

Optimization of Turbine Disk

Purpose:

To minimize Weight of Turbine Disk

Problem features:

Objective: Weight of Turbine Disk

Variable parameters: Geometry of Turbine Disk

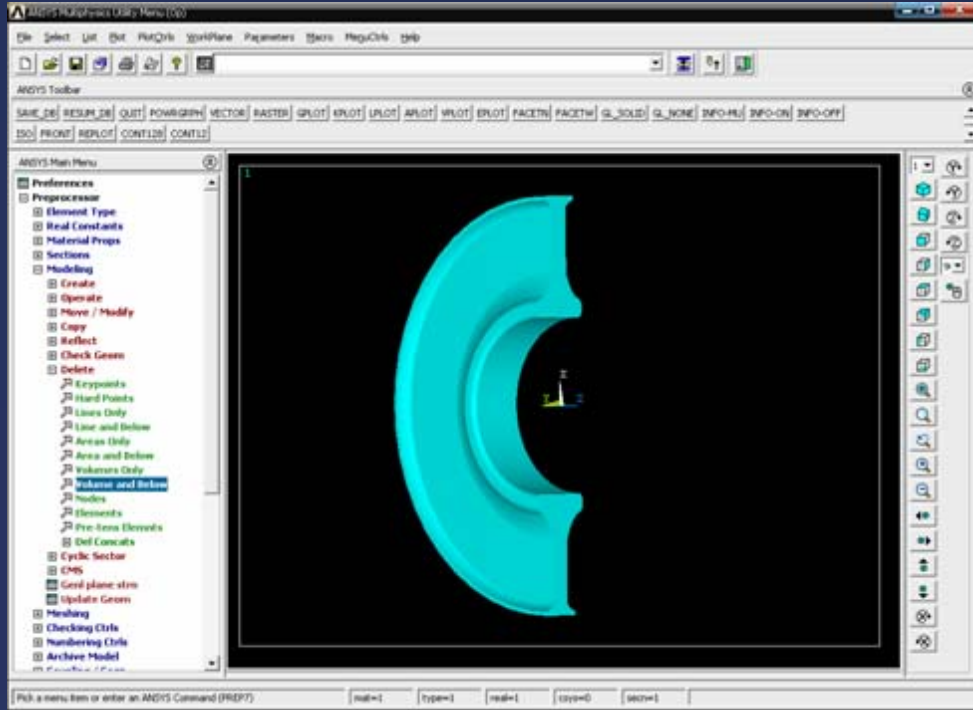
Constraints: Stress

Analysis Codes: ANSYS

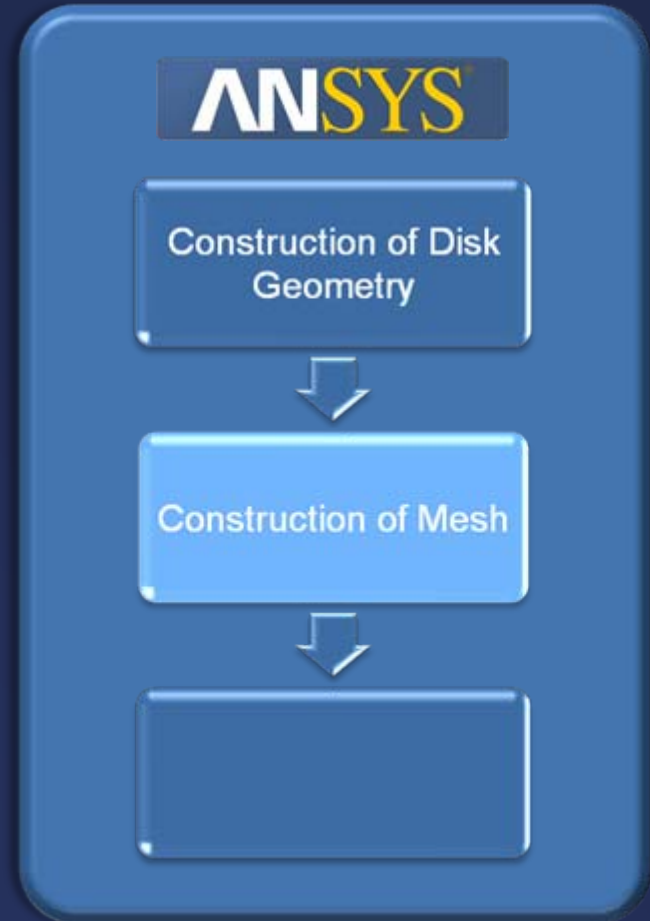
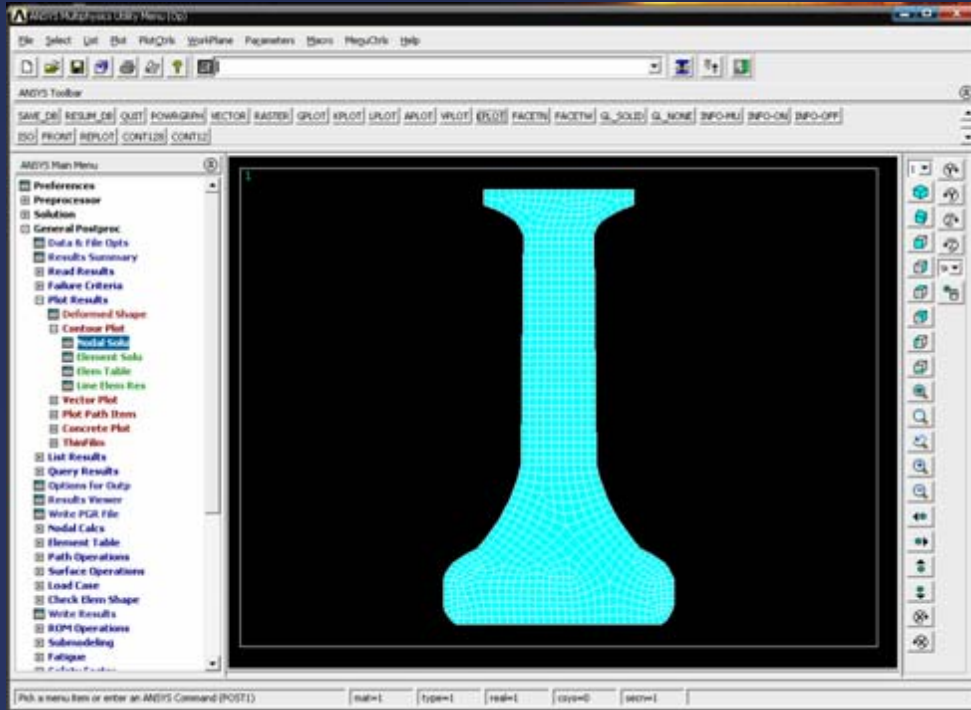
IOSO NM



