High Density contour lines and Soundings for Navigation

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Overview

- SevenCs/Chartworld, a quick overview
- HD-ENCs
- Test data from LINZ
- ENC Bathymetry Plotter
- 7Cs Analyzer

SWPHC19 Presentation SevenCs Hamburg

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SevenCs / ChartWorld

A quick overview



SevenCs / ChartWorld A quick overview

- Founded in 1992 in Hamburg, Germany
- SevenCs belongs to ChartWorld
 International group of companies
- Digital Chart Agent, ECDIS Manufacturer, VAR, ENC and SENC distribution services
- Products and Services related to ENC / ECDIS
- Long term member of IHO Working Groups



SevenCs / ChartWorld Products and Services

- Chart Distribution (incl. Nautical Publications)
- Solutions for Voyage Planning
- Fleet Monitoring
- ECDIS Kernel software
- Web based solutions for electronic charts
- Chart Production/Validation Software
- ECDIS and Navigation Software (ECS, PPU)
- Complementary data services (satellite derived shoals, T&P, Nav Areas)





High Density ENCs



HD-ENCs

- High Density ENC Production and Maintenance Guidance - S-65 Annex A, Edition 1
- Higher Density Contour lines and Soundings
- Allows users such as Port Operators to optimize and maximize vessel operations
- Available of high-resolution bathymetry data sets
- Ready to be used on existing ECDIS
- Ease of creation of HD-ENCs



HD-ENC Production LINZ



HD-ENC and LINZ

- "hdENC Project Documentation" Draft provided by LINZ were followed as far as practical
- Courtesy of LINZ
- Key focus in Production of hdENC:
 - Shoal biased surface smoothing
 - Shoal feature to be displayed
 - Usage of contour interval @ 0.5m and sounding spacing @30m
 - Avoidance of human intervention where possible
 - Automate sounding selection





ENC Bathymetry Plotter

- ENC display
- Modelling tool for fune-tuning of results
- Automated contour generation for nautical charts
- Advanced sounding selection
- Generalization of bathymetric surface
- Regular and High Density ENCs
- Input formats
 - xyz, ASCII Grid
 - Geo Tiff
 - BAG
 - S-102



Processing of the provided data (I)

1. Importing of Source Data

- XYZ dataset
- Coordinate reference system

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Processing of the provided data (II)

2. Gridding

- Consistency of density of dataset
- Any "gaps" in dataset
- Interpolation

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|---------------------------------|--|
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Processing of the provided data (III)

3. Generalization

- Creation of "drape"
- Configure generalization and smoothing parameters at varying water depths





Processing of the provided data (IV)

- 4. Creation of S-57 DEPCNT and DEPARE
- Sounding selection according to required parameters
 - Source file
 - Variable density
 - Distance to contours
 - Definition of small areas

| Calculate Soundings | | | | | | | × |
|-----------------------------------|--|--------|-----------|-------------|----------------|-----------|---|
| Source - Selected Soundings: | Combined generalised 0.5m patched_20180802 | | | | | | |
| Source - Underwater Obstructions: | | | | | | | - |
| Scale 1: | le 1: 2000 | | | | | | |
| Remove Previous Soundings: | | | | | | | |
| Profile: | HD ENC 0 | | | | | | - |
| Profile Settings | | | | | | | |
| Interva | | | Take | Over from C | Contour Levels | | |
| Sounding Intervals and Spacing | | from | | Che | ut (mm) | World (m) | 7 |
| | | -00 | +00 | 15 | | 30 | _ |
| | | | | | | | |
| | | Unit (| hart [mm] | <-> | Unit W | /orld [m] | |
| Distance to Co | 1 | 2 | 2 | | | | |
| Distance to Underwater C | 20 | 40 | 40 | | | | |
| Small Areas - Size | 50 | 100 | 100 | | | | |
| | | | | | | | - |



Processing of the provided data (V)

- 5. Validation of HD ENC and addition of other Chart Informaiton
- Validation of HD ENC bathymetry
 - All regular ENC validation checks are applicable
 - 7Cs Analyzer has additional HD ENC checks
- Other chart information can be incorporated with standard chart production tools
 - e.g. ENC Designer





HD-ENC Validation Checks



Validation of HD ENCs

- High Density (HD) ENC
 Production and Maintenance Guidance
 (Edition 1.0.0, January 2020)
- 7Cs Analyzer includes dedicated checks for HD cells:
 - 'HD ENC' string is to be included in the comment [COMT] subfield
 - does dataset have contours of \leq 1 m?
 - CATZOC A1 or A2?
 - Check for appropriate contour density
 - Check whether HD ENC is spelled correctly



Test findings LINZ dataset

- Data was successfully incorporated
- Ideal set of parameters for smoothing, contour generation, and sounding selection
- Achieve consistency
- Validation with 7Cs Analyzer
 - Bathymetry feastures properly attributed
 - No topology errors -> especially challenging in dense contours
- Cases wherby errors were highlighted
 - two coincident soundings were reported
 - Few cases where sounding value = DRVAL 1 (see image)





Thank You

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