Tank with eliptic ends - volume calculation
Tank s eliptickými dny - výpočet objemu

$R := 1400$ Tank Radius - Polomer nadrze (mm)

$L := 12500$ Tank lenght - Delka nadrze (mm)

$v := 800$ Round end height - Vyska klenuti (mm)

$h := 0, 140 .. 2800$ Level - Hladina (mm)

$$hproc_h := h \cdot \frac{100}{(2 \cdot R)}$$

Cylindric part volume calculation
Vypocet objemu valcove casti nadrze

$$alfa_h := 2 \cdot acos\left[\frac{(R - h)}{R}\right]$$

$$CylVol_h := 0.5 \cdot L \cdot R^2 \cdot \left(alfa_h - \sin\left(alfa_h\right)\right) \cdot 10^{-9}$$

Eliptic ends volume calculation
Vypocet objemu eliptických vik

$B_h := \sqrt{R^2 - (R - h)^2}$ Integration limit calculation
Vypocet integracni meze

Eliptic ends volume calculation in the range 0 - 50 %
Vypocet objemu eliptických vik pro 0 - 50 %

$$VikLow_h := 4 \cdot v \cdot \int_{R-h}^{R} \int_{0}^{B_h} \sqrt{1 - \frac{x^2}{R^2} - \frac{y^2}{R^2}}\, dx\, dy$$

Spheric ends volume calculation in the range 50 - 100 %
Vypocet objemu kulových vik pro 50 - 100 %

$$VikHigh_h := \frac{4}{3} \cdot \pi \cdot R^2 \cdot v - 4 \cdot v \cdot \int_{h-R}^{R} \int_{0}^{B_h} \sqrt{1 - \frac{x^2}{R^2} - \frac{y^2}{R^2}}\, dx\, dy$$

$$A\_Vik_h := if\left(R > h, 10^{-9} \cdot Re\left(VikLow_h\right), 10^{-9} \cdot Re\left(VikHigh_h\right)\right)$$

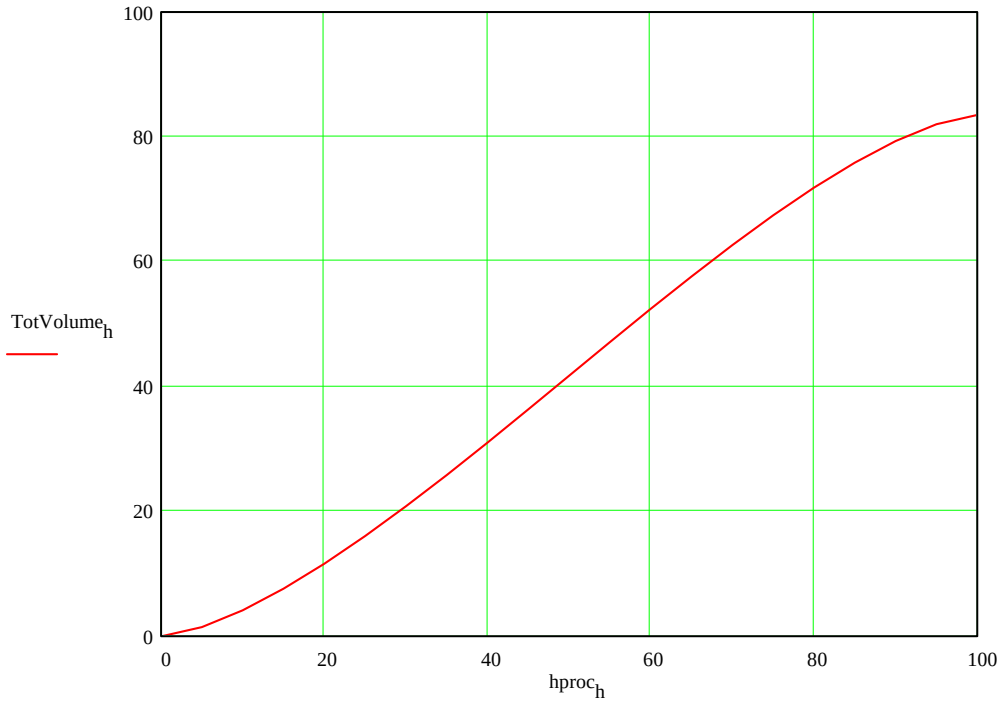
Total volume calculation (cylindric part + eliptic ends parts)
Vypocet celkoveho objemu (valcová cast + objem vik)

$$TotVolume_h := \left(A\_Vik_h + CylVol_h\right)$$

Results - Vysledky

Level Hladina (mm)	Level Hladina (%)	Volume Objem	Cylindric part volume Objem válcové části	Spheric part volume Objem vik
h	$hproc_h$	$TotVolume_h$	$CylVol_h$	A_Vik_h
0	0	0	0	0
140	5	1.486	1.439	0.048
280	10	4.19	4.006	0.184
420	15	7.639	7.24	0.399
560	20	11.642	10.959	0.683
700	25	16.074	15.048	1.026
840	30	20.839	19.42	1.419
980	35	25.859	24.008	1.85
1120	40	31.062	28.75	2.312
1260	45	36.386	33.593	2.793
1400	50	41.769	38.485	3.284
1540	55	47.151	43.376	3.775
1680	60	52.475	48.219	4.256
1820	65	57.679	52.961	4.718
1960	70	62.698	57.549	5.149
2100	75	67.463	61.921	5.542
2240	80	71.895	66.01	5.885
2380	85	75.898	69.729	6.169
2520	90	79.347	72.963	6.384
2660	95	82.051	75.53	6.52
2800	100	83.537	76.969	6.568

Graf 1
Total volume as a function of actual level
Celkovy objem jako funkce výšky hladiny



Graf 2
Spheric part volume as function of actual level
Objem vik jako funkce výšky hladiny