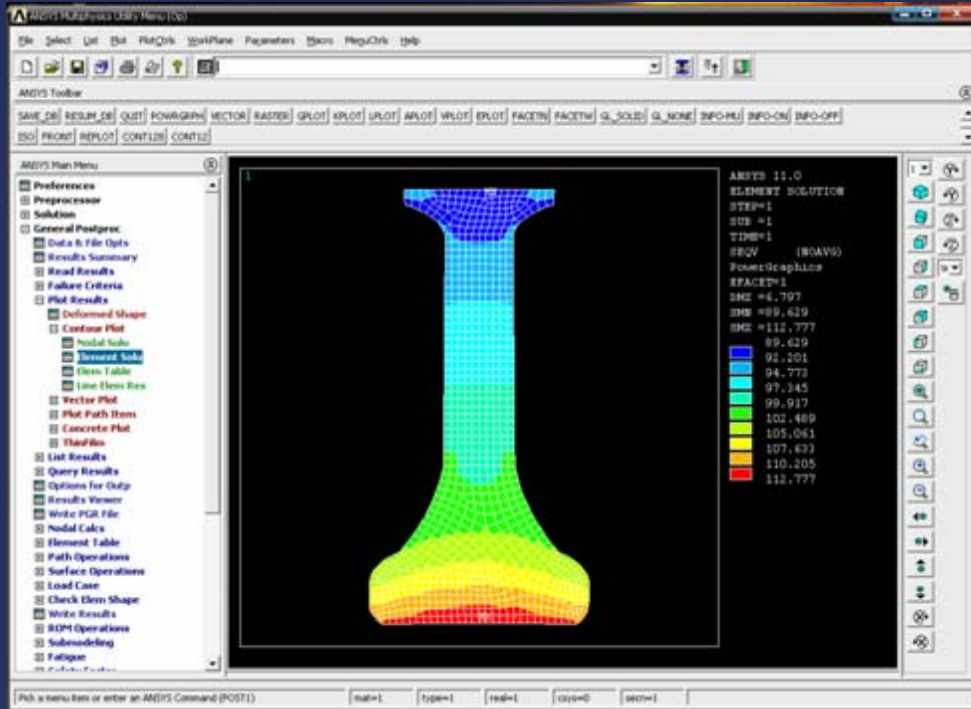
Optimization of Turbine Disk



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ANSYS

Construction of Disk
Geometry



Construction of Mesh



Stress Analysis

Optimization of Turbine Disk

IOSO

Design Variables



Algorithm of Optimization



Moving strategy



Building of approximation function

Project [задача: disk] - IOSO NM 1.1.0

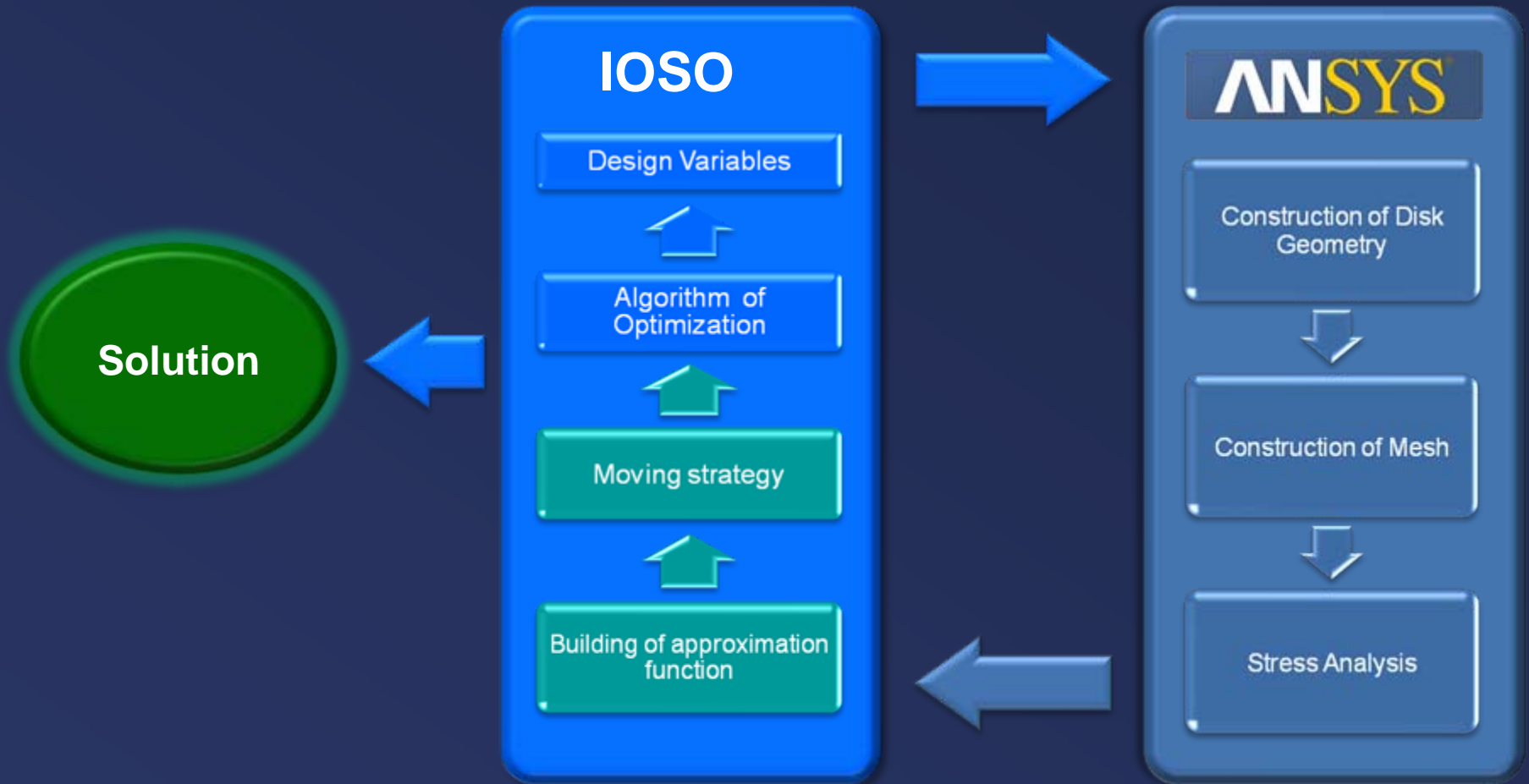
Файл Плата Вид Формат Данные Проект Расчет Справка

