

› **CUSTOM COORDINATE SYSTEM METHOD DESIRE**
D008 2023FPL/INK 29 | R.P. EBELING

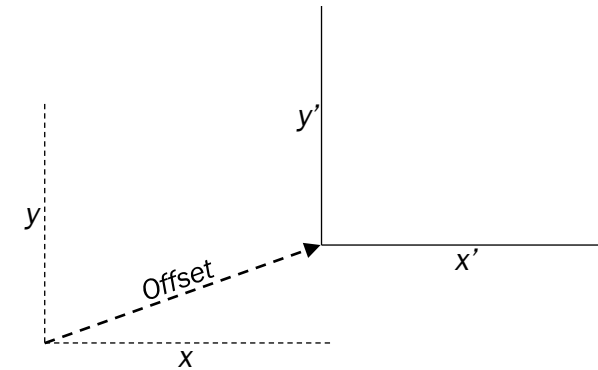
05 June 2023

› INTRODUCTION

- › It is very useful to be able to use a custom coordinate system when performing SEM imaging or EDX analysis on a sample.
- › A custom coordinate system can be used to:
 - › Find back image or analysis locations used in a previous SEM session.
 - › Set a chosen location to become the new origin (0, 0) or any other custom value, to make the navigation and imaging easier.
 - › Mimic a coordinate system of another experimental setup or analysis tool (e.g. XPS) to find back features or locations of interest which were observed or targeted in these setups/tools.
- › It is assumed that setting up a custom coordinate system involves setting coordinates in the SEM stage x and y axis, with a fixed rotation and tilt angle.
 - › If the SEM has the ability to define more complex coordinate systems, possibly also involving the rotation and tilt of the stage, this is considered positive.
- › Setting up a custom coordinate system is assumed to be done in several ways:
 - › Based on one position
 - › Based on two positions
 - › Based on three positions
 - › This will be elaborated in the following slides.

› CUSTOM COORDINATE SYSTEM BASED ON ONE POSITION

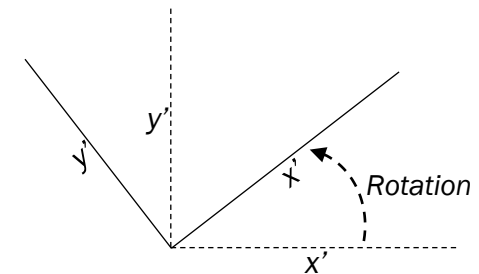
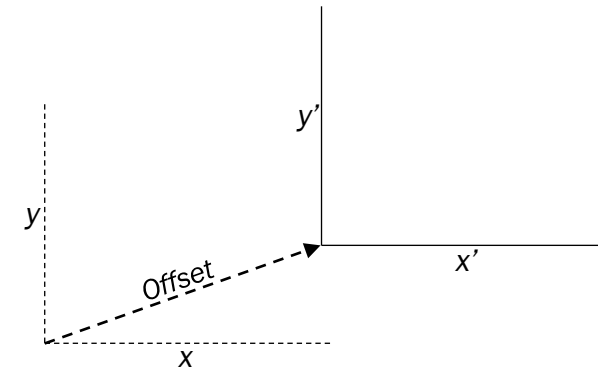
- › A custom coordinate system based on one position changes one position of the SEM stage (X, Y) to a freely chosen coordinate (X', Y').
- › This results in a coordinate system (x', y') with an offset with respect to the original SEM stage coordinate system (x, y).
- › The (x', y') coordinate system is an orthonormal system, with both axes at 90 degrees w.r.t. each other and the same scale for both axes. Also the scale is the same as for the original coordinate system (x, y).
- › There is no rotation angle between the newly defined coordinate system and the original SEM stage coordinate system.



Position 1

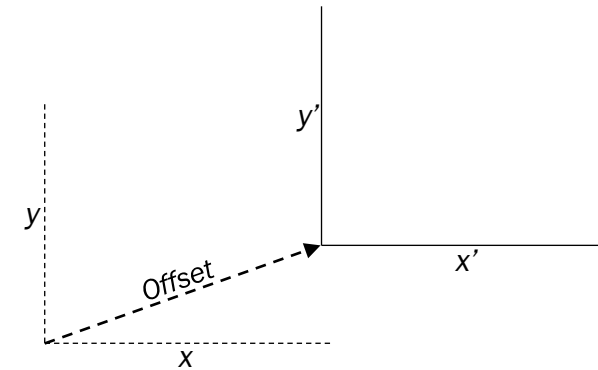
› CUSTOM COORDINATE SYSTEM BASED ON TWO POSITIONS

- › A custom coordinate system based on two positions gives more freedom to the operator.
- › Two locations of the SEM stage will obtain new freely chosen coordinates.
- › This results in a coordinate system (x', y') with an offset and/or a rotation with respect to the original SEM stage coordinate system (x, y) .
- › The (x', y') coordinate system is an orthonormal system, with both axes at 90 degrees w.r.t. each other and the same scale for both axes.
- › The scale of the (x', y') coordinate system can be different than the scale of the original (x, y) coordinate system.

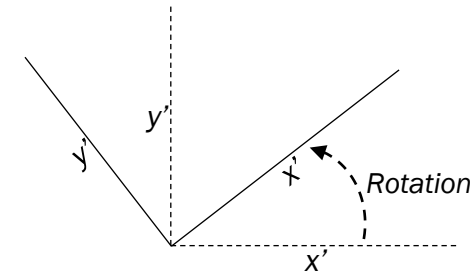


› CUSTOM COORDINATE SYSTEM BASED ON THREE POSITIONS

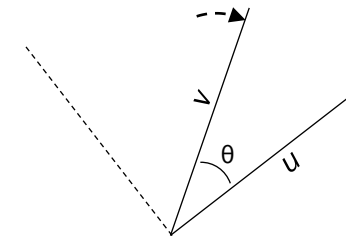
- › A custom coordinate system based on three positions gives most freedom to the operator.
- › Three locations on the SEM stage will receive new freely chosen coordinates.
- › This results in a coordinate system (u, v) with one or more of the following characteristics:
 - › An offset with respect to the original SEM stage coordinate system (x, y)
 - › A rotation angle between the new u axis and the original x axis.
 - › Each new axis may have a different scale w.r.t. each other and/or w.r.t. the original x and y axes.
 - › There can be an angle θ between the u and v axis which is not equal to 90 degrees.



Position 1



Position 2



Position 3

› REQUIREMENT CUSTOM COORDINATE SYSTEM

- › The SEM system should be able to set up a custom coordinate system, as stated in requirement R-6000-080.
 - › 50 points are awarded if the SEM can do a custom coordinate system with one position
 - › 400 points are awarded if the SEM can do a custom coordinate system with two positions
 - › 500 points are awarded if the SEM can do a custom coordinate system with two positions

» **THANK YOU FOR
YOUR TIME**

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