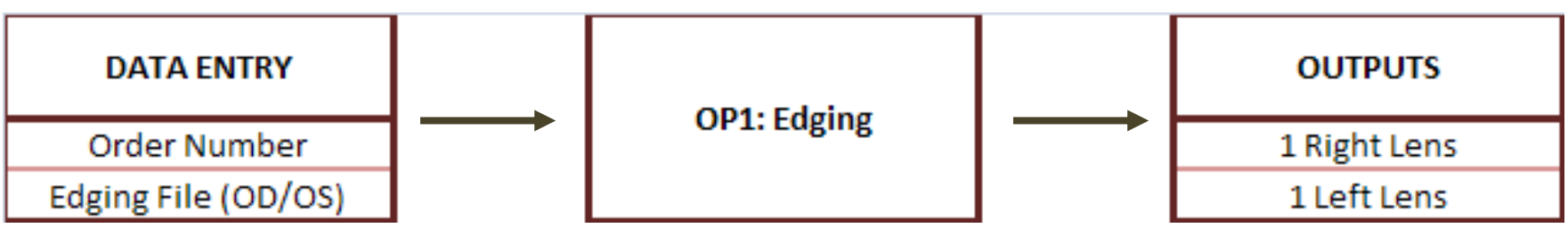
OI Recipe Name: Int	No	1	?

OPTICAL PRESCRIPTION OD	SAMPLE FILE	NUMBER	ENCRYPT
Sphere: Float	No	1	?
Cylinder: Float	No	1	?
Prism: Float	No	1	?
Axis: Float	No	1	?
Addition: Float	No	1	?

OPTICAL PRESCRIPTION OS	SAMPLE FILE	NUMBER	ENCRYPT
Sphere: Float	No	1	?
Cylinder: Float	No	1	?
Prism: Float	No	1	?
Axis: Float	No	1	?
Addition: Float	No	1	?

SUB-ORDER Assembly Operations





Content of the Manufacturing order *(“Data Entry”)*

Order Number	SAMPLE FILE	NUMBER	ENCRYPT
Identification Code: Alphanumerical	No	1	Yes

Edging	SAMPLE FILE	NUMBER	ENCRYPT
OD Edging File: ¿¿¿¿¿??????	No	1	Yes
OS Edging File: ¿¿¿¿¿??????	No	1	Yes