Проект с автоматическим обменом данными

Задан проект

| Входные параметры | | Выходные параметры | | Счетные параметры | | Начальные точки | | Алгоритм | | Иные | |
|-------------------|------|--------------------|-------------|-------------------|--|-----------------|--|----------|--|------|--|
| Нижняя граница | | Верхняя граница | | | | | | | | | |
| Nr | ID | Имя | Тип | Определяет | | | | | | | |
| 1 | IV1 | h67 | Независимый | 3/IV1:5 | | | | | | | |
| 2 | IV2 | h76 | Независимый | 4/IV2:10 | | | | | | | |
| 3 | IV3 | h65 | Независимый | 10/IV3:51 | | | | | | | |
| 4 | IV4 | h54 | Независимый | 6/IV4:21 | | | | | | | |
| 5 | IV5 | h43 | Независимый | 4/IV5:14 | | | | | | | |
| 6 | IV6 | h32 | Независимый | 2/IV6:5 | | | | | | | |
| 7 | IV7 | h21 | Независимый | 2/IV7:4 | | | | | | | |
| 8 | IV8 | h5 | Независимый | 6/IV8:14 | | | | | | | |
| 9 | IV9 | h5 | Независимый | 14/IV9:20 | | | | | | | |
| 10 | IV10 | h3 | Независимый | 40/IV10:58 | | | | | | | |
| 11 | IV11 | h43 | Независимый | 4/IV11:13 | | | | | | | |
| 12 | IV12 | h21 | Независимый | 4/IV12:8 | | | | | | | |

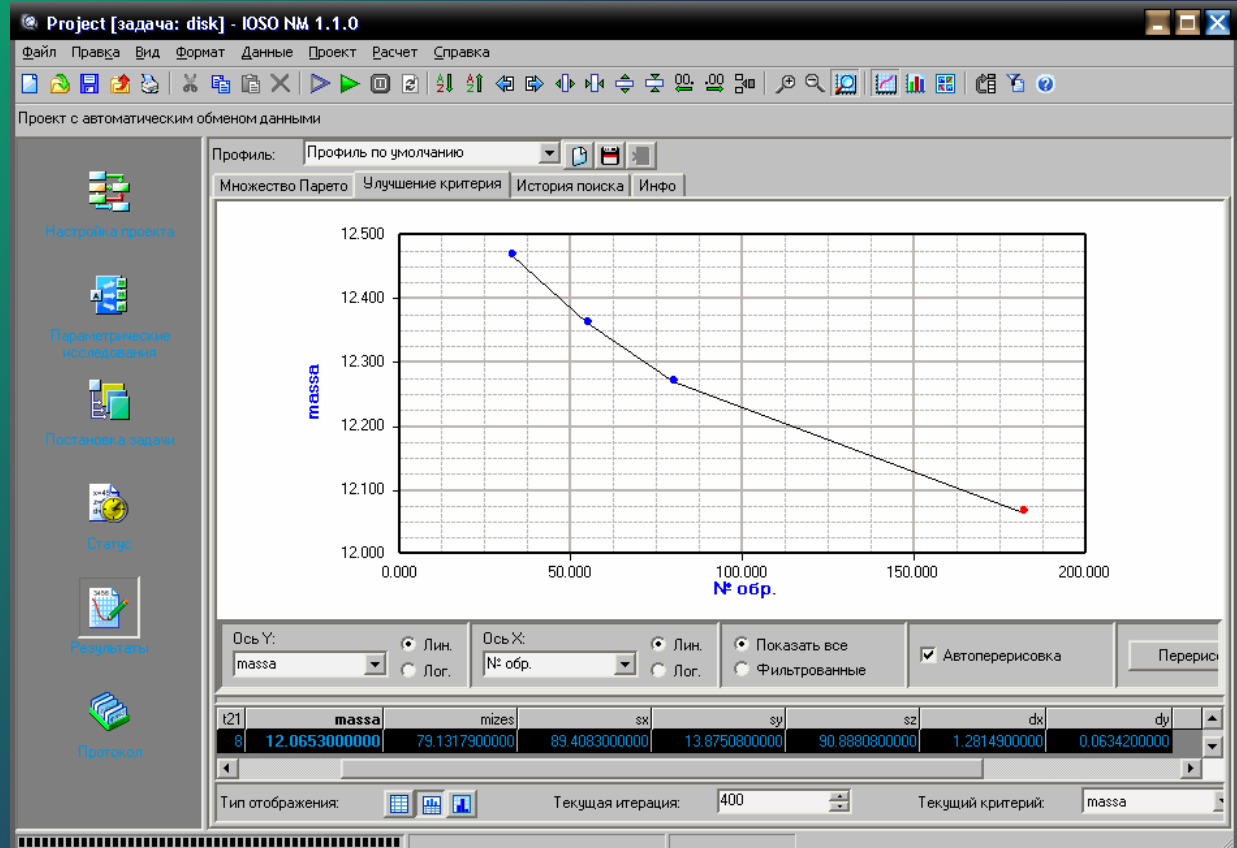
Optimization of Turbine Disk



Optimization of Turbine Disk

Result

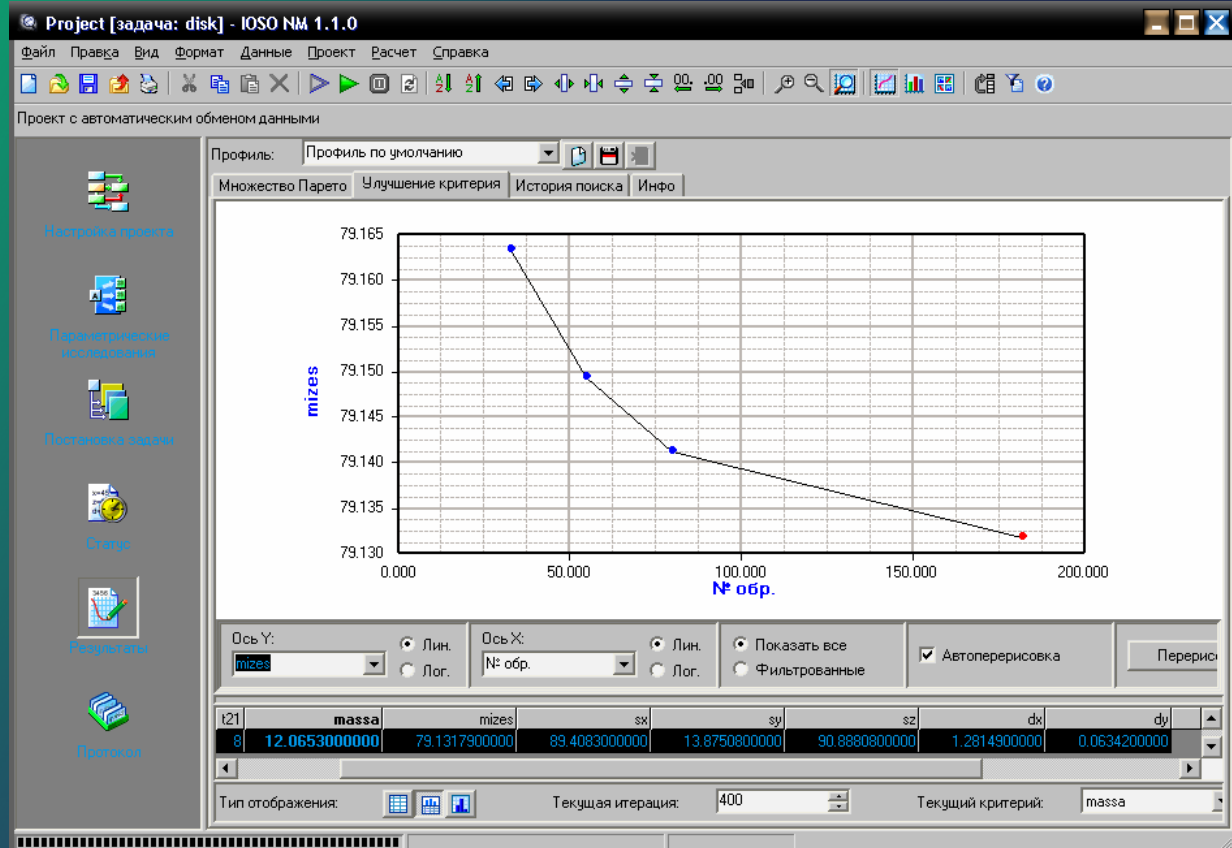
Weight



Optimization of Turbine Disk

Result

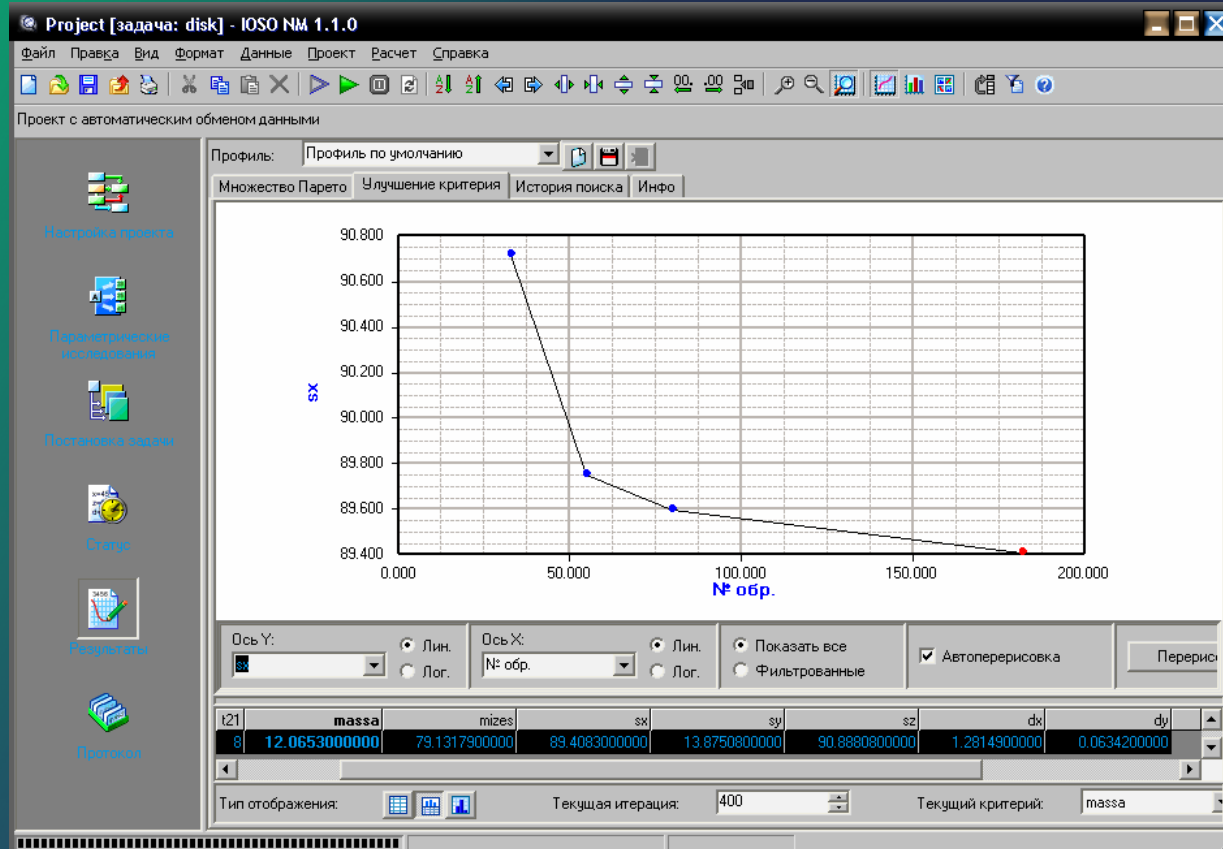
Par mizes



Optimization of Turbine Disk

Result

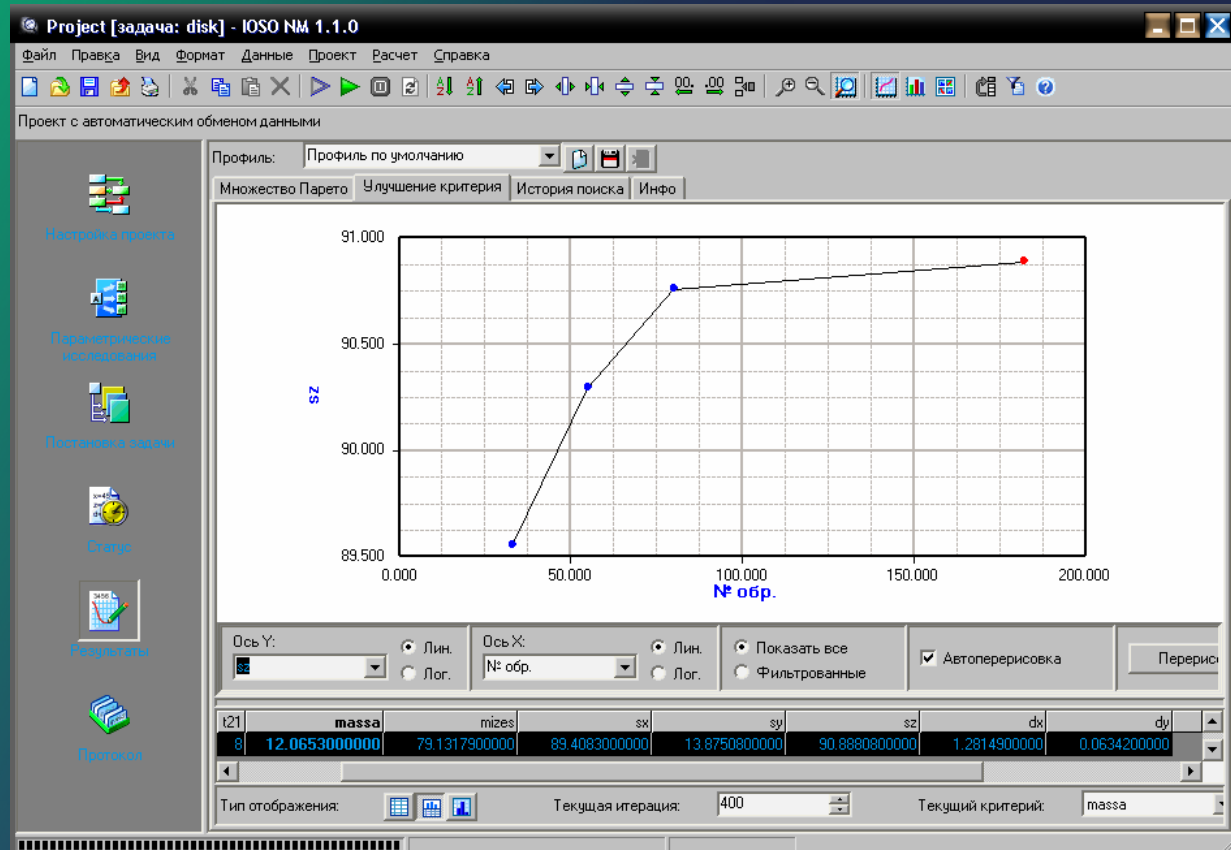
Sx



Optimization of Turbine Disk

Result

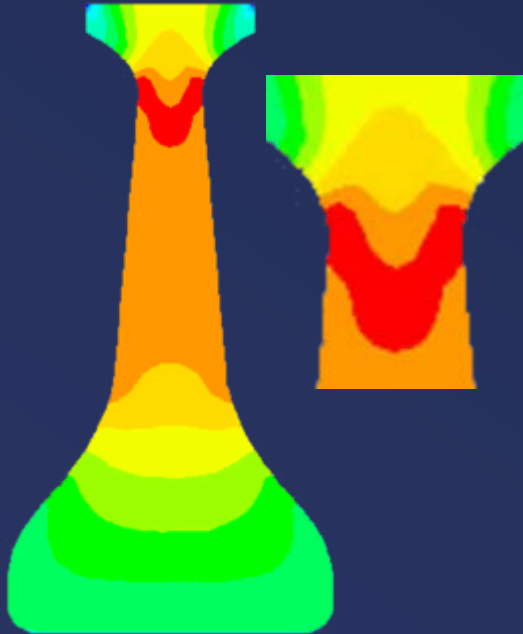
Sz



Optimization of Turbine Disk

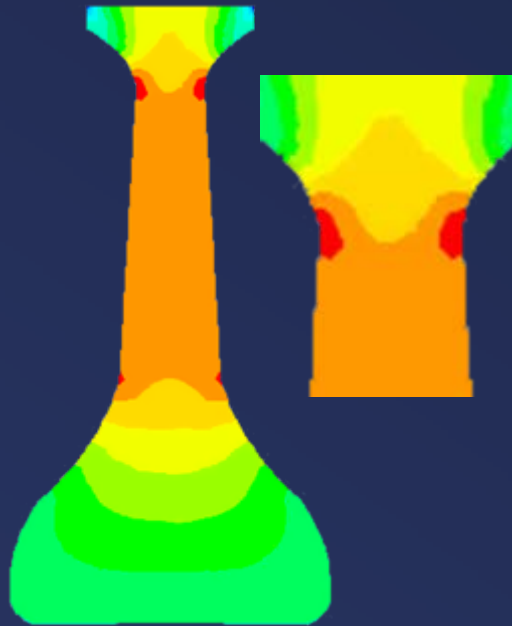
Distribution of Stress

Initial



Weight = 12,64 κΓ
 $\sigma_r = 91,48 \text{ κΓ/ΜΜ}^2$
 $\sigma_t = 87,80 \text{ κΓ/ΜΜ}^2$

Current



Weight = 12,27 κΓ
 $\sigma_r = 87,97 \text{ κΓ/ΜΜ}^2$
 $\sigma_t = 90,75 \text{ κΓ/ΜΜ}^2$

Optimized



Weight = 12,07 κΓ
 $\sigma_r = 87,77 \text{ κΓ/ΜΜ}^2$
 $\sigma_t = 90,88 \text{ κΓ/ΜΜ}^